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NEW TECHNOLOGIES DEVELOPMENT AND APPLICATION
NOVE TEHNOLOGIJE RAZVOJ I PRIMJENA

BOOK OF ABSTRACTS
KNJIGA SAŽETAKA

Editors: Isak Karabegović, Ahmed Kovačević, Sead Pašić, Sadko Mandžuka



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”NT-2022“

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NOVE TEHNOLOGIJE - RAZVOJ I PRIMJENA

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BOOK OF ABSTRACTS – KNJIGA SAŽETAKA

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TEHNOLOŠKI PARK “INTERA” U MOSTARU

NEW TECHNOLOGIES - DEVELOPMENT AND APPLICATION „NT-2022“

Word of the organizers

We are aware of a different problems that the contamporary economy suffer. Research capacities are limited and infrastructure is poorly developed. Companies fall in using the contemporary knowledge and specialization, rarely promote innovation and commercialization, poorly manage research facilities and technology transfer. All this ultimately leads to their inadequate capacities to meet market demands, as well as lagging in a regional development and a low competitiveness. The organizers are going to prepare the series of free seminars, conferences and round tables for the economy, small and medium enterprises, with the goal to introduce new capacities and the possibilities of the technology development. Thus the organizers want to encourage technology transfer, development projects and innovative work, as well as develop awareness of the importance of intellectual property protection. In a product development, from concept to its production, a key element in achieving market success, is time. With ever stringent market requirements, the trends in increasing product individualization (personalization) become more obvious, and there are fewer products of mass consumption. Alternative solutions in production are increasingly being used to meet such conditions in the development and production. The organizers' intention is to introduce new methods and technologies to our market, as well as to inform the engineers, designers, contractors and investors about the possibilities and advantages of new methods and technologies, as well as products in their technical and financial form. The aim is to bring closer new 21st century technologies, that are in use in developed countries, to professional public in above mentioned conferences, seminars and round tables. With their development trends and achievements, new technologies can contribute to the development of both small and medium-sized enterprises and large companies, and thus to develop the local community in which they operate. The goals of conferences, seminars and round tables is that manufacturing companies as well as research and development institutions become more familiar with the latest technical and technological achievements in the field of new technologies used in the 21st century.

Sarajevo, 12th May 2022 *THE ORGANIZERS*

NOVE TEHNOLOGIJE - RAZVOJ I PRIMJENA „NT-2022“

Uvodna riječ organizatora

Uočili smo veliki problem današnjeg gospodarstva. Istraživački su kapaciteti ograničeni, infrastruktura slabo razvijena, kompanije zaostaju za suvremenim znanjem i specijalizacijama, rijetko promoviraju inovacije i komercijalizacije, slabo se upravlja istraživačkim kapacitetima i transferom tehnologija, što u konačnici dovodi do neadekvatnih kapaciteta kompanija za odgovor na zahtjeve tržišta, zaostajanja u regionalnom razvoju i niskoj konkurentnosti. Organizatori pripremaju seriju besplatnih seminara, konferencija i okruglih stolova za privredu, mala i srednja poduzeća, na kojima ih žele upoznati s novim kapacitetima i mogućnostima koje nude. Time također žele potaknuti transfer tehnologije, razvojne projekte, inovativni rad i razviti svijest o važnosti zaštite intelektualnog vlasništva. Pri razvoju proizvoda, od ideje do njegove proizvodnje, ključni element u postizanju uspjeha na tržištu je vrijeme. Uz sve oštrije zahtjeve tržišta, očitiji su i trendovi u porastu individualizacije (personalizacije) proizvoda, a sve je manje proizvoda masovne potrošnje. Kako bi se udovoljilo takvim uvjetima pri razvoju i proizvodnji, sve se više primjenjuju alternativna rješenja u proizvodnji. Namjera je organizatora približiti nove metode i tehnologije našem tržištu i upoznati inženjere, projektante, izvođače, te investitore o mogućnostima i prednostima novih metoda i tehnologija, kao i proizvoda u njihovom tehničkom i financijskom obliku. Stručnoj javnosti ovakvim konferencijama, seminarima i okruglim stolovima želimo približiti nove tehnologije 21. stoljeća koje su u upotrebi u razvijenim zemljama u svijetu. Nove tehnologije svojim trendovima razvoja i dostignućima mogu doprinijeti razvoju kako malih i srednjih poduzeća, tako i velikih kompanija, te na taj način razviti lokalnu zajednicu u kojoj djeluju. Ciljevi konferencija, seminara i okruglih stolova će biti takvi da proizvodnim tvrtkama i razvojno-istraživačkim institucijama približe najnovija tehničko-tehnološka dostignuća na području novih tehnologija koje se koriste u 21. stoljeću.

Sarajevo, 12. maj, 2022.god. *ORGANIZATORI*

PREFACE

Modern industrial production is exposed to many influences and problems that prevent the strengthening of market competitiveness. Let us mention a few of them: materials and raw materials are constantly becoming more expensive, and some even disappear, so a suitable replacement should be found; mass production disappears, and large series manufacturing decreases, while small-scale and medium serial production increases to some extent; new production philosophy demands and prefers highly educated personnel able to successfully implement new technologies; technologies, as well as knowledge, quickly become obsolete, which requires lifelong learning, i. e. constant update of already acquired knowledge; environmental requirements are stronger and higher, which increases companies' costs and funds to invest in equipment (there is a demand for pollution and waste materials reduction, greater work safety, recycling, etc.); market is full of various goods and products of questionable quality from medium developed countries and often with dumping prices; there are ever increasing demands for wage increases, which forces the owners to dislocate their production facilities or move to countries with cheaper labor force; increased education of personnel affects their mobility and increase of fluctuation, as well as greater opportunities in the choice of better jobs, so that they make more use of their intellectual and emotional capabilities, thereby changing the mental structure of employees; customers are increasingly looking for a good design, durability and good price, with a wide range of support and service, not just a product; customers' knowledge is increasing, thus causing the increase in requirements that a product must be flawless in every respect, rather «ideal» (well designed, reliable, stylish, economical, etc.). To successfully solve the abovementioned requirements, there are new technological, production, organizational and other methods and models that ensure the improvement and modernization of production in the preparation phase (modern methods of product design, methods for modeling, simulation and optimization of products and production program, evolutionary methods – methods of artificial intelligence, software and computer hardware), as well as in the realization phase of production (flexibility, innovation, productivity, automation, product quality) we can name it all with a single word "Industry 4.0", which is already present around us, but its concept is not widespread.

The main objectives of the conference are:

- *Transfer of new and high technologies towards the development of scientific research work and implementation in production, in order to achieve technological and economic growth production in companies*
- *Transfer of innovations and practical knowledge and results of our own research, with the aim of strengthening competitiveness of companies.*
- *Promotion of technological and economic feasibility of applying new technologies in companies' industrial production, as well as "Industry 4.0".*
- *Organizing and conducting education to prepare young people for jobs will be in the future, to use technologies that will be, discovered, for competitiveness that will be global.*
- *Performing training courses in new technologies, production and business systems, integrated product development, implementation and maintenance of quality systems, production logistics, acquisition of competitive ability in the market, the application of modern methods in production management, the development of modern and successful production, etc.*
- *Education of the implementation of "Industry 4.0" with the aim of improving many aspects of human life.*

Sarajevo, 12th May 2022 *THE ORGANIZERS*

PREDGOVOR

Suvremena industrijska proizvodnja je izložena mnogim utjecajima i problemima koji ometaju jačanje konkurentnosti na tržištu. Evo samo nekih od njih: materijali i sirovine neprestano poskupljuju, a neki i nestaju, pa im valja naći odgovarajuću zamjenu; masovna proizvodnja nestaje, a velikoserijska se smanjuje, dok raste maloserijska i donekle srednjeserijska proizvodnja; nova proizvodna filozofija uvjetuje, preferira visoko educirane kadrove sposobne da uspješno implementiraju nove tehnologije; tehnologije kao i znanja brzo zastarijevaju, što zahtijeva cjeloživotno učenje, odnosno stalno osvježavanje već stečenih znanja; sve su oštriji i veći ekološki zahtjevi, što poduzećima povećava troškove i sredstva za investiranje u opremu (traži se smanjenje zagađivanja i otpadnih materijala, veća sigurnost u procesu rada, reciklaža otpada i sl.); tržište je sve punije raznovrsnim proizvodima ali i proizvodima upitne kvalitete iz srednje razvijenih zemalja i često s damping cijenama; sve su veći zahtjevi za porastom plaća, što vlasnike prisiljava da svoje proizvodne pogone dislociraju, odnosno presele u zemlje sa jeftinijom radnom snagom; porast obrazovanosti kadrova sve više utječe na njihovu mobilnost i porast fluktuacije, te veće mogućnosti u izboru boljih radnih mjesta, kako bi više koristili svoje intelektualne i emocionalne mogućnosti, čime se mijenja mentalna struktura zaposlenih; kupci sve više traže dobar dizajn, trajnost i povoljnu cijenu proizvoda, uz široki asortiman i servisne usluge, a ne samo proizvod; znanje kupaca sve je veće, zbog čega nastaju i sve veći zahtjevi da proizvod mora biti bez greške u svakom pogledu, bolje rečeno «idealan» (dobro dizajniran, pouzdan, moderan, ekonomičan itd.). Za uspješno rješavanje navedenih zahtjeva postoje nove tehnološke, proizvodne, organizacijske i druge metode i modeli koji osiguravaju unapređenje i modernizaciju proizvodnje u fazi pripreme (moderne metode oblikovanja proizvoda, metode modeliranja, simulacije i optimizacije proizvoda i programa proizvodnje, evolucijske metode-metode umjetne inteligencije, softverske i računalne tehnike), kao i u fazi realizacije proizvodnje (fleksibilnost, inovativnost, proizvodnost, automatizacija, kvaliteta proizvoda),sve to možemo nazvati jednom riječi „Industrija 4.0“, koja je već prisutna oko nas ali njen koncept nije dovoljno rasprostranjen.

***Osnovni ciljevi održavanja konferencije su slijedeći**:*

- *Transfer novih i visokih tehnologija u pravcu razvoja naučnoistraživačkog rada i implementacije u proizvodnji, s ciljem ostvarenja tehnološkog i ekonomskog rasta proizvodnje u kompanijama.*
- *Transfer inovacija i praktičnih znanja i rezultata vlastitih istraživanja, s ciljem jačanja konkurentske sposobnosti kompanija.*
- *Promocija tehnološke i ekonomske opravdanosti primjene novih tehnologija u industrijskoj proizvodnji u kompanijama, kao i“Industrije 4.0“.*
- *Organiziranje i izvođenje edukacija da pripreme mlade ljude za poslove koji ce biti u budućnosti, kako bi koristili tehnologije kojeće biti u budučnosti, za konkurentnost koja će biti globalna..*
- *Izvođenje edukacijskih predavanja iz novih tehnologija, proizvodnih i poslovnih sistema, integriranog razvoja proizvoda, uvođenja i održanja sistema kvalitete, logistike proizvodnje, stjecanja konkurentske sposobnosti na tržištu, primjene modernih metoda u upravljanju proizvodnjom, razvoju moderne i uspješne proizvodnje, itd.*
- *Edukacija o opravdanosti implementaciji „Industrije 4.0“ sa ciljem poboljšanja mnogih aspekata ljudskog života.*

Sarajevo, 12. maj, 2022.god. *ORGANIZATORI*

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ABSTRACTS / SAŽETCI

„NEW TECHNOLOGIES, DEVELPMENT AND APPLICATION“

„NOVE TEHNOLOGIJE, RAZVOJ I PRIMJENA“

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ACADEMY OF SCIENCES AND ARTS OF BOSNIA AND HERZEGOVINA

Namik Hrle
IBM Fellow and VP, Data and AI
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Biography:

Namik Hrle is a Vice President of Development in IBM’s Data and AI division and the Director of its development lab in Germany. He holds a title of IBM Fellow, the ultimate distinction of IBM technical career given to a small number of individuals who demonstrated the highest level of technical leadership, innovation, business impact, social eminence, and talent building.

He is a regular member of IBM Academy and Technical Experts Council. IBM’s Master Inventor, a holder of 70 patents, numerous outstanding technical achievements, author recognition and corporate awards, Namik has a world-wide reputation as the ultimate expert in using data and AI for digital transformation and reinvention of enterprise applications.

Prof. Kim Tiow Ooi, PhD
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Topic: “DESIGN AND INNOVATION IN ROTARY POSITIVE DISPLACEMENT COMPRESSORS”

Biography:

Professor Ooi Kim Tiow obtained his BEng and PhD in Mechanical Engineering from the University of Strathclyde, Scotland, U.K. in 1986 and 1990, respectively. In his nearly 30 years of career with the university, he has been bestowed thrice Teacher of the Year Award, and twice The Nanyang Award for Excellence in Teaching. Dr Ooi is a prolific inventor, he has numerous patents in his name and a few have been commercialised. His innovative works have won numerous local and international awards, including the World’s Best Technology Showcase, USA, in 2009; Institute of Mechanical Engineering, UK, Fluid Mechanics Group-Donald Julius Groen Prize, in 2017 and TECO Green Tech International Competition Bronze Medal in 2019. In 2014, he was awarded the Nanyang Innovation and Entrepreneurship Award.

He publishes more than 150 research papers in international journal and conferences and has been invited to be Editor in Chief, Associate Editor, Editorial Board Member, Guest Editor and Reviewers of International Journals. He sits in numerous international advisory boards for international conferences in UK, Europe, China and India. Dr Ooi is a co-author of a book and chapters of encyclopaedias. He is widely consulted by engineering companies both locally and internationally. He is a member of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHARE).

Prof, Adnan Mehonic, PhD
Assistant Professor in Nanoelectronics & RAEng Research Fellow at UCL;
Editor-in-Chief at APL Machine Learning; CTO at Intrinsic Semiconductor Technologies
London
ENGLAND

Topic: “ENERGY-EFFICIENT AI SYSTEMS BASED ON MEMRISTIVE TECHNOLOGY”

Biography:

Dr Adnan Mehonic (AM) is an assistant professor in nanoelectronics and RAEng research fellow at the Department of Electronic and Electrical Engineering, University College London. He received a BSc in Electronic Engineering from the University of Sarajevo in 2009 and was awarded the Golden Badge, the best student award. He graduated from UCL with an MSc in Nanotechnology (Distinction, Oxford Instruments prize for the best MSc project) in 2010 and PhD in 2014 (top 3 best PhD thesis in 2013/14, EE Department). To date, he has authored more than 100 journal publications and international conference proceedings on memristive technologies and energy-efficient AI hardware.

His research resulted in two major EPSRC project grants - EP/K01739X/1 in 2013 (£1.4m) and EP/P013503/1 in 2016 (£735k) and a Leverhulme grant in 2016 (£330k). In 2017, he was awarded a highly prestigious 5-year Royal Academy of Engineering Research Fellowship to work on neuromorphic technology for energy-efficient AI hardware (£722k). He serves on the advisory boards of Wiley's Adv. Intelligent Systems, and is a review editor for Front. in Materials and Front. in Nanotechnology. He is a board member for IoP's Dielectrics and Electrostatics group and an IoP and IET member. He is the director of the MSc in Nanotechnology at UCL. He is the inventor of 10 resistance-switching patents and co-founder of spinout company ("IntrinSic Semiconductor Technology"), where he serves as a Chief Technology Officer. He received the "One to Watch 2015" award from UCL Enterprise for UCL's most innovative staff, MIT's Technology Review "Innovators under 35", and Wiley's Advanced Science "Rising Star" in 2021. Recently, his perspective article "Brain-inspired computing: We need a master plan" that makes a case for energy-efficient AI has been accepted in Nature.

Krešimir Vidović, Ph.D.
Head of establishment and development of laboratory – Ericsson Nikola Tesla d.d.
Zagreb
CROATIA

Topic: “APPLICATION OF BIG DATA SETS AND DATA SCIENCE IN TRANPORTATION ENGINEERING”

Biography:

Krešimir Vidović is Senior Solution Architect at Ericsson Nikola Tesla (ENT) and Assistant professor at Faculty of Traffic and Transportation Sciences (FTTS) University of Zagreb. Also. he worked as expert associate at Institute of Transport and Communications in Zagreb (2007-2010), on scientific research projects, traffic planning projectsand on the development of specialized computer applications for traffic engineering (CAD, GIS). Since 2010, he has been employed as a domain expert in the field of intelligent transport systems at Ericsson Nikola Tesla. He leads ENT & FTTS joint Laboratory for application of data science in transport and logistics.

CONTENTS – SADRŽAJ

DESIGN AND INNOVATION IN ROTARY POSITIVE DISPLACEMENT COMPRESSORS

***Ooi Kim Tiow*[1]**
[1]*Nanyang Technological University, Singapore*

Ooi Kim Tiow

ABSTRACT:
Rotary compressors have been in use for more than a century and are necessary for daily life in heating, ventilation, air-conditioning, refrigeration (HVAC-R) and air compression applications. These are very mature technologies;with numerous research and development (R&D) efforts, recent improvements have become incremental. Thus, these improvements may be insufficient to keep up with and address the energy and environmental issues faced by mankind in the 21st century which grows more severe as time goes on. Hence, new compressor designs have been invented to bring about more significant improvements. Two new compressor designs will be highlighted here: the revolving vane compressor to reduce frictional losses, and the coupled vane compressor to reduce material and fabrication costs, both of which having the potential to reduce the carbon footprint fortheir applications.

Keywords: *rotary compressors, positive displacement machines, design, coupled vane, revolving vane*

1.INTRODUCTION

Small and medium size positive displacement rotary vane compressors are widely used in heating, ventilation, air-conditioning, refrigeration (HVAC-R), and even air compression applications. The application range of various compressor types are shown in Figure 1. Apart from very-high pressure applications (>100 bar), reciprocating positive displacement compressors have been replaced by its rotary counterparts.

ENERGY-EFFICIENT AI SYSTEMS BASED ON MEMRISTIVE TECHNOLOGY

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Adnan Mehonic

ABSTRACT:
The future progress of AI is dependent on the capability of hardware systems. Intense AI-driven data-centric applications lead to unsustainably large compute power demands. Current state-of-the-art hardware consumes far too much energy and is restrictive to many applications where energy resources are limited (e.g. IoT devices). This is becoming unsustainable and might halt the future rapid progress of AI, which is becoming even more critical in a wide range of rapidly growing data-centric technologies spanning Big Data, IoT, transport, medicine, security, entertainment. This challenge led to the exploration of post-CMOS technologies, from innovations in materials and novel nanoelectronics to better-suited computer architectures (e.g. non-Von Neumann systems that solve the data movement bottleneck). This paper presents memristor technology as a potential solution for implementing energy-efficient AI systems.

Keywords: *memristors, energy-efficient AI, neuromorphic*

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1. INTRODUCTION

Among three factors (accessible data, algorithmic solutions and powerful hardware) needed for continuous development in artificial intelligence (AI), hardware is becoming the main bottleneck. The increasing compute power demands vastly outpace the efficiency improvements obtained through Moore scaling or innovative computer architecture solutions. Although Graphical Processing Units (GPUs) improved performance by more than >300x from 2012 until 2020, this is not enough to meet the demand [1]. The compute power demands now double every two months, which results in the cost of AI increasing dramatically. More specifically, the cost of training has grown from a few $ in 2012 to ~$10m in 2020 [1]. Fundamental limitations to improving the energy efficiency of computing are the excessive growth of data transfer costs whenupscaling the Von Neumann architecture and limits of CMOS technologies scaling. Von Neumann architecture is not the best suited for data-intense tasks, as data transfer from memory to compute units leads to inefficiencies in most cases.

APPLICATION OF BIG DATA SETS AND DATA SCIENCE IN TRANPORTATION ENGINEERING

***Krešimir Vidović*[1,2]**
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[2] *Faculty of Transport and Traffic Sciences, University of Zagreb, Zagreb, Croatia*

Krešimir Vidović

ABSTRACT:
The development and application of information and communication technologies (ICT) have started an era of big data. Big data sets originating from mobile telecommunication networks, besides their primary purpose within the telecom environment, are becoming more popular in other application areas such as transportation engineering. Existing research have proven that analytics of such data, by using data science methodology and tools can be used to draw a complete and representative picture of urban migrations and mobility assessment. The application of this analytics is used in transportation planning, transportation management and for improvements in traffic safety. Further developments in both communication technology and data science indicates that real application of mobile network data, especially as a substitute for traditional measurements have great potential that needs to be exploited.

Keywords: *Big Data, Data Science, Intelligent transport systems*

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1. INTRODUCTION

In recent years telecommunication network has been recognized by scientific community as a valuable source of data, that can be utilized for geospatial analysis in application in different business verticals (marketing, transport, health…). The basic principles of operation of mobile communication network requires that mobile terminal is in constant (when used) or periodic (when idle) communication with mobile network base station antennas. Since that base station antenna is characterized, among others, with its location and coverage parameters (including radius, azimuth etc…), fact that the user's mobile terminal is connected to particular antenna enables its approximate positioning in space. The accuracy of this type of positioning may vary, and is dependent on technology (2G, 3G, 4G, 5G), signal strengths, environment, obstacles etc…The positioning accuracy isn't comparable to GNSS systems since this type of mobile positioning may result with significant location uncertainty (position error of 100-500 meters in urban environment). [1], [2] Therefore, use cases for this type of data should be resistant to this position error. Besides this flaw, this type of data is characterized and ...

DESIGN OF A DIGITAL TWIN OF A ROBOTIC CELL FOR PRODUCT QUALITY CONTROL

Gotlih Janez[1], Brezočnik Miran[2], Mirko Ficko[3], Marko Jovanović[4], Belšak Rok[5], Karner Timi[6]
[1,2,3,5,6]University of Maribor, Faculty of Mechanical Engineering, Maribor, Slovenia
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Gotlih Janez


Brezočnik Miran


Mirko Ficko


Karner Timi

ABSTRACT:
Progress in automation is based on the development of methods that allow the construction of flexible and reconfigurable systems to perform tasks that need to be completed in the shortest possible time and with the required quality. In this sense, the development and implementation of digital twins, which allow the prediction of the behavior of physical processes, services or systems and system optimization in a virtual, simulated environment, is steadily increasing in the industrial environment. This article presents the development of a digital twin of a robotic cell by coupling state-of-the-art software environments. The individual parts of the digital twin system are presented and combined to form a functioning automated system. The operation of the virtual cell is verified by simulating a cycle consisting of transporting the product via conveyor belts through the safety door into the quality control cell, where inspection is performed using the UR5 robotic arm.

Keywords: *digital twin, robotics, quality control, home appliance device*

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1. INTRODUCTION

Robotization is one of the most important trends in industries with mass production. In these environments, the preparation and precise design of automation systems is of great importance. The idea of digitally modeling physical objects and simulation of their behavior in real time was first introduced in 2002. At that time, this idea was referred to as the "mirrored spaces model", but over the years the term "digital twin" has become widely accepted [1, 2].

Today, it is estimated that in the near future, many companies will set up digital twin models that virtually simulate or predict the behavior of physical processes, services, or systems [3]. Setting up a digital twin in the design phase of a system makes it easier to test the effectiveness of the system so that potential problems in subsequent real-world implementations can be identified ...

SELECTIVE SURFACE MODIFICATIONOF COMPLEXLY SHAPED STEEL PARTS BY ROBOT-ASSISTED 3D SCANNING LASER HARDENING SYSTEM

Dmytro Lesyk[1], Matej Hruska[2], Vitaliy Dzhemelinkyi[1], Oleksandr Danyleiko[1], Milan Honner[2]
[1]National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, Ukraine
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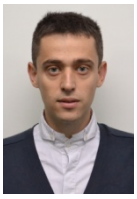
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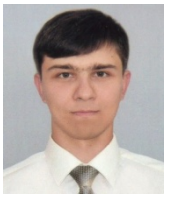
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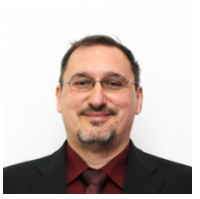
Milan Honner

ABSTRACT:
Laser surface hardening is one of the most advanced surface modification techniques to increase the wear resistance of large-sized and complexly shaped metal products. In this study, the laser transformation hardening process for the high-quality surface treatment of the steel products is applied using a high-power disc laser with extremely good beam quality and three-dimensional (3D) scanning optics. The shaft AISI 1066 steel part was selectively processed by the robot-based laser hardening system to increase the surface hardness. At the same time, such a computer numerical control (CNC) laser system is ideal for remote surface treatment of complexly shaped metal products. The experimental tests with a solid-state disc laser of a maximum power of 5.3 kW were performed with constant power. Both plane and cylindrical areas on the shaft were hardened and compared. The results showed that the hardness values on the plane surfaces correlate well with the hardness values on the cylindrical surfaces. The hardening intensity was about 2.5 times higher than that of the unhardened carbon steel shaft.

Keywords: *shaft AISI 1066 steel part, laser transformation hardening process, disc laser, robot-based 3D scanning, surface hardness, hardening intensity*

---

1. INTRODUCTION

Currently, it is well-known that the use of expensive wear-resistant and corrosion-resistant materials is not economically rational to solve the problem of increasing the reliability and durability of specific metal products. To significantly improve the performance of structural metal parts are the most promising methods of surface hardening by changing the structure of the subsurface layer without changing the chemical composition and surface roughness of the processed surface [1, 2].

THE IMPLEMENTATION PROCESS AND FACTORS THAT INFLUENCE THE QUALITY OF THE INTEGRATION OF COLLABORATIVE ROBOTS IN THE AUTOMOTIVE INDUSTRY

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Vasile Gusan

Aurel Mihail Ţîţu

ABSTRACT:
The automotive manufacturing process has the role of manufacturing the finished products or final assembly of the products intended for vehicles.In automotive, industrial organizations must produce as quickly as possible, at the highest possible quality and at the lowest possible cost in order to continue to secure a competitive place on the market. Due to this requirement, it was necessary to discover certain solutions through which: the manufacturing speed will increase and remain constant during manufacturing, the quality of the manufacturing process will be improved because a qualitative process will always lead to quality products, and manufacturing costs generated during process time to be reduced.These requirements led, in time, to the emergence of collaborative robots.If traditional robots were intended for particular applications, collaborative robots have much greater flexibility. The scientific paper presents, in an elegant manner, the process of integration of collaborative robots and the steps to be followed in order to transform manual processes, old or new, into manufacturing processes with collaborative robots.Certain factors that influence the quality of integration of collaborative robots are presented.

Keywords: *collaborative robot, process, automotive, quality, manufacturing*

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1. INTRODUCTION

The automotive industry is easily driven to total automation and digitization. Intelligent manufacturing facilitates product quality assurance and reduced manufacturing costs. By reducing manufacturing costs, industrial organizations aim to increase profits. Thus, collaborative robots are implemented on a large scale. Collaborative robots are a reliable solution to manufacture intelligently, qualitatively and at the lowest possible cost. Even if this aspect represents a slightly higher investment than a manufacturing ...

THE INFLUENCE OF COLLABORATIVE ROBOTS ON THE QUALITY, EFFICIENCY AND EFFECTIVENESS OF AUTOMOTIVE MANUFACTURING FLOWS

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[5]*Continental Automotive Systems, Sibiu, România*

Aurel Mihail Țîțu

Vasile Gusan

ABSTRACT:
These days, industrial organizations are looking for multiple solutions so that they remain flexible and competitive in the market.This situation leads directly to the improvement of manufacturing flows by automation or their robotization. Quality, efficiency, and effectiveness are important aspects that any organization must take into account in order to remain competitive.Thus, the manufacturing processes with collaborative robots are becoming more and more common in the industry. This aspect is due not only to the lack of staff, but also to the multiple advantages collaborative robot bring.The current pandemic context further favors the implementation of these types of robots. Collaborative robots are becoming more and more a necessity today, due to the fact that they can easily mold to the process and improve it from several points of view. Collaborative robots bring an important impact in terms of quality, efficiency and effectiveness of manufacturing flows. The scientific paper presents in an elegant way the effect that collaborative robots bring, following the integration, on the manufacturing flows in automotive.

Keywords: *collaborative robot, efficiency, effectiveness, automotive, manufacturing*

1. INTRODUCTION

The year 2020, a year in which the lives of many have changed, a year in which the world has stopped for a while and a year that will certainly not be easy to forget for many people. From then until now, quality, efficiency and effectiveness have remained performance indicators that directly affect the organization's profit. Industrial organizations have come to understand that to survive in the marketplace, ...

THE AERODYNAMIC WIND LOADS OF A NAVAL SURFACE COMBATANT IN MODEL SCALE

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Sarih Sarı

Ali Dogrul

Seyfettin Bayraktar

ABSTRACT:
Design of the ships considering hydrodynamic and aerodynamic requirements is important especially for naval surface combatants. From the aerodynamic point of view, the superstructure and the flight deck, which is used for landing and take-off operations of aerial vehicles, have to be designed in terms of ship airwake and wind loads. The superstructure combined with the sea and weather conditions has a crucial effect on the flow characteristics such as the turbulence and vortices on the flight deck. This study covers the numerical investigation of aerodynamics of a naval surface combatant designed by the Office of Naval Research (ONR). As a more realistic ship, ONR Tumblehome hull was chosen instead of the generic frigate model SFS2 and ONRT model has been widely used for validation studies as a benchmark geometry. Numerical analyses were conducted by employing the k-ω turbulence model and solving the unsteady RANS equations. In the present study, the axial and tangential velocity distributions on the flight deck of ONRT were firstly validated in model scale. Following this, one more model scale geometry was generated and the aerodynamics of these vessels were investigated in headwind conditions. Thus, the scale effects on the aerodynamics of the ship were observed maintaining the dynamic similarity based on Reynolds number. Furthermore, the aerodynamic wind loads on the ONRT surface combatant vessel are presented for various wind-over-deck (WOD) angles in one model scale.

Keywords: *Aerodynamics, CFD, ONRT, RANS, Ship airwake*

MULTIBODY MODELING AND DYNAMICALANALYSIS OF A FIXED-WING AIRCRAFT

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Maria Curcio


Carmine Maria Pappalardo


Domenico Guida

ABSTRACT:
This study is aimed at developing a simplified virtual model capable of simulating the dynamic behavior of a fixed-wing aircraft by applying the multibody approach. The case of an aircraft with simplified aerodynamics, an axial thrust, and without control surfaces is considered. After modeling the aerodynamic actions following a Lagrangian approach, the equations of motion are analytically derived and numerically implemented in a MATLAB computer code to develop a virtual model capable of simulating the dynamic behavior of the aircraft. Finally, the numerical results found are presented and a discussion on the numerical results is provided, paying attention to the Cessna 172 Skyhawk, which is considered as the case study.

Keywords: *fixed-wing aircraft, longitudinal flight dynamics, multibody simulation, Lagrangianmechanics, Cessna 172 Skyhawk.*

---

1. INTRODUCTION

This section provides an introduction to the topics considered in the present paper.Unmanned Aerial Vehicle (UAV) is a type of aircraft that can be easily piloted either through a ground-based command station or through a pre-established flight plan. Due to their potential applications, their use is growing day by day [1,2], as they have the fundamental advantage of being able to perform even particularly complex operations, with lower economic and ethical costs [3-7].Numerical-experimental methods are very suitable in cases like these [8-10].Generally, in the field of flight dynamics, Newton's second law is mainly used to derive the equations of motion of an aircraft [11,12]. Blended Newtonian and Lagrangian approaches are seldom used to carry out this type of analysis. However, once the equations of motionare obtained, it is possible to set up a dynamic simulation in a general-purpose software environment like MATLAB that is able to reproduce the dynamic behavior of the aircraft during its flight [13].

IMPROVING THE PERFORMANCE OF ANAERODYNAMIC PROFILE BY TESTINGIN THE SUBSONIC WIND TUNNEL

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Eliza-Ioana Apostol

Raluca Bălaşa

ABSTRACT:
The development of new technologies for commercial aviation involves significant risks to technologies, as these programs are often driven by fixed assumptions about the airline's future needs, while being subject to many technical uncertainties. The effect of these uncertainties is exacerbated by the fact that development programs are long and uncertainties continue to evolve depending on the aircraft. Unfortunately, the standard methods used to carry out all the activities related to the design, manufacture and testing of an aircraft are not sufficient to determine the performance of an aircraft. Thus, worldwide the activity of experimental aerodynamics is crucial in the development and modernization of civilian, military and spacecraft aircraft. The need to perform tests on models of complex phenomena in fluid mechanics, have required, since the late nineteenth century, the design and construction of specific experimental installations called wind tunnels. Thus, wind tunnels have been used with great success since the beginning of aviation as a tool to design new concepts in aerodynamics.
These works aim to improve the performance, accuracy and quality of testing, increase the competitiveness of similar installations on the world market, ensure the national capacity for research - development of new products of the aeronautical and defense industry.

Keywords: *aircraft, technologies, wind tunnel, aviation*

THE INFLUENCE OF LITHIUM CONCENTRATION AT THE SURFACE OF AL-LI AEROSPACE ALLOY EXTRUSIONS ON DYE PENETRANT INSPECTION

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Vlad Ciprian Cupșan


Aurel Mihail Țîțu

ABSTRACT:*This paper depictsthe current processing of aerospace aluminium alloy Al-Liextruded material, with emphasis on nonconformities caused by the permanent fluorescent background during dye penetrant inspection. The process for dye penetrant inspection is described in full details to provide a clear image about each individual processing step. The second part includes a series of tests performed on aluminium alloy Al-Li type material during dye penetrant inspection, as part of the root cause identification process. The last part of the paperillustrates an innovative hypothesis related to the causebehind the permanent fluorescent background during dye penetrant inspection. The innovative hypothesis related to the influence of lithium concentration at the surface of the Al-Li aerospace alloy extrusions is tested by relevant trials and results arepresentedas part of the conclusions.*

Keywords: *aluminum alloy,Al-Li, dye penetrant, fluorescent background, lithium concentration.*

1. INTRODUCTION

In the current context of the commercial aircraft sector, the costs for each flight must be reduced continuously in order to allow an increase in competitiveness for each airline in service. The main driver for the cost of airline ticket prices is the fuel consumption of the aircraft during one flight cycle. There are many areas of improvement for the reduction of aircraft fuel usage, like: more efficient engines, smarter aerodynamic surfaces and aircraft weight reduction.The latter can be divided also in different areas of the aircraft, with the main one being the aerostructure of the aircraft. Being the heaviest part of the aircraft beside from the engines, it provides a lot of opportunities for decreasing weight.The aerostructure has a high complexity and at the same time a large diversity in singular components.Thus, the incremental improvements of the aircraft aerostructure for weight reduction went in the direction of identifying new lighter materials. ...

BREAKDOWN OF THE PRODUCT QUALITY ASSURANCE FLOW WITHIN THE ADVANCED PRODUCT QUALITY PLANNING (APQP) METHODOLOGY IN THE AEROSPACEINDUSTRY

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Aurel Mihail Țițu


Vlad Ciprian Cupșan

ABSTRACT:
This paper presents a breakdown of the product quality assurance flow from the Advanced Product Quality Planning (APQP) methodology within the aerospace industry. It starts with the description of the current requirements for APQP deployment and continues with specific information related to APQP standardization in the aerospace industry, that includes also the AS 9145 aerospace standard. The paper gives step by step guidance on how to implement and use the product quality assurance flow as part of the aerospace APQP methodology. To highlight the contributions for the implementation of core APQP activities per the applicable requirements, the paper includes industry application models. The last part, the conclusions of the paper, provide a list of key points to be considered for any organization within the aerospace industry whichaimsto implement the Advanced Product Quality Planning (APQP) methodology based on the AS 9145 aerospace standard.

Keywords: *aerospace industry, APQP, AS 9145, product quality, flow.*

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1. INTRODUCTION

The aerospace industry has been at the forefront of innovation related to materials and processes, always pushing the boundaries in order to improve the customer experience and costs. Since the takeoff of the commercial aircraft sector, the aerospace industry has used the lessons learned by the military aircraft sector, thus implementing and using some aspects of standardization and statistical control. Based on this evolution and in conjunction with its specificity, the aerospace industry has incrementally improved the approaches applied during the design, plan and manufacturing of aircraft materials, components and assemblies. Mainly due to low number of aircraft build per year, until recently the aerospace industry has ...

STUDYING THE MECHANICS OF LOW-PLASTIC MATERIALS SURFACE LAYER PROCESSED BY DEFORMING BROACHING

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Ihor Shepelenko


Evhen Solovykh


Oleh Bevz


Serhii Leshchenko

ABSTRACT:
A method is proposed for modeling the stress-deformed state of low-plastic material surface layer, using the example of SCH20 cast iron, processed by deforming broaching. From the standpoint of the plasticity resource exhaustion, the analysis of the surface layer was carried out, which made it possible to establish the presence of plastic deformation local zone. It is shown that the zone of local plastic deformation is characterized by the presence of tensile stresses, which accelerates the rate of depletion of the plastic resource in the surface layer and microfracture. The stress-strain state and the history of deformation of the surface layer adjacent to the hole being machined have been investigated. The quality of the processed surface was studied according to the resource parameter of the used plasticity. The possibility of using a combined technology, including the operations of deforming broaching and finishing antifriction non-abrasive treatment, taking into account the influence of local plastic deformation zone, has been established.

Keywords: *Deforming broaching, plasticity, modeling, stress-deformed state, local zone, low-plastic material*

DEVELOPMENT OF THE TECHNIQUE FOR DESIGNING RATIONAL ROUTES OF THE FUNCTIONAL SURFACES PROCESSING OF PRODUCTS

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Yaroslav Kusyi


Oleh Onysko


Andrii Kuk


Bohdan Solohub


Volodymyr Kopei

ABSTRACT:
The quality of the products is a wide concept, which is closely related with the development and design of the stage parts and stages of the Product Life Cycle. Therefore rational technological processes of products machining provide regulated machining accuracy, quality of surface layers of the products, their operational characteristics and reliability indicators. Traditional techniques for planning a rational route of treatment of product surfaces only ensured to form restricted number of quality parameters of products. Developed technique of planning a rational route of treatment of products provides relationships between material homogeneity of product and technological methods of surfaces treatments using the LM-hardness method. This technique is realized for steel products including for shaft 6E4-2717.00.00.01. The values of the Weibull homogeneity coefficients (m) during machining of shaft 6E4-2717.00.00.01 increase from 6.12-11.46 to 198.23-344.59. At that the material constants A_m in the technological chain "input blank – output product" change from 0.814 to 0.966 during machining of shafts 6E4-2717.00.00.01 by cutting and abrasive methods of processing.

Keywords: *technological process, technological inheritability, LM-hardness method, object-oriented design, functionally-oriented design*

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1. INTRODUCTION

The achieving of the necessary parameters of accuracy, surface layers quality of products is provided by rational technological processes planning of manufacturing products. Technological processes of manufacturing products are realized by means of the cutting methods, surface plastic deformation, heat treatment and coating. The optimal structure of technological routes of functional surfaces processing is determined by providing the minimum technological cost of manufacturing machine products from one side, and achieving the required operational characteristics and reliability indicators in accordance with the operating conditions of machine ...

INVESTIGATION OF THE INFLUENCE OF TAPERED THREAD PITCH DEVIATION ON THE DRILL-STRING TOOL-JOINTFATIGUE LIFE

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[1,2,4,5]Ivano-Frankivsk National Technical University of Oil and Gas, Ivano-Frankivsk, Ukraine
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Volodymyr Kopei *Oleh Onysko* *Yaroslav Kusyi* *Viktor Vriukalo* *Tetiana Lukan*

ABSTRACT:
Pipes and drill string elements are connected by tapered threads on the pin and box. These connections are called string-grid tool-joint. Such connections are made by lathe. Therefore, their accuracy largely depends on the kinematics of the lathe, as well as the accuracy of the profile of the cutters and their geometric parameters. One of the basic parameters of thread accuracy is its pitch. An important indicator for a tapered threaded connection is the accuracy of the lead angle and pitch. Therefor these two parameters and their influence on strength are the objects in this research. Increasing the thread pitch in the direction of the larger diameter of the pin taper can lead to a decrease in the fatigue strength of the joint.

Keywords: *drill-string tool-joint, lathe machining, inclination angle of the tapered thread, pin and box, FEA, fatigue*

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1. INTRODUCTION

The drilling of the oil and gas well requires maximum improvement of drilling machine equipment, among which drill string pipes are the most widely used component. The most complex and responsible part of the drill-string pipe is the tool-joint – the connector of pipes and other elements of the drill string. It is intended for mechanical fastening of drill pipes among themselves and for ensuring tightness. These requirements largely depend on the accuracy of the tapered thread on both parts of the drill-string pipe - pin and box. One of the most important influence parameter of the thread accuracy is pitch accuracy. Since the tapered threads are produced by means of machining on lathes, the accuracy thus largely depends on the accuracy of lathe tool kinematic.Among the parameters that affect the efficiency of the pipes and the accuracy of the cut is also the accuracy of the profile and pitch diameter.Therefore, the comprehensive identification of problems of precision threading, which arise in the process of their manufacture is associated with both theoretical studies of the kinematics of lathe machining , and with studies of the fatigue strength of the pipe thread joint in general.

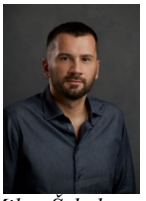
PROCESS OF RAPID PROTOTYPING USING WIND TURBINE AS AN OBJECT OF EXPERIMENTAL RESEARCH

BRZA IZRADA PROTOTIPA KORIŠĆENJEM VETRO TURBINE KAO OBJEKAT EKSPERIMENTALNOG ISTRAŽIVANJA

Mina Šibalić[1], Nikola Šibalić[2], Milan Šekularac[3], Aleksandar Vujović[4]
[1,2,3,4]University of Montenegro, Faculty of Mechanical Engineering,8100 Podgorica, Montenegro


Mina Šibalić


Nikola Šibalić


Milan Šekularac


Aleksandar Vujović

ABSTRACT:
Techniques that manufacture parts by additive methods (by gradually adding solid material) are classified as rapid prototyping. Rapidprototyping has revolutionized prototyping with a key difference from conventional methods – supstractive methods. Overall process of new product development includes the prototype as an integral part of product engineering design. The prototype is a preliminary version of the final product and its purpose is to test or analyze the principles of operation as well as design evaluation. Using 3D printing (3DP) technology for prototyping significantly reduces production time and costs. Previously faced limitations by engineers, regarding tools which are available to them, are overcame with use of 3D printers. In this paper, the focus will be on CAD design, rapid prototyping (RP) of small wind turbine. Also, the paper generates prototypes from real material, using 3DP technologies and laboratory tests, that is determination of power on the turbine shaft.

Keywords: *prototype, wind turbine, rapid prototyping, 3DP*

REZIME:
Tehnike koje proizvode delove aditivnim metodama (postepenim dodavanjem čvrstog materijala) spadaju u brzu izradu prototipa. Brzo izrađivanje prototipa revolucioniralo je izradu prototipova sa ključnom razlikom u odnosu na konvencionalne metode – supstraktivne metode. Prototip je sastavni deo inženejrskog dizajna proizvoda i učestvuje u ukupnom procesu razvoja novog proizvoda. On predstavlja preliminarnu verziju krajnjeg proizvoda i njegova svrha je testiranje ili analiza principa rada kao i procenu dizajna. Korišćenje tehnologije 3D štampe (3DP) za izradu prototipova značajno se smanjuju vreme i troškovi proizvodnje. 3DP omogućava prevazilaženje ograničenja sa kojima su se ranije suočavali inženjeri pri dizajnu alata. U ovom radu će se koristiti CAD softver za dizajn male vetro turbine i brza izrada prototipa (RP). Takođe, u radu je izvršeno i generisanje prototipa od realnog materijala, korišćenjem tehnologija 3DP i laboratorijska ispitivanja odnosno određivanje snage na vratilu turbine.

Ključne reči: *prototip, vetro turbina, brza izrada prototipa, 3DP*

DYNAMIC ANALYSIS OF A HYBRID HEAVY-VEHICLE

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[2]MEID4 Academic Spin-Off of the University of Salerno, Fisciano, Italy
[3]Engineering Research Institute, Universidad Privada San Juan Bautista, Lima, Perú

Marco Claudio De Simone

Domenico Guida

ABSTRACT:
The aim of this work is to analyze the use of hybrid powertrains in public transport by heavy vehicles. In the last years, the increasing demand for sustainable mobility has stimulated the use of electrified powertrains also in the heavy-duty transport sector. Numerous European regulations prohibit non-electrified vehicles from entering historical centers, in highly congested urban areas and airports. The use of an electric motor coupled to an Internal Combustion Engine (ICE) in a bus, whose motion is characterized by continuous transients, especially in the case of vehicles dedicated to urban transport where the distance between two successive stops is reduced. In the work, it was decided to investigate the various hybrid architectures normally used in vehicles and put on a multibody model to test optimal management systems of the engines present on the vehicle.

Keywords: *multibody, dinamics,heavy-vehicle,hybrid, simscape*

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1. INTRODUCTION

The architecture of a hybrid vehicle refers to the different ways of connecting the powertrain (IC engine and electric machines) to the output shaft and the power divider [1]. With the term power-split HEV Device (PSD), it is usually indicated the device generally consists of one or multiple planetary gearboxes dedicated to the purpose. Using the planetary gear in a PSD allows replacing the components present on a traditional vehicle (gearbox, alternator, starter motor) with two electric machines with two electric motors [2, 3].

CONTROLLER SOFTWARE OPTIMIZATION IN ADAPTIVE EXTREME AUTOMATION SYSTEMS

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[3]Sumy State University Sumy, Sumy, Ukraine
[4]Sumy National Agrarian University, Sumy, Ukraine


Sergii Tymchuk


Ivan Abramenko


Vira Shendryk


Sergii Shendryk


Oleksii Piskarev

ABSTRACT:
The paper is devoted to the analysis of algorithms for finding optimal solutions for nonlinear functions with several variables. Often microprocessors in process automation systems monitor and perform calculations to find the extremum of such functions in order to generate a control signal that will be transmitted to the executive. The algorithm of formation of control signals in the adaptive microprocessor system of automation of technological process having the extreme function of the purpose is improved. The following is proposed to ensure high control efficiency with a minimum amount of measurement information. Algorithm for changing the size of a simplex while maintaining its regularity, taking into account the sign of the criterion function at the search stage. The number of steps in the observation phase in which at least one of the previous vertices remains intact. A computational experiment confirmed the effectiveness. Modeling of the process of finding the extremum of the criterion function of the two control influences showed the high efficiency of the proposed algorithm for the development of control microcontroller software.

Keywords: *Software, extreme control system, control algorithm, sequential simplex method, modelling.*

THE ESTABLISHMENT OF AN ADVANCED BRUSH MODEL FOR SIMULATION OF VEHICLE DYNAMICS

USPOSTAVLJANJE NAPREDNOG BRUSH MODELA ZA POTREBE SIMULIRANJA DINAMIKE KRETANJA VOZILA

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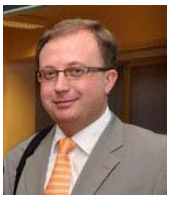
[2]University in Sarajevo, Faculty of Mechanical Engineering, Sarajevo, Bosnia and Herzegovina


Zijah Jelkić


Boran Pikula

ABSTRACT:
In this paper, the existing Brush model is analyzed and optimized for determining the forces that generate between the tire and the road surface. Several different models are described that are most often used in practice as well as their characteristics. These models differ the most in the complexity or in the number of parameters used to determine the forces between the tire and road. To simulate vehicle dynamics, it is necessary to have as simple and at the same time as accurate a model as possible. Based on the characteristics of all the mentioned models, as well as the conditions for the numerical simulation, the Brush model was chosen as the best option. Since the Brush model is intended for quasi-stationary conditions, and to simulate vehicle dynamics, a model for dynamic conditions is required, several changes have been made. In the Brush model, the contact pressure is observed as if the tire is stationary, ie. as a symmetrical parabola to simplify the calculation.
...

Keywords:*Adhesion, Contact pressure, Vehicle dynamic, Simulation*

REZIME:
U ovom radu je analiziran i optimizovan postojeći model Brush za određivanje sila koje nastaju prilikom kretanja točka (pneumatika) po podlogi. Opisano je i nekoliko različitih modela koji se najčešće koriste u praksi kao i njihove karakteristike. Ovi modeli se najviše razlikuju u kompleksnosti odnosno u broju korištenih parametara za određivanje sila između točka i podloge. Za potrebe simulacije dinamike vozila je potrebno imati što jednostavniji i u istom trenutku što tačniji model. Na osnovu karakteristika svih navedenih modela, kao i uslova za numeričku simulaciju odabran je modelBrush kao polazna tačka. S obzirom na to da je modelBrush namijenjen za kvazistacionarne uslove, a za potrebe simulacije dinamike vozila je potreban model za promjenljive uslove, urađeno je nekoliko izmjena. U modelu Brush se kontaktni pritisak posmatra kao da točak miruje, tj. kao simetrična parabola radi pojednostavljenja proračuna.
...

Ključne riječi: *Prijanjanje, kontaktnipritisak, dinamikavozila, simulacija*

INNOVATIVE BURN RISK ASSESSMENT FOR PRODUCTS WITH METAL SURFACES

INOVATIVNA PROCENA RIZIKA OD OPEKOTINA ZA PROIZVODE SA METALNIM POVRŠINAMA

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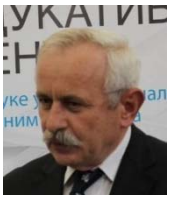
[1,2,3,4,5]University of Novi Sad, Faculty of Technical Sciences, Department of Production Engineering, 21000 Novi Sad, Serbia

Zorana Lanc



Milan Zeljković

Miodrag Hadžistević

Branko Štrbac

Miloš Ranisavljev

ABSTRACT:
Innovative burn risk assessment presented in this paper deals with hot metal surfaces of the product, which can be found at workplaces as well as households. Presented risk assessment enables quantification of the risk of burning by determinating the severity of burns depending on the degree of burns and the size of the hot surface. By using the IR camera for temperature measurement, it is possible to assess the risk of burning across the entire surface of the product and provide an IR image with the accurate location of the burn risk area. This is the most important advantage of innovative burn risk assessment and it is presented in this paper on a simple example of an iron.

Keywords: *burns, risk assessment, product, metal surface, IR camera*

REZIME:
Inovativna procena rizika od opekotina, predstavljena u ovom radu, bavi se vrućim metalnim površinama proizvoda, koji se mogu naći kako na radnom mestu tako i u domaćinstvima. Prikazana procena rizika omogućava kvantifikaciju rizika od opekotina određivanjem težine opekotina u zavisnosti od stepena opekotina i veličine vruće površine. Korišćenjem IC kamere za merenje temperature, moguće je proceniti rizik od opekotina na čitavoj površini proizvoda i obezbediti IC slike sa tačnom pozicijom i veličinom oblasti rizika od opekotina. Ovo je najvažnija prednost inovativne procene rizika od opekotina i u ovom radu demonstrirana je na jednostavnom primeru pegle.

Ključne reči: *opekotine, procena rizika, proizvodi, metalne površine, IC kamera*

INVESTIGATION OF PROPERTIES OF TUNGSTEN HEAVY ALLOYS FOR SPECIAL PURPOSES

ISTRAŽIVANJE SVOJSTAVA VOLFRAMOVIH TVRDIH LEGURA ZA POSEBNE NAMJENE

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[3]Faculty of metallurgy and technology, University of Zenica


Šaban Žuna


ZijadAlibašić


Aida Imamović

ABSTRACT:
Tungsten heavy alloys have wide applications where hardness, high density, high wear, and high-temperature resistance are required. A special use for tungsten heavy alloys are in military sectors.Within the advanced technologies in the production of tungsten heavy alloys, and own results of tungsten heavy alloys for special purposes are presented.
In this paper, two different tungsten alloys and their specifics from the aspect of chemical, mechanical and metallographic results are analyzed.

Keywords: *tungsten alloys, haev ymetals, special purpose*

REZIME:
Volframove tvrde legure imaju široku primjenu za slučajeve kada se zahtijeva visoka tvrdoća, visoka gustoća, visoka otpornost habanju i vatrootpornost. Posebna namjena volframovih tvrdih legura se odnosi na vojne oblasti. U okviru naprednih tehnologija u proizvodnji teških legura volframa prikazani su i vlastiti rezultati ispitivanja teških legura volframa za posebne namjene.
U ovom radu analizirane su dvije različite volframove legure i njihove specifičnosti sa aspekta rezultata hemijskih, mehaničkih i metalografskih ispitivanja.

Ključne riječi: *legure volframa, tvrdi metali, posebne namjene*

COMPLEXITY MEASUREMENT FOR ASSEMBLY OF PERSONALIZED PRODUCTS

MJERENJE KOMPLEKSNOSTI ZA MONTAŽU PERSONALIZIRANIH PROIZVODA

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Amanda Aljinović


Nikola Gjeldum


Marko Mladineo

ABSTRACT:
Today, industries need processes that rapidly meet customer needs and preferences. The assembly process is a breaking point that brings many challenges especially when a customer decides about the configuration of the product. This causes a high variety of information in the system and its uncertainty. Since complexity caused by personalized products affects assembly performances, research in recent years has focused on approaches to complexity measurement, such as information theory, axiomatic design and heuristic approaches. This paper illustrates the example of the application of the complexity measurement on the assembly process for personalized products. There is a discussion on the link between complexity measurement and process performances and the role of complexity measurement for managing processes. The research on complexity measurement had made it possible to detect the maximum complexity on the workstation to make changes if necessary. ...
Keywords: *complexity measurement, information theory, assembly, personalized products, Internet of Things*

REZIME:
Danas industrije trebaju procese koji brzo zadovoljavaju želje i potrebe kupaca. Montažni proces je prijelomna točka koja donosi mnoge izazove, posebno ako kupac odlučuje o konfiguraciji proizvoda. To uzrokuje veliku raznolikost informacija u sustavu i nesigurnost sustava. Budući da kompleksnost uzrokovana personaliziranim proizvodima utječe na performanse montaže, istraživanja su se posljednjih godina usmjerila prema pristupima za mjerenje kompleksnosti kao što su teorija informacija, aksiomatski dizajn i heuristički pristupi. Ovaj rad prikazuje primjer primjene mjere kompleksnosti u montažnom procesu personaliziranih proizvoda. Izražena je važnost poveznice između mjerenja kompleksnosti i performansi procesa te uloge mjerenja kompleksnosti za upravljanje procesima. Istraživanje mjerenja kompleksnosti omogućuje pronalazak makismalne kompleksnosti na radnoj stanici, kako bi se po potrebi izvršile promjene. ...
Ključne riječi: *mjerenje kompleksnosti,teorija informacija, montaža, personalizirani proizvodi, Internet stvari*

CELLULOSE FILTERS IN INDUSTRIAL PROCESSES AND COMPATIBILITY WITH IONIC LIQUIDS

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Darko Lovrec


Vito Tič

ABSTRACT:
Ionic liquids, combinations of ions and cations, offer many combinations of these. Therefore, there are many possibilities for the use of these liquids in different areas of industry, as they can be tailored to a specific purpose of use. Due certain special, excellent properties, they are already found today in various fields of industrial technical use, where they are declared as a high-tech fluid.
However, in many industrial processes, the liquid used must be filtered before use or during use. In the case of ionic liquids, the question arises as to the compatibility of the ionic liquid used with the material used as the filter element. In the presented case, we focused on the compatibility of ionic fluids used in hydraulic systems as hydraulic fluid and commonly used filter materials.

Keywords: *industrial processes, cellulose filters, ionic liquids, hydraulic, compatibility*

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1. INTRODUCTION

Filtration of gases or fluids is used in various fields of technology. This involves filtering the air, either ambient, compressed, sterile, steam filtration, or filtering of various technical gases. Filtration is even more common when using different fluids, either in connection with nutrients or in a variety of technological processes. Filters are used in the purification or filtration of water and soft drinks, in the dairy industry, in winemaking, in breweries, pharmacy, the food industry and elsewhere.
A wide variety of materials are used in these areas as filter materials. They can be made of polyester materials, fibreglass, or other materials. Very often we also encounter cellulose filters,especially when it comes to filtering different media in different technological processes.Cellulose filters are also used in cases where it is necessary to filter various lubricating oils. [1]
In the case of using oil in the technical process, it is necessary to clean the oil in different cases. So, it is necessary to clean new or used oil in the transfer from storage to machine, or vice versa, to clean oils used in test runs, to remove the different contaminants after repair work, or maintain the required cleanliness level of lubricating oil. ...

MODELLING AND DEVELOPMENT OF INTEGRATED HYDRAULIC SYSTEM OF THE TRANSFEMORAL PROSTHETIC LEG

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Zlata Jelačić


Želimir Husnić


Remzo Dedić


Faris Ustamujić

ABSTRACT:
In order to perform high demanding power movements, transfemoral prosthetic leg must be powered, primarily in its main joints – knee and ankle. A new hydraulic control system is developed in order to achieve required kinematics and dynamics and enable the user to perform high power demanding activities in more natural manner, especially stair ascent. The hydraulic cylinders are integrated within a newly designed concept of a 3D printed prosthetic leg. This paper describes the development of a new type of above-knee prosthesis with entirely integrated hydraulic system and separated drives for the knee and ankle joints. The entire hydraulic system is located in the lower leg area of the transfemoral prosthetic leg.

Keywords: *above-knee prosthetic leg, rehabilitation robotics, hydraulic system*

SAŽETAK:
Za izvođenje pokreta velike snage, transfemoralnaprotetska noga mora biti napajana, prvenstveno u njezinim glavnim zglobovima - koljeno i gležanj. Razvijen je novi hidraulički upravljački sustav kako bi se postigla potrebna kinematika i dinamika, te omogućila korisniku da na prirodniji način izvodi zahtjevne aktivnosti, posebno penjanje uz stepenice. Hidraulički cilindri integrirani su u novodizajniran koncept 3D tiskane protetske noge. Ovaj rad opisuje razvoj nove vrste natkoljenične proteze s potpuno integriranim hidrauličkim sustavom i odvojenim pogonima za zglobove koljena i gležnja. Cijeli hidraulički sustav nalazi se u području potkoljenice transfemoralneprotetske noge.

Ključne riječi: *natkoljenična protetska noga, rehabilitaciona robotika, hidraulični sustav*

WEB-BASED REMOTE CONTROL AND MONITORING OF PNEUMATIC WORKSTATION

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Vito Tič


Darko Lovrec

ABSTRACT:
Automation systems based on programmable logic controllers are more and more present in every industrial machinery, especially in rapidly evolving and growing Industry 4.0 systems. Modern state-of-the-art automation systems should also have a possibility of remote control and monitoring of the process.
Aim of the research and development work was to investigate possibilities of remote control and monitoring of automation systems based on industrial PLC equipment without any need for additional software. The paper presents a remote control and monitoring solution on a laboratory pneumatic workstation using Beckhoff software and hardware equipment.

Keywords: *pneumatic, workstation, remotecontrol, monitoring, PLC, Beckhoff*

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1. INTRODUCTION

Automation systems are present in modern industrial environment at every step, whether it is a smallor a large manufacturing company. Automation enables the production of a wide variety of products with high productivity, efficiency and low cost. The most common automation systems found in industrial environments are:mechanical,electrical,electronic,pneumatic systemsand hydraulic systems.
Each of the systems has its advantages and disadvantages. The most optimal solution to each automation problem is obtained by combining individual systems, of which we use those that have the most advantages in the field of use and thus take advantage of the best features of each technique. The fact is that electronic control systems have so many advantages in this technique that no other system can replace them.
Modern industrial automation is therefore not possible without the use of industrial programmable logic controllers (PLCs) that allow the control of other systems. Certainly one of the biggest advantages of PLCs is their high flexibility and productivity. ...

RESEARCH ON MODELING THE TECHNOLOGICAL PROCESSINGOF TYPOGRAPHIC FILM

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Aurel Mihail Țîțu

ABSTRACT:
This paper was developed based on a study conducted within a company whose main object of activity is the realization of a wide range of printing products and the provision of services in this field. The research starts with a SWOT analysis of the company, followed by the presentation of the preparation of the printing film and the elaboration of the factorial experiment strategy applied in order to model and partially optimize the technological process of printing the printing film. Using a known software application, the experimental data obtained based on the adopted influencing factors were performed - the temperature in the pools of substances, the level of the developer in the pool and the level of the fixer in the pool, having as objective the quality of the raster point and the lack of stains. on film. The last part of the paper highlights our own points of view and the conclusions drawn from the elaboration of the study.

Keywords: *scientific research, experimental statistical modeling, strategies in the field of quality, processing, typographic film*

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1. INTRODUCTION

The company in which the study was conducted has as main object of activity the realization of a wide range of printing products and the provision of services in this field, printing of newspapers, books, leaflets, flyers, calendars, diaries, catalogs, leaflets, leaflets, posters. One of the long-term objectives planned by the company is to achieve an efficient quality management system, regarding the quality policy. The activity of the company is structured within functional compartments, each of them having a well-defined role in the general gear of the company [1]. ...

ERGONOMIC ANALYSIS OF DRIVER POSTURES ON ELECTRIC SCOOTER

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Slavica Mačužić Saveljić

Jovanka Lukić

ABSTRACT:
Micromobility includes light vehicles such as electric scooters, bicycles, electric bicycles. It is becoming more and more common in cities, both because it is easier to apply and to reach a certain place faster. Micro vehicles produce a small amount of exhaust gases and emit low noise levels. They are characterized by the fact that they represent the best mode of transport on short distances. Their use reduces the load on the lumbar spine in relation to motor vehicles, but still has a measurable impact on oscillatory comfort. In this paper an electric scooter in the CatiaV5 R18 software package was modelled and RULA (Rapid Upper Limb Assessment) package was used for human body load investigations. The influence of the anthropometric data of ten digital human models (five male and five female) on human body load were analysed. The body load was examined in driving conditions. The results showed that the obtained values of body load were different between subjects as well as their body parts.

Keywords: *micromobility, load, driver, CatiaV5R18, RULA*

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1. INTRODUCTION

Micromobility is a term associated with the rapid evolution of light vehicles. "Micro vehicles" are becoming more and more represented for both private and business purposes. According to [1], the term "micro" can refer to vehicles that are usually less than 500 kg, but also to short-distance travel. Such vehicles have a low adverse impact on the environment [2]. Micromobility defines the use of micro vehicles or vehicles with a mass not exceeding 350 kg and a speed not exceeding 45 km/h. For this reason, these vehicles are safety for pedestrians as opposed to motor vehicles. The practicality of application at these vehicles is significant. They are suitable for fast and short trips, especially in urban areas. Assessment of discomfort or body position in driving conditionis performed using digital human models and methods RULA, REBA etc. [3]. The RULA method, introduced in 1993, assesses static muscle activity and the force acting on the upper extremities. It is designed to quickly assess the load on the musculoskeletal system due to the position of the neck, waist and upper extremities. ...

MECHANISM DESIGN FOR A LOW-COST AUTOMATIC BREATHING APPLICATIONS FOR DEVELOPING COUNTRIES

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Marco Claudio De Simone

Domenico Guida

ABSTRACT:
The aim of this paper is to present a design activity conducted for developing a new device for automatic breathing applications for developing countries using, to generate the necessary airflow, an Ambu (Auxiliary Manual Breathing Unit), a self-expanding bag for manual ventilation, used for support respiratory activity.
The idea is to create a mechanism to automate the device, through the use of open-source components and/or in any case easily available, and make it usable for intensive care applications for sedated patients or to support ventilatory activity in patients in cardiac arrest. The requirements of the device are essentially two: high reliability guaranteed by the automatic and/or mechanical transmission and adjustment mechanism of the airflow and the characteristic breathing times, all made accessible at a low cost.

Keywords: *multibody, dinamics,ventilation device,ambu, simscape*

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1. INTRODUCTION

Mechanical ventilators are one of the essential elements in ICU to treat respiratory insufficiency caused by the different variants of the virus, among other diseases [1]. According to WHO figures, the total number of people diagnosed positive exceeds 318 million globally, with Europe and the Americas on top of the list with 116 million each. The total number of deaths exceeds 5 million worldwide and both regions have 1.7 and 2.4 million deaths respectively [2]. These figures give a rough idea of the number of mechanical ventilators needed to cope with this pandemic. The problem of the lack of mechanical ventilators is still latent since there are still massive infections. Globally, the vaccinated population is estimated at 49.8%, who remain susceptible to infection but are not expected to require intensive care on a massive scale. ...

ON THE POSSIBILITY OF DESIGNING A NEW PISTON SCHEME WITH TWO RINGS

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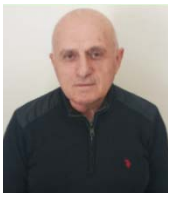
[1]*Universiteti Politeknik i Tiranes*


Erjon Selmani


Koçi Doraci

ABSTRACT:
The traditional scheme of three-ring automovive pistons, have been changed towards a new scheme with two piston rings. The main focus of the analysis were the inter-ring gas leakages, but in addition to this, the oil consumption and friction losses were also investigated.A piston with only two rings is smaller and hence lighter, and with reduced manufacturing costs. According to results, the simple elimination of a ring leads to the increase of the blow-by, oil consumption and the friction, but if tighter tolerances are applied, optimistic results in terms of oil consumption can be obtained with a slight increasein the blow-by and friction.

Keywords: *piston rings, blow-by,oil consumption,internal combustion engines*

1. INTRODUCTION

Internal combustion engines has undergone several improvements in the latest years, one of them is the trend of downsizing. On the other side, this trend has been accompanied by a general reduction in fuel consumption, pollutant emissions and frictions.Among the several elements in engines, blow by is an indication of the quality of tightness of the ringpack. Several studies has been performed on the topic of the blow by [1-4], but in all the cases the piston consisted of a three-ring pack. In [5] physical tests were made on a two ring piston, but the focus was the oil consumption of the engine. This article proposes an analysis of the blow-by gases as well as the consumption of lubricating oil by an engine to which a change has been applied. Specifically, the second ring has been eliminated and some geometric and mechanical parameters have been modified. All the geometrical data, together with the related working parameters of the engine were written in ©Ricardo RINGPAK for the solution.

LATEST TRENDS AND POSSIBILITIES IN THE PRODUCTION OF STAINLESS STEELS USING WAAM

ZADNJI TRENDOVI I MOGUĆNOSTI U PROIZVODNJI NEHRĐAJUĆIH ČELIKA KORISTEĆI WAAM

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Nikola Knezović


Angela Topić


Franjo Gilja

ABSTRACT:
WAAM (Wire and Arc Additive Manufacturing) is a production technology that has been widely investigated in the last thirty years, although the first patent dates from almost one hundred years ago. It is becoming more and more popular to investigate since it enables the production of large near-net-shape metal products. It uses existing welding equipment to provide the heat source and the material feedstock, so the initial investment costs can be lower. Since it became interesting mostly thanks to its use in the aerospace industry, most used materials firstly included light metal alloys. In recent years, great development has been seen in the field of stainless steel products, enabling this technology to produce stainless steel parts for everyday use. This paper aims to present the newest trends and possibilities regarding the stainless steels parts produced using WAAM technology and to give suggestions on what can be done in the future.

Keywords: *welding, additive manufacturing, stainless steels*

REZIME:
WAAM (aditivna proizvodnja uz pomoć žice za zavarivanje i električnog luka) je proizvodna tehnologija koja se značajnije proučava u zadnjih trideset godina, iako je prvi patent zabilježen prije skoro sto godina. Postaje sve popularnija jer omogućava proizvodnju velikih metalnih komada koji ne trebaju značajniju obradu nakon izrade. Koristi se postojeća oprema za zavarivanje (izvor topline i dodatni materijal), početni troškovi za ulaganje mogu biti niži. Budući da je tehnologija postala zanimljiva najviše radi upotrebe u avio-industriji, najčešće korišteni materijali su ispočetka bili laki metali. U zadnje vrijeme je došlo do razvoja upotrebe ove tehnologije kod nehrđajućih čelika, za izradu proizvoda za svakodnevnu upotrebu. Cilj ovog rada je predstaviti najnovija dostignuća vezana za proizvodnju komada od nehrđajućih čelika WAAM tehnologijom, te dati prijedloge za buduće korake.

Ključne riječi: *zavarivanje, aditivna proizvodnja, nehrđajući čelici*

INFORMATION MEASUREMENT SYSTEM FOR DETERMINATION OF CUTTING FORCEAT TURNING TECHNOLOGY

INFORMACIONI MJERNI SISTEM ZA ODREĐIVANJE OTPORA REZANJA KOD TEHNOLOGIJE STRUGANJA

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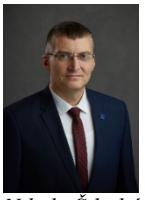
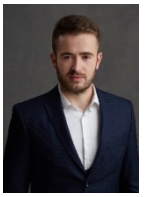


Nikola Šibalić



Marko Mumović

ABSTRACT:
As machining is one of the fundamental technological disciplines, knowledge of cutting forces is of great importance, so this paper presents an information measurement system, which was developed with the aim of measuring cutting force at the machining process of longitudinal turning. The contribution of this paper is that it allows for a simple acquisition of experimental data using a dynamometer (piezo-plate) to measure the cutting force during cutting and thus form a procedure for calibration of measuring devices. Measurements of three components of force were conducted in three mutually perpendicular directions Fc, Fr and Ft for bronze alloy, using modern measuring equipment, piezo-plate, as well as an eight-channel universal amplifier. The obtained digital data were processed in the MX Assistant and MATLAB software.

Keywords: *information measuring system, cutting force, piezo-plate, turning*

REZIME:
Kako obrada rezanjem predstavlja jednu od fundamentalnih tehnoloških disciplina, od izuzetne je važnosti poznavanje otpora rezanja, tako da je u ovom radu predstavljen informacioni mjerni sistem, koji je razvijen sa ciljem mjerenja otpora rezanja kod obrade uzdužnog struganja. Doprinos ovog rada je da se na jednostavan način izvrši akvizicija eksperimentalnih podataka korišćenjem dinamometra (piezo-ploče) za mjerenje otpora rezanja pri obradi rezanjem i pri tom formira postupak za baždarenje mjernih uređaja. U radu su izvršena mjerenja tri komponente sile u tri međusobno normalna pravca (Fc - glavni otor rezanja, Fr - otpor prodiranja i Ft - otpor pomoćnog kretanja) za leguru bronze, korišćenjem savremene mjerne opreme, piezo-ploče, kao i osmokanalnog univerzalnog mjernog mosta. Dobijeni digitalni podaci su obrađeni u softveru MX Assistant i MATLAB.

Ključne reči: *informacioni mjerni sistem, otpor rezanja, piezo-ploča, obrada struganjem*

APPLICATION OF SERVICE ROBOTS FOR LOGISTICS DURING THE COVID-19 PANDEMIC ACCELERATES THE IMPLEMENTATION OF INDUSTRY 4.0

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Isak Karabegović


Edina Karabegović


Mehmed Mahmić


Ermin Husak

ABSTRACT:
The development of science leads to changes that come with the initiation and implementation of innovations in technologies that are implemented in production, thus leading to fundamental changes in the economic and social system of each society. Development of new technologies, including robotics & automation, intelligent sensors, 3D printers, cloud computing, radio frequency identification – RFID, etc., is the foundation of the fourth industrial revolution, i.e., Industry 4.0. The implementation of Industry 4.0, among other technologies, is mostly based on robotic technology, both industrial and service robots.Of all the service robots, we can single out the service robots for logistics, whose high implementation was caused by the COVID-19 pandemic. There are two reasons for the high trend in the application of service robots for logistics.One reason is the COVID-19 pandemic, where the use of service robots can meet one recommendation, and that is distance. In order to control the pandemic, especially in medical institutions where patients are affected by the COVID-19 virus, it is necessary to treat patients with medicines, which can easily beachieved by the use of service robots. Another reason for their application is global competition in the market where work must be done to improve quality, reduce production time, reduce production and maintenance costs, to replace workers on all monotonous and difficult work tasks. By applying service robots, we increase the implementation of Industry 4.0 and thus create a significantly higher level of added value, create more benefits and bring benefits to all people in the world.

Keywords:*service robots, logistics, automation, COVID-19, Industry 4.0*

AN ANLYSIS OF HEAT AFFECTED ZONE AT PERCUSSION WELDING OF AUSTENNITIC STEEL WIRES

ANALIZA ZONE UTICAJA TOPLOTE KOD PERKUSIONOG ZAVARIVANJA AUSTENITNIH ČELIČNIH ŽICA

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Univerzitetski Kampus, Mostar, Bosnia and Herzegovina


Edin Džiho


Sead Pašić


Edin Šunje

ABSTRACT:
Capacity discharge percussion welding is non-conventional welding process where heat source is an electric arc obtained by discharging of capacitor bank. The arching time is very short, around 10 ms, and depends on a few parameters such as: capacity of capacitor bank, voltage, movement speed of welded pieces during welding. During arching a certain amount of material is melted and after that squeezed out by applied force used in welding process. Upon these welding parameters depends on many welded joint characteristics, quantity of squeezed material, heat affected zone properties, geometry of welded joint. All mentioned directly influence on mechanical properties of welded joints. In this paper is analysed the influence of capacity discharge percussion welding parameters on heat affected zone properties of welded joints.

Keywords: *percussion welding, welding parameters, heat affected zone, microstructure, hardness*

REZIME:
Kapacitivnoperkusiono zavarivanje je nekonvencionalni postupak zavarivanja kod kojega je izvor toplote električni luk nastao pražnjenjem kondenzatorske baterije. Vrijeme gorenja luka je vrlo kratko, oko 10 ms, a zavisi od više parametara, kao što su: kapacitet kondenzatora, napon, brzina kretanja dijelova koji se zavaruju. Za vrijeme gorenja električnog luka izvjesna količina materijala se topi i istiskuje vani primjenom sile tokom procesa zavarivanja. Od ovih parametara zavarivanja zavise karakteristike zavarenog spoja, količina istisnutog materijala, osobine zone uticaja toplote, i geometrija zavarenog spoja. Sve navedeno direktno utiče na mehaničke osobine zavarenog spoja. U ovom radu je analiziran uticaj parametara kapacitivnog perkusionog zavarivanja na osobine zone uticaja toplote zavarenog spoja.

Ključneriječi: *perkusiono zavarivanje, parametri zavarivanja, zona uticaja toplote, mikrostruktura, tvrdoća*

INFLUENCE OF DELTA FERRITE ON MECHANICAL PROPERTIES OF NICKEL FREE AUSTENITIC STAINLESS STEELS

UTICAJ SADRŽAJA DELTA FERITA NA MEHANIČKA SVOJSTVA AUSTENITNOG NEHRĐAJUĆEG ČELIKA BEZ NIKLA

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Jasmin Halilović


Denijal Sprečić


Edis Nasić


Džemal Kovačević

ABSTRACT:
This paper deals the results of testing of mechanical properties for nickel free austenitic stainless steel depending on the content of delta ferrite. The appearance of delta ferrite is caused by different ratios of alphagen and gammagen alloying elements, and its appearance is greatly influenced by the method of production, as well as subsequent mechanical processing and heat treatment. Nickel free austenitic stainless steels were manufactured using induction furnace by adding nitrided ferroalloy under atmospheric pressure. Mechanical properties investigation and microstructural analysis of forged and solution annealing ingots were performed for different nitrogen content. Analysis of microstructure was done by optical microscopy, whereas tensile tests were performed for characterization of mechanical properties.

Keywords: *nickel freeaustenitic stainless steels, delta ferrite, mechanical properties, nitrogen*

REZIME:
U ovom radu predstavljeni su rezultati ispitivanja mehaničkih svojstava austenitnog nehrđajućeg čelika bez nikla u zavisnosti od sadržaja delta ferita. Pojava delta ferita je uzrokovana različitim odnosom alfagenih i gamagenih legirajućih elemenata, a na njegovupojavu u velikoj mjeri utiče način proizvodnje, kao i naknadna mehanička i termička obrada. Austenitni nehrđajući čelici bez nikla proizvedeni su u indukcijskoj peći dodavanjem nitrirane ferolegure pod atmosferskim pritiskom. Ispitivanje mehaničkih svojstava i mikrostrukturna analiza kovanih i rastvarajuće žarenih ingota izvršena su za različite sadržaje nitrogena. Analiza mikrostrukture urađena je optičkim mikroskopom, a za karakterizaciju mehaničkih svojstava izvršena su ispitivanja na zatezanje.

Ključne riječi: *austenitni nehrđajući čelik bez nikla, delta ferit, mehanička svojstva, nitrogen*

IMPACT OF DEFORMING RATE ON PLASTIC PROPERTIES OF METALS

UTJECAJ BRZINE DEFORMIRANJA NA PLASTIČNA SVOJSTVA METALA

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Stipo Buljan

Darko Šunjić

ABSTRACT:
The choice of technological factors and the clarification of the impact of deformation speed at the impulse-high-speed processing of metals has a high degree of significance. Generally, there is no single opinion on the character of changes in the parameters of plasticity with the increase of deformation speed. In the testing of carbon and alloyed steel, aluminium, copper and its alloys, a reduction of plasticity at high deformity rates has been observed, which explains the existence of a "critical speed" for those materials at which destruction occurs instantaneously. The metal which is in fact surrounded by impulse stripping shows that plastic deformation is formed by duelling and slipping within a grain. During this obstruction in the working case, elastic-plastic waves occur where the size of the voltage is linked to the speed of the wave propagation.

Keywords: *deformation speed, high-speed processing, extraction coefficient*

REZIME:
Izbor tehnoloških faktora i razjašnjenje utjecaja brzine deformiranja pri impulsnoj – visokobrzinskoj obradi metala ima veliki praktički značaj. Uglavnom ne postoji jedinstveno mišljenje o karakteru promjena parametara plastičnosti sa povećanjem brzine deformiranja.
Pri ispitivanju ugljičnih i legiranih čelika, aluminija, bakra i njegovih legura, uočeno je smanjenje plastičnosti pri visokim brzinama deformiranja, što se objašnjava postojanjem “kritične brzine” za spomenute materijale pri kojoj razaranje nastaje trenutačno. Metal koji je u biti opterećen impulsnim opterećenjem pokazuje da plastična deformacija nastaje dvojnikovanjem i klizanjem unutar zrna. Za vrijeme ovakvog opterećenja u radnom predmetu javljaju se elastično-plastični valovi gdje je veličina napona vezana s brzinom prostiranja vala.

Ključne riječi:*brzina deformiranja, visokobrzinska obrada, koeficijenti zvlačenja*

STRESS AND DEFORMATION ANALYSIS OF DIFFERENT BOLT MODELS IN FINITE ELEMENT ANALYSIS

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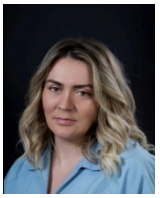
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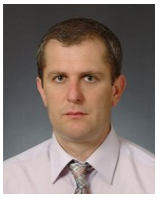
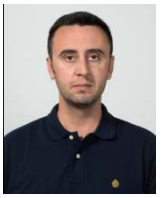
Emir Nezirić


Safet Isić


Edin Šunje

ABSTRACT:
Finite Element Method (FEM) is a commonly used numerical method for solving engineering problems by cutting the structure into several elements connected to nodes. A set of algebraic equations is solved (instead of multiple partial differential equations) to obtain the desired results. The method is usually applied through different computer software on the structure models. It is required more time to solve large models with a lot of elements. To reduce solution time, it is required to simplify some of the parts of the structure and use some approximations. Some of the usual components in structures are bolts, which could be simplified by different models. The proposition of the simple structural model is created in FEM software named ANSYS is created and analyzed with different bolt models. Stress and deformation results are compared to the analytical solution for the proposed model. It is shown that the best results for deformation are obtained for bolt modelled as line body, and the best result for the stress in bolts are obtained for a solid body model of a bolt and nut. For all variants of the bolt model, is shown that it gives larger values of stress and deformations than analytical calculations, which increases the safety factor of a structure. Usage of the right approximation of structure parts in FEM can decrease solution time and still give an appropriate result for deformation and stress.

Keywords: *finite element method, bolt, stress, deformation*

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1. INTRODUCTION

Calculations of the stress and deformation of bolted connections for practical use are regulated by international standards for different fields of engineering. For example, bolted joints of steel structures are regulated by EN 1993-1-8 [1] and pressure vessels with bolted domed ends are regulated by EN 13445-3 [2]. Most of the standards are focused on the definition of how to handle some safety coefficients, standardized calculation factors for the increase or decrease of applied loads and procedures for calculations. Calculations of the bolted connection for ...

BIM MODELING IN MECHANICAL ENGINEERING

BIM MODELIRANJE U MAŠINSKOM INŽINJERINGU

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Ermin Huskić


Adis J. Muminović


Isad Šarić


Nedim Pervan

ABSTRACT:
Building information modeling (BIM) is a process based on so called intelligent three dimensional (3D) models. These models incorporate not only dimensional properties of the product. They incorporate all information's about functional or descriptive properties. There is significant difference between computer aided design (CAD) modeling and BIM modeling. Goal of this paper is to describe and highlight that differences. Through the paper it is described when, where and why BIM modeling needs to be used. Idea behind BIM modeling principles is described in detail. In addition, advantages and disadvantages of BIM modeling is highlighted. Potential possibilities of using BIM modeling in the field of mechanical engineering have been presented.

Keywords: *Building Information Modeling (BIM), Computer Aided Design (CAD), Mechanical engineering, MEP*

SAŽETAK:
Building information modeling (BIM) je process baziran na takozvanim inteligentnim trodimenzionalnim (3D) modelima. Ovi modeli se ne sastoje samo od dimenzionih karakteristika proizvoda već u sebi sadrže sve informacije o funkcionalnim i opisnim karakteristikama. Postoji bitna razlika između computer aided design (CAD) modeliranja i BIM modeliranja. Cilj ovog rada je da se opišu i istaknu te razlike. Kroz rad je objašnjeno kada, gdje i kako treba upotrebiti BIM principe modeliranja u odnosu na CAD modeliranje u mašinskom inžinjeringu. Principi BIM modeliranja su detaljno objašnjeni kroz rad. Također, prednosti i nedostaci ovog tipa modeliranja posebno su istaknuti, navedene su potencijalne oblasti upotrebe BIM modeliranja u mašinskom inžinjeringu.

Ključne riječi: *Building Information Modeling (BIM), Computer Aided Design (CAD), Mašinsko inžinjerstvo, MEP*

INFLUENCE OF MULTIPLE TOOL GEOMETRY ON DRAWING FORCE

UTICAJ GEOMETRIJE VIŠESTEPENOG ALATA NA SILU IZVLAČENJA

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Mirna Nožić

HimzoĐukić

ABSTRACT:
The paper presents experimental results of research on the influence of the geometry of a multistage tool on the drawing force. The results refer to six different five-step tools that are dimensioned in three different ways. The tools were tested in production conditions on horizontal mechanical presses on two different products with different total logarithmic degree of deformation.

Keywords: multistage tools, dimensioning of multistage tools, drawing with wall thickness reduction, tool geometry, drawing force, redistribution of total logarithmic degree of deformation

REZIME:
U radu su dati eksperimentalni rezultati istraživanja uticaja geometrije višestepenog alata na silu izvlačenja. Rezultati se odnose na šest različitih petostepenih alata koji su dimenzionisani na tri različita načina. Alati su testirani u proizvodnim uslovima na horizontalnim mehaničkim presama na dva različita proizvoda sa različitim ukupnim logaritamskim stepenom deformacije.

Ključne riječi: *višestepeni alati, dimenzionisanje višestepenih alata, izvlačenje sa redukcijom debljine zida, geometrija alata, sila izvlačenja, preraspodjela ukupnog logaritamskog stepena deformacije*

---

1. INTRODUCTION

In the process of deep drawing with the reduction of wall thickness, multi-stage tools are used. The executive parts of each multi-stage tool are: a puller and a set of extraction rings. The number of rings in a multi-stage tool is usually from two to six, so depending on that number, we are talking about: two-stage, three-stage, four-stage, five-stage or six-stage tools. The rings are arranged in the carrier according to the diameter from the largest to the smallest, which corresponds to the diameter of the extracted work piece.

EXPERIMENTAL DETERMINATION OF INFLUENCE OF COOLING PARAMETERS ON INJECTION MOLDED PART DIMENSIONAL STABILITY

EKSPERIENTALNO ODREĐIVANJE UTJECAJA PARAMETARA HLAĐENJA NADIMENZIONALNU STABILNOST BRIZGANIH DIJELOVA

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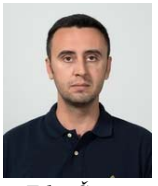

Edin Šunje

Edin Džiho

ABSTRACT:
Injection molding is one of the commonly used methods for plastics processing. The process of injection molding consists of a sequence of stages and the time it takes to complete all the stages referred to as cycle time of injection molding process. The process of injection molding comprises the steps of closing the mold, injection of molten plastics within the closed mold, cooling the molten plastic, opening, and ejecting the product. The process of cooling is the most important stage of the injection molding process, it takes up to 75% of the total cycle time. The effects of coolant flow, melt temperature, cooling time and holding pressure on injection molded part quality has been analyzed. Physical and numerical experiment has been conducted and the most influential parameters has been determined. The material used in experiment is polypropylene Sabic PP 412MN40.

Keywords: *polymer**,** injection molding, cooling, coolant flow regimes, mold temperature, melt temperature, holding pressure*

REZIME:
Postupak brizganjaplastike je jedan od najčešće korištenih metoda prerade plastičnih masa. Proces brizganja plastike se sastoji od više faza, a ukupno vrijeme potrebno za završetak svih fazadefinišemo kaovrijeme trajanja ciklusa. Proces čine faza zatvaranja alata, ubrizgavanja rastopljene plastike u kalupnu šupljinu, hlađenja rastopljene plastike, otvaranja alata i izbacivanja proizvoda. Faza hlađenja je najznačajnija u procesu brizganja plastike, obzirom da na nju otpada i do 75% ukupnog vremena ciklusa. U radu je analiziran utjecaj protoka medija za temperiranje, temperature rastopa, vremena hlađenja i naknadnog pritiska na kvalitet otpreska. Provedeni su fizički i simulacioni eksperimenti nakon čega su definisani najutjecajniji procesni parametri. Materijal koji je korišten u eksperimentu je polipropilen Sabic PP 412MN40.

Ključne riječi: *polimer**,** brizganje plastike, hlađenje, režimi protoka, temperature alata, temperatura rastopa, naknadni pritisak*

ESTIMATION OF SHRINKAGE AND WARPAGE IN GLASS-FIBER REINFORCED POLYAMIDE HINGE

PROCJENA SKUPLJANJA I DISTORZIJE KOD BAGLAME IZRAĐENE OD POLIAMIDA OJAČANOG STAKLENIM VLAKNIMA

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Edin Šunje

Edin Džiho

ABSTRACT:
The estimation of shrinkage and warpage is key input parameter for proper injection mold design. Shrinkage is the property of polymeric material, and it cannot be eliminated. If the shrinkage is uniform, part will be smaller but not warped, on the other side if the shrinkage is differential it will lead to part warpage. There are several reasons for part warpage: part geometry, injection pressure and temperature, mold cooling, material property. Especially, it is challenging to predict warpage in fiber reinforced materials, due to its differential shrinkage in flow direction and perpendicular to flow direction. In this study, numerical analysis is used to predict warpage on plastic hinge made of glass fiber reinforced polyamide. The result verification has been conducted through simulation dimensional control comparison with the corresponding measured dimensions of the real part.

Keywords: *polyamide 6, glass-fiber, shrinkage, warpage, injection molding, injection mold*

REZIME:
Procjena skupljanjai distorzije je ključni ulazni parametar u procesu projektovanja alata za brizganje plastike. Skupljanje je osobine polimernih materijala i ne može se eliminisati. Ukoliko je skupljanje uniformno, otpresak se neće deformisati samo će postati manji, s druge strane neuniformno skupljanje uzrokuje distorziju otperska. Postoji više razloga zbog kojih dolazi do distorzije brizganih dijelova: geometrija dijela, pritisak, temperatura, hlađenje i osobine materijala. Poseban je izazov predvidjeti distorziju kod vlaknima ojačanih materijala, zbog diferencijalnog skupljanjau smjeru tečenja i okomito na smjer tečenja materijala. U ovom istraživanju su korištene numeričke metode kako bi se predvidjela distorzija baglame izrađene od poliamida ojačanog staklenim vlaknima. Verifikacija rezultata procjene distorzije je urađena komparacijom tolerisanih mjera sakorespondirajućim mjerama stvarnog dijela.

Ključne riječi: *poliamid 6**,** staklena vlakna, skupljanje, distorzija, brizganje plastike, alati za brizganje plastike*

DEPENDENCE BASIC GEOMETRIC CHARACTERISTICS OF POLYMER COMPONENTS ON PARAMETERS INJECTION MOLDING AND GATE POSITION

ZAVISNOST OSNOVNIH GEOMETRIJSKIH KARAKTERISTIKA POLIMERNIH KOMPONENTI OD PARAMETARA INJEKCIONOG BRIZGANJA I POLOŽAJA UŠĆA

Edis Nasić[1], Denijal Sprečić[1], Jasmin Halilović[1], Džemal Kovačević[1]
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Edis Nasić


Denijal Sprečić


Jasmin Halilović


Džemal Kovačević

ABSTRACT:
Dimensional shrinkage of components is a very common occurrence in the injection molding process. This phenomenon leads to deviations, often to deformations that affect the final shape, dimensions and quality of the final component. It is difficult to completely avoid this phenomenon. In relation to the used material, shape component and construction tool, there are several influential factors. In this paper, the influence of: melt temperature, holding pressure, injection velocity and gate position on geometrical characteristics - dimensional shrinkage is analyzed. The material used to make the components is low density polyethylene (LDPE). The results of the research showed that by changing: holding pressure, injection velocity, melt temperature and gate position, can be affected on dimensional shrinkage.

Keywords: *Shrinkage, deformations, molding parameters, injection molding, gate position*

REZIME:
Dimenziono skupljanje komponenti je vrlo česta pojava u procesu injekcionog brizganja. Ova pojava dovodi do odstupanja, često do deformacija koje utiču na konačni oblik, dimenzije i kvalitet završne komponente. Teško je u potpunosti izbjeći ovu pojavu. U odnosu na korišteni materijal, oblik komponente i konstrukciju alata, više je uticajnih faktora. U ovom radu analiziran je uticaj: temperature rastopine, pritiska držanja, brzine injektiranja i položaja ušća na geometrijske karakteristike - dimenziono skupljanje. Materijal korišten za izradu komponenti je polietilen niske gustoće (LDPE). Rezultati istraživanja su pokazali da se promjenom: pritiska držanja, brzine injektiranja, temperature rastopine i položaja ušća može uticati na dimenziono skupljanje.

Ključne riječi: *Skupljanje, deformacija,parametri brizganja, injekciono brizganje, položajušća*

DEVELOPMENT OF 3D PRINTED TRANSFEMORAL PROSTHETIC LEG WITH ACTUATED JOINTS

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[2]Airbus DS GmbH, Germany
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Zlata Jelačić


Faris Ustamujić


Remzo Dedić


Želimir Husnić

ABSTRACT:
Most amputees use passive prostheses, meaning that these devices are not powered in any way and cannot give any additional output of energy to its user. They usually work on using elastic or some other potential energy which is stored during one sequence of gait, and then released in another. However, performing high power demanding tasks, such as stair ascent, presents a problem, because the lack of muscles makes it impossible to produce the required forces. To perform high demanding power activities, prosthesis must be powered, primarily in its main joints – knee and ankle. This paper describes the concept of a new type of 3D printed above-knee prosthesis with integrated knee and ankle drives. The entire hydraulic system is located in the lower leg area of the above-knee prosthetic leg.

Keywords: *above-knee prosthetic leg, rehabilitation robotics, hydraulic control system, wearable robotics*

SAŽETAK:
Većina amputiranih koristi pasivne proteze, što znači da se ti uređaji ne napajaju ni na koji način i ne mogu dati nikakav dodatni izlaz energije svom korisniku. Obično rade na korištenju elastične ili neke druge potencijalne energije koja se pohranjuje tijekom jednog slijeda hoda, a zatim oslobađa u drugom. Međutim, izvođenje zadataka koji zahtijevaju veliku snagu, kao što je penjanje uz stepenice, predstavlja problem, jer nedostatak mišića onemogućuje stvaranje potrebnih sila. Za obavljanje zahtjevnih aktivnosti, proteza mora biti napajana, prvenstveno u svojim glavnim zglobovima – koljenu i gležnju. Ovaj rad opisuje koncept nove vrste 3D tiskane natkoljenične proteze s integriranim pogonima za koljena i gležanj. Cijeli hidraulički sustav nalazi se u području potkoljenice protetske noge.

Ključne riječi: *natkoljenična protetska noga, rehabilitaciona robotika, hidraulični sustav, nosiva robotika*

COMPARISON OF OPTIMIZATION METHODS IN OPTIMIZATION OF TWO BAR STRUCTURE

POREĐENJE OPTIMIZACIJSKIH METODA U OPTIMIZACIJI STRUKTURE SA DVA ŠTAPA

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Ermin Husak

Mehmed Mahmić

ABSTRACT:
In this paper, the analysis of the results obtained by optimizing the two bar structure is given. The minimum mass of the structure was chosen as an objective function. The constraint placed on the structure is the permissible stress in each bar. The optimization of the two bar structure was done with four methods: nonlinear programming, genetic algorithm, particle swarm optimization and ant colony optimization. The best results were obtained by particle swarm optimization.

Keywords: *optimization, structure, bar, optimization methods.*

REZIME:
U ovom radu data je analiza rezultata dobijenih optimizacijom strukture sa dva štapa. Kao funkcija cilja odabrana je minimalna masa strukture. Dozvoljeni napon u svakom štapu je odabran kao ograničenje. Optimizacija strukture sa dva štapa je urađena sa četiri metode: nelinearnim programiranjem, genetskim algoritmima, optimizacijom rojem čestica i optimizacijom kolonijom mrava. Najbolji rezultat je dobijen optmizacijom rojem čestica.

Ključne riječi: *optimizacija, struktura, štap, optimizacijske metode.*

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1. INTRODUCTION

Optimal design is a modern approach to design where optimization is an unavoidable phase of this process. Optimal design involves determining the optimal geometric parameters for a set objective function. The optimization process is carried out on the basis of some of the developed optimization methods. The most important classical group of optimization methods is mathematical programming. These methods are based on calculating the gradients of the objective and constraint function, so they are often called gradient methods. The modern group of optimization methods is represented by heuristic methods. ...

THE WIDER PICTURE OF VALUE CREATION IN LIFE AND BUSINESS THAN LEAN PRODUCTION CONCEPT

ŠIRA SLIKA STVARANJA VRIJEDNOSTI U ŽIVOTU I POSLOVANJU OD KONCEPTA LEAN PROIZVODNJE

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Ismar Alagić

ABSTRACT:
Every system is intended to create a "value". Value is "all that contributes to the market form or function of a product or service in such a way those buyers are willing to pay for it". A very common term we encounter is waste. The Lean concept works by recognizing all activities that "do not add value" or what customers are not willing to pay. Lean production concept has recognized seven such losses, even more ones according to Author of article. The basic message of Lean Production concept is Lean Manufacturing = Common Sense.
Think about the nuclear weapons race, recent wars, global warming, environmental pollution, GMO and fast food, various cancer causes, modern slavery, poverty, corrupt financial systems, the recent COVID- 19 outbreak, and so on. If we are smarter today why don't we use that knowledge to be happier and create positive changes both as a collective and as individuals? Isn't the most valuable form of knowledge that which can make us happier? ...

Key words: *Value, Value creation, Lean Production, time, value laws*

REZIME:
Svaki sistem, bio on proizvodni ili bilo koji drugi, ima za cilj stvaranje "vrijednosti". Vrijednost je "sve što doprinosi tržišnom obliku ili funkciji proizvoda ili usluge na način da su ti kupci spremni platiti za to". Vrlo čest izraz s kojim se susrećemo je otpad ili gubici. Lean koncept funkcionira tako što prepoznaje sve aktivnosti koje "ne dodaju vrijednost" ili ono što kupci nisu spremni platiti. Koncept lean proizvodnje prepoznao je sedam takvih gubitaka, čak i više prema autoru članka. Osnovna poruka koncepta Lean Production je Lean Manufacturing = Common Sense.
Razmislite o utrci nuklearnog oružja, nedavnim ratovima, globalnom zagrijavanju, zagađenju okoliša, GMO-u i brzoj hrani, raznim uzrocima raka, modernom ropstvu, siromaštvu, korumpiranim financijskim sustavima, nedavnoj epidemiji COVID-19 itd. Ako smo danas pametniji zašto to znanje ne iskoristimo da budemo sretniji i stvorimo pozitivne promjene i kao kolektiv i kao pojedinci? ...

Ključni pojmovi: *Vrijednost, stvaranje vrijednosti, Lean proizvodnja, vrijeme, zakoni vrijednosti.*

GENETIC MODELING OF DIE LOAD IN HYDROFORMING OF CROSS TUBE

GENETSKO MODELIRANJE OPTEREĆENJA ALATA KOD HIDROOBLIKOVANJA RAČVE

Mehmed Mahmić[1], Edina Karabegović[2], Ermin Husak[3]
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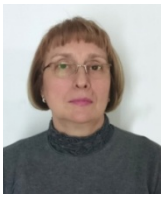
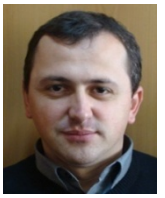
Mehmed Mahmić


Edina Karabegović


Ermin Husak

ABSTRACT:
In addition to the optimal process parameters, machines, tools and materials have a significant impact on the successful execution of the plastic forming process in the machining system. All these elements of the processing system are important for achieving maximum productivity, optimal quality, and minimum production costs. Previous research and theoretical analysis of dies as executive elements have shown that any deviation that may occur on the plastic forming die during operation reflects on the quality of the product, which does not ensure competitiveness in the market. The durability of the die depends on several parameters, depending on the plastic forming process, macrogeometry of the die, microgeometry of the die working zone, die load, tribological condition of contact surfaces, etc. The research provided in this paper relates to the modeling of die loads in the cross tube hydroforming process using the genetic algorithm method.

Keywords: *hydroforming, die, load, experiment, GA modeling*

SAŽETAK:
Za uspješno izvođenje procesa plastičnog oblikovanja u obradnom sistemu, pored optimalnih parametara procesa, značajan utjecaj imaju mašina, alat i materijal. Svi navedeni elementi obradnog sistema važni su za postizanje maksimalne produktivnosti, optimalnog kvaliteta i minimalnih troškova proizvodnje. Dosadašnja istraživanja i teorijske analize alata, kao izvršnih elemenata pokazala su da bilo kakvo odstupanje koje se može javiti na alatu za plastično oblikovanje u toku eksploatacije se odražava na kvalitetu proizvoda, koja ne osigurava konkurentnost na tržištu. Postojanost alata ovisi od više parametara, ovisno od procesa plastičnog oblikovanja, makrogeometrije alata, mikrogeometrije radne zone alata, opterećenja alata, tribološkog stanja kontaktnih površina i dr. Istraživanja data u ovom radu odnose se na modeliranje opterećenja alata u procesu hidrooblikovanja račve primjenom metode genetskog algoritma.

Ključne riječi: *hidrooblikovanje, alat, opterećenje, eksperiment, GA modeliranje*

THE VALUE MANAGEMENT THROUGH VALUE ARCHITECTURE IN LIFE AND BUSINESS

UPRAVLJANJE VRIJEDNOŠĆU KROZ ARHITEKTURU VRIJEDNOSTI U ŽIVOTU I POSLU

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Ismar Alagić

ABSTRACT:
Author of article has learned and implemented many business performance tools over the last 20 years of his business improvement and system control consulting career. In this article, it will present you how to implement Value management in order to create positive changes.
The objectives of this article are to familiarize readers with business concepts, methods, and tools, as well as to provide them with relevant examples on how to apply them in both their businesses and private lives. It is important to realize that everything we plan and do on a daily basis should have one simple goal: to improve and maximize value creation for yourself and for the people around us. We are the CEOs of our lives. We know what we value and we make priorities and tough decisions every day. Some of us are more proactive and structured in our life-management process than others but after reading this article you will be equipped with essential managerial concepts and methods you will apply in both personal life and business environment. ...

Key words: *Value, Value management, tools and methods, Change Management, Continuous improvement.*

REZIME:
Autor članka naučio je i implementirao mnoge alate za poslovne performanse u posljednjih 20 godina svoje konzultantske karijere za poboljšanje poslovanja i kontrolu sustava. U ovom će vam članku biti predstavljeno kako implementirati upravljanje vrijednostima kako biste stvorili pozitivne promjene.Ciljevi ovog članka su upoznati čitatelje s poslovnim konceptima, metodama i alatima, kao i dati im relevantne primjere kako ih primijeniti u svom poslu i privatnom životu.
Važno je shvatiti da sve što svako dnevno planiramo i radimo treba imati jedan jednostavan cilj: poboljšati i povećati stvaranje vrijednosti za sebe i za ljude oko nas. Mi smo izvršni direktori svojih života. Znamo što cijenimo i svakodnevno donosimo prioritete i teške odluke. Neki od nas su proaktivniji i strukturiraniji u našem procesu upravljanja životom od drugih, no nakon čitanja ovog članka bit ćete opremljeni bitnim menadžerskim konceptima i metodama koje ćete primijeniti u osobnom životu i poslovnom okruženju. ...

Ključne riječi: *Vrijednost, Upravljanje vrijednostima, alati i metode, Upravljanje promjenama, Kontinuirano poboljšanje.*

K-MEANS CLUSTERING AND HADAMARD METRIC FOR GRAPHS MODELLING

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ABSTRACT:
Modelling a geometric surface or contour surface is a modern field involving a wide range of topics such as mathematics, computer science, engineering design. The main task in modelling a geometric surface is to approximation the shape of the contour surface of a 3D solid object the most efficient way. In this paper we will give a method to optimize the geometric model, by defining a local sampling of the mesh, based onk-means method and minimization of the Hausdorff measure with an homologous model.

Keywords: *geometric modelling, Hausdorff distance, k-means, clustering*

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1. INTRODUCTION

Geometric modelling of a surface is based on a polygonal tessellation, but the most efficient models are using triangular meshes. However, by increasing the density of triangles in the mesh would reduce the approximation error, thus giving a better rendering. Nevertheless also the computational cost increases thus reducing the efficiency of the geometric modeling. Moreover, for a given surface there not exists a unique polygonal shape so that is still unsolved the problem of chosing the optimal mesh. For a given solid we can have two geometric models which are characterized by several parameters like e.g., the polygons of the tesselation, the discrete curvature in the meshes, computed at the sampling points, the minimal circuits, the color intensity. In order to compare two models it has been recently proposed [1] a measure of the difference between two shapes by using the so called Hadamard shape. However, in order to measure all distances between polygons on two shapes, has some computational costs that can be reduced by measuring the distances between some suitably chosen points on the mesh. This subset of points is selected by using the k-means algorithm. In the following we will propose a comparison between homologous geometric models which is based on the k-means method, thus reducing the computational costs.

REALIZATION OF SINGLE IMAGE SUPER-RESOLUTION RECONSTRUCTION BASED ON WAVELET TRANSFORM AND COUPLED DICTIONARY

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Wei Qin


Min Zhao


Shuli Mei


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Vincenzo Guercio


Francesco Villecco

ABSTRACT:
In various tasks of machine vision, image resolution is one of the important factors that affect the performance of the model. Generally, crop images with low resolution and lack of detail information may be collected. The picture is not good for the accuracy of yield prediction and crop pest identification. In this paper, tomato leaves are used as the target image, and the super-resolution reconstruction process takes advantage of the sharpness of the image, which has the characteristic of Scale invariance. Firstly, each image block is classified by using clustering algorithm according to the sharpness value of the image, and then wavelet transform is used to extract image features from each class of image blocks to get wavelet subbands respectively, subbands of each class not only train a union dictionary, but also learn a separate mapping function. Joint dictionary training and separate mapping matrix learning are helpful to optimize the high resolution and low resolution sparse coefficients. In the Reconstruction Stage: in order to reduce the image reconstruction time, the wavelet transform is only applied to the image blocks with a certain sharpness value, while the image reconstruction performance is basically unchanged, then the high-resolution image blocks are reconstructed by using the mapping function, coupled dictionary and the sparse representation coefficients of the image blocks. When the sharpness of the image block is lower than a certain sharpness value, the high and middle resolution image blocks will be superimposed to finally get the high resolution image.In the various tasks of machine vision, image resolution is one of the important factors that affect average PSNR value of the algorithm in this paper is 3.94dB, 3.54dB, 3.36dB, 3.23dB, 3.01dB and 1.51dB higher respectively.

Keywords: *Sharpness value;Clustering; Sparse representation;Coupled dictionary*

SHEARLET AND PATCH REORDERING BASEDTEXTURE PRESERVING DENOISINGMETHOD FOR LOCUST SLICEIMAGES

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Shuli Mei


Leiping Zhu


Matteo d'Amore


Andrea Formato


Francesco Villecco

ABSTRACT:
Locust slice image is a kind of cartoon-like images, in which the texture possesses theproperty of self-similarity.Both of the texture and the noises belong to the high-frequency signals, and so it is difficult to tell the difference between them for most denoising methods.Aim to the problem, we propose a novel denoisingmethod by combining the patch reordering with the shearlet transform.In the reordering process, the patches are divided into smooth and texture components. The filters obtained from the training set are employed to process the patches in smooth regions and the shearlet transform are employed to process the texture regions.The experiments show that the values of PSNR and SSIMof the processed images obtained by the proposed method are betterthanthe common methods.

Keywords: *texture preserving; image denoising; patch reordering; shearlet transform*

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1. INTRODUCTION

The study on the interaction mechanism of biological pesticides and organisms plays an important role in the development of the new pesticide. The researchonlocust microscopic section images is an important tool in observing the cell structure of locusts. The slice imagesof the locust have rich texture structures, some of whichhave self-similar fractal structures [1-5]. Both of the noise in the images and texture belong to the high-frequency signals, so it is difficult to tell the difference between them by mean of the common image processing methods. As the common methods are employed to remove the high-frequency signals in order to denoise, while the texture and contour of the image is blurred.Time-fractional gas dynamics equation [6-10]and fractal logic equation [4] are actively used to explore the convergence point with the field of image processing. Considering the multi-scale characteristics, some researchers use wavelet transform to denoise the image.

SHEARLET TRANSFORM AND THE APPLICATION IN IMAGE PROCESSING

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Hu Haitao


Piercarlo Cattani


Vincenzo Guercio


Francesco Villecco

ABSTRACT:
Shearlet is a multi-dimensional function used for sparse representation, which has many excellent characteristics such as multi-resolution and multi-direction. It can detect the position of singular points and the direction of singular curves, and is more sensitive to the geometric structure of the image. Therefore, this paper introduces the shearlet transform and its application in image processing, and introduces the bendlet transform proposed on this basis.

Keywords:*shearlet, bendlet, transform, image processing*

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1. INTRODUCTION

Fourier theory is widely used in signal analysis, but it cannot provide frequency information in the corresponding time period, and there is no time-frequency analysis. As a result, the wavelet analysis tool was born. It can obtain better time resolution in the high-frequency part of the signal by replacing the infinite-length trigonometric function basis with the finite-length decaying wavelet basis. And obtaining better frequency resolution in the low-frequency part of the signal.
Waveletshave the characteristics of multi-scale, which can flexibly and accurately analyze the relationship between time and frequency, and can flexibly select different basis functions for different problems. Wavelet can also realize the clustering of important information in the image.

BACKUP TECHNOLOGIES APPLICABLE FOR SECURING THE DATABASES ININTELLECTUAL PROPERTY ORGANIZATIONS

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Radu Costin Moisescu

ABSTRACT:
The proposed paper argues from a scientific point of view the need to implement the international standard ISO 27001:2013 by analyzing security measures to be integrated in organizations whose object of activity is the protection of intellectual property in order to protect data and databases. At the same time, the need to analyze and implement adequate technologies for centralized backup systems in intellectual property organizations is taken into account using dynamic simulations through which systems performance can be determined and evaluated by analyzing experimental results. The research refers to an analysis of database security technologies in the information systems within these organizations. The issue of analysis of architectures and technologies that can be applied in the field of database security by implementing modern centralized backup mechanisms from existing information systems in these organizations is an extremely relevant aspect analyzed and explained in this research. The proposed research can be considered a reasoned and documented point of view in a topical field.

Keywords: *information system, computer system, data architectures, data, backup*

1. INTRODUCTION

Modern economies are driven by digital information and new communication technologies, giving organizations and individuals easy access to a wide range of information, regardless of their forms of existence, storage or geographic location. All these mechanisms for the transmission, storage and processing of information encourage the development of new products and services.

In this context, developed countries have implemented both government programs for the development and implementation of new technologies and the consolidation and security of information and communication infrastructures. The development of the use of electronic means for communications in all areas of activity and fundamental transformations in organizations and throughout society has led to a sustained increase in the volume of data to be processed and stored, thus raising the issue of securing them.

DEDUPLICATION TECHNOLOGIES APPLICABLE FOR THE BACKUP SYSTEMS ININTELLECTUAL PROPERTY ORGANIZATIONS

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Radu Costin Moisescu

Aurel Mihail Țițu

ABSTRACT:
The sustained pace of data growth as well as the attempt to ensure that the management of this data can be achieved successfully is a growing challenge nowadays. Increasing the volume of data and their complexity, concerns about performance in trying to save / restore or move this data. In this context, in intellectual property organizations, the centralized storage technologies must be closely monitored to ensure that the storage mechanism implemented is appropriate to these types of data. Thus, new data deduplication technologies are an essential tool to help address these concerns. The research refers to an analysis of the impact that the implementation of data deduplication mechanisms in the information systems within these organizations has. The impact of the development of data deduplication mechanisms is presented by analyzing the results of dynamic simulations that can determine and evaluate the performance of centralized backup systems in these organizations and which represents an extremely relevant aspect analyzed and explained in this research. The proposed research can be considered a reasoned and documented point of view in a topical field.

Keywords: *information system, deduplication, data architectures, management, backup*

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1. INTRODUCTION

Intellectual property will certainly develop, adapting to the digital age. But, in order to achieve a balance between the public interest in digital information and the private rights to information, additional efforts are needed, but also an adaptation over time. In the context of the development of IT infrastructures and applications that facilitate access to digital information, the protection of intellectual property is an important mission in which decision makers and stakeholders will have to work together to ensure the protection of these rights. Increasing and improving access to digital information for society as a whole is thus ensured by the development of information infrastructure and ...

A STRATEGY FOR APPLYING OPEN DATA INITIATIVES

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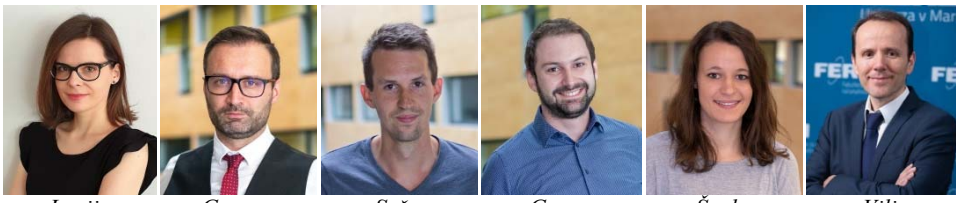

Lucija Brezočnik | *Gregor Polančič* | *Sašo Karakatič* | *Grega Vrbančič* | *Špela Pečnik* | *Vili Podgorelec*

ABSTRACT:
The advances of information technology have brought us to a period of increasingly rapid creation, sharing and exchange of information. In general, we do not perceive just how much information we are creating by using modern information technology devices. Still, the reality here is that we are creating data on a business and personal level while it continues to grow in both importance and volume. Therefore, this paper provides guidelines for a successful open data initiative implementation. For the latter, we present key stakeholders with their engagement reasons, critical success factors, and strategic themes for the designated area.

Keywords: *Open Data, Open Government, Freedom of Information, Transformation, Guidelines*

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1. INTRODUCTION

Nowadays, most individuals and organisations generate a broad range of data when performing their operations; however, the data is often left inaccessible in a local database or even forgotten after the initial use. Because of that, properly prepared and presented data is a largely untapped resource. However, the question that arises is why would such data be of public interest? There are many areas where we can expect open data (OD) to be of value and where examples of its use already exist [1]. Many different groups of people and organisations can benefit from the availability of OD, including the government itself [2]. At the same time, it is impossible to precisely predict how and where value will be created in the future because the use of data often creates new possibilities for further uses. The nature of innovation is that developments often come from unlikely places. ...

DIGITAL TRANSFORMATION USING ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING: AN ELECTRICAL ENERGY CONSUMPTION CASE

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Intelligent Systems Laboratory, Faculty of Electrical Engineering and Computer Science, University of Maribor, Slovenia






Vili Podgorelec | *Sašo Karakatič* | *Iztok Fister Jr* | *Lucija Brezočnik* | *Špela Pečnik* | *Grega Vrbančič*

ABSTRACT:
Companies nowadays eagerly compete in providing their customers with the best possible services, where the companies in the electrical energy market are no exception. As artificial intelligence and machine learning are considered the fundamental multi-purpose technologiesand the innovation entity with the most significant potential for disruption, the companies strive to adopt these technologies and integrate them into their business processes.To test the possibilities for the introduction of AI and ML methods in their information system and business processes, we established a pilot project with a company operating in the electrical energy domain. An electrical energy consumption forecasting model has been developed alongside with some additional components. The obtained results show that a proper use of AI and ML methods can offer means for providing new and advanced services to different kinds of company's customers.

Keywords: *digital transformation, artificial intelligence, machine learning, power engineering, electrical energy consumption, prediction*

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1. INTRODUCTION

Efficient processing of business data has always been at the heart of the electrical power engineering industry and its related activities, enabling it to provide secure, reliable and high-quality services and transparent operations [1]. In times of constant growth of both the volume and details of data collected on the one hand, and the desire and need for their best use on the other, we are witnessing extremely rapid development of information technology, software solutions and services. As the overall amount of generated data growsdaily, so does the ability of computer systems and approaches to process this mass of data and discover new, more accurate insights. In doing so, modern methods of artificial intelligence (AI) and machine learning (ML) are the ones that enable the designers of information systems and software engineers to develop new services based on in-depth automated processing of the captured data.

PETRI NET-BASED MODEL OF MASTER/SLAVE DATASET REPLICATION IN BIG DATA

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Ilija Hristoski

Tome Dimovski

ABSTRACT:
In today's corporate world, the Big Data paradigm assists organizations in harnessing their plentiful data in their never-ending pursuit for new business possibilities. The main problem that such businesses have is keeping Big Data infrastructure performant, scalable, dependable, and accessible. All of these issues are often solved by implementing fault-tolerant systems. Dataset replication is one of the critical procedures that must be performed on a regular basis in order to increase system resilience. The purpose of this work is to propose a performance model regarding the execution of reading and writing operations found in one of the most used Big Data replication architectures, the Master/Slave architecture, which is based on the usage of the class of Generalized Stochastic Petri Nets. Such a model may be used for performance analysis to acquire various performance metrics in relation to different working scenarios with varying input parameters.

Keywords: *Big Data infrastructure, Master/Slave dataset replication, read/write operations, performance modeling, Generalized Stochastic Petri Nets (GSPNs)*

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1. INTRODUCTION

The total quantity of data generated, shared, recorded, copied, and consumed by organizations, businesses, industry, and individuals are expected to increase dramatically throughout the world in the forthcoming years. It has already reached 64.2 zettabytes in 2020 (1 zettabyte equals 1 trillion gigabytes) [1]. In addition, global data generation is expected to exceed 180 zettabytes during the next five years, up to 2025. Despite this intensely rising trend, only a portion of this freshly created data is stored, as only 2% of the data produced and consumed in 2020 was saved and held until 2021. Following such a significant rise in data volume, the installed base of storage capacity is expected to grow at a compound annual growth rate (CAGR) of 19.2% from 2020 to 2025. In 2020, the installed base of storage capacity already surpassed 6.7 zettabytes on a global scale [1]. ...

CYBERCRIMES WAYS TO PICK UP ELECTRONIC DEVICES

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Petrică Tertereanu

ABSTRACT:
Currently, almost every crime has an electronic component, such as computers or an electronic technology that facilitates crime. The more time we spend in the digital world, the more opportunities we offer cybercriminals. The investigation refers to the way of singing up electronic devices containing evidence related to the crime being investigated, whether it is a regular one or terrorist action. In today's society, people use different computers, electronic devices and other electronic media in many activities in their lives. Criminals use the same devices to facilitate their illegal activities. Technologies enable criminals to commit crimes internationally, remotely, with complete anonymity. Cyber attacks are a complex category of threats , through the accentuated dynamics, the global character, the difficulty of identifying the source of the attack and establishing effective countermeasures. The likely targets of these attacks can be both civilian critical infrastructure objectives and communication systems and information technologies used by military structures.

Keywords: *information system, electronic devices, cyber attack, cybercrime, electronic technology*

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1. INTRODUCTION

In recent decades, cyberspace has had a major impact on all components of society. The uninterrupted functioning of information and communication technology has made our daily lives, our fundamental rights, our social interactions and our economies dependent on them. Fundamental rights, democracy and the rule of law need protection in cyberspace. But online freedom requires both safety and security[1].
The more we spend in the digital world, the more opportunities we offer cybercriminals. Cybercrime is a form of crime with one of the fastest rates of development, which causes worldwide damage to at least one million people a day. In today's society, in the constituent elements of the crime most often there is an electronic part such as the computer or an electronic component that contributes to its commission. The computing technique used contains e-evidence that relates to the crime committed, whether we are referring to a common crime or a terrorist offence [2]. Information and Communication Technology (ICT) is the backbone of economic growth and is a source of strategic importance underpinning the sectors of the economy. ...

RECURSIVE METHOD OF FORMING A TECHNICAL OBJECT DESCRIPTION AND DESIGN PROCESS ORGANIZATION

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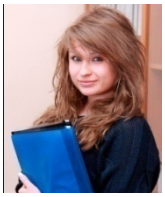
Viktoriia Antypenko


Viktor Nenia


Anna Marchenko


Bohdan Antypenko

ABSTRACT:
This article presents the recursive method of forming a description of any mechanical engineering object, which provides its practical computer support, regardless its type. Creative activity on new technical objects development is considered as manufacturingactivity. It is a subject to control and management, organizational and administrative regulation. Such activity has three features of its substantiation. These are designing, projection and aesthetic design. The last two ones are quite simple according to control and management of the process of the technical object project development as they are based on a previously accepted and approved concept. However, in the first case, where the designed object is considered as the one containing many complex processes, the “decomposition” approach is chosen. Its development process is algorithmized on the basis of formal Terms of References (ToR) meaning the selection of components that would be specially combined into one unit and ensure compliance with the ToR requirements. Such object description using ICOM approach of the IDEF0 method, form the interfaces that are necessary for the object functioning. It provides the clarification of the component description if it is absent or formation the last ToR in the design chain, if there is an understanding of the component practical implementation or choosing an appropriate item according to the catalog, if there is a real component description. These three cases cover all possible variants of the output decomposition results and guarantee the completion of an organized recursive process of detailing the designed object description.

Keywords: *recursive method, technical object description, computer support, decomposition, component description, design process organization, manufacturing.*

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1. INTRODUCTION

Nowadays there is a regularity: the law of human society on growing consumption, is that people’s activities in everyday life, in manufacturing and in the public field require new types of objects which should be more functional, more convenient and easier to use. In general, they must be of higher quality.Furthermore, business as the driving force of modern progress demands to produce these new types of objects as soon as possible.Mainly, these requirements are laid down and partially implemented at the designing stage.Exactly this feature determines the design requirement ...

USING SWOT ANALYSIS FOR MORE EFFICIENT COMMUNICATION AND PERFORMANCE AT THE LEVEL OF PUBLIC ADMINISTRATION

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Iuliana Moisescu

ABSTRACT:
Various strategic management and planning tools and techniques are available for organizations to analyze their current situation, and one powerful yet simple technique used in strategic planning is the SWOT analysis. This type of analytical tool is also used at the level of public administration, as it offers the opportunity to identify the key elements necessary to fulfill the purpose for which those public authorities were created. Knowing the strengths, weaknesses, opportunities, and threats represents essential information that must underpin certain decisions necessary in a particular economic and social context to converge with the objectives assumed by government programs. Also, identifying the weaknesses through a SWOT analysis can lead to implementing the most suitable and significant strategy, which could optimize the activities carried out at the level of a public institution. Public institutions need improvements so a SWOT analysis could create the premises for more efficient communication and performance concerning public services.

Keywords: *public administration, SWOT, improve, management, communication*

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1. THE USE OF A SWOT ANALYSIS

The first step in any effective communication is to carefully and accurately identify the situation facing an organization. A situation may identify an opportunity to be embraced because it offers a potential advantage to the organization [1]. Strategic management is a set of managerial decisions and actions that determines the long-run performance of a corporation. The study of strategic management emphasizest he monitoring and evaluating of external opportunities and threats in light of a corporation’s strengths and weaknesses to generate and implement a new strategic direction for an organization**Pogreška! Izvor reference nije pronađen.**. Different strategic factors like Strengths, Weaknesses, Opportunities, and Threats, known by their acronym, SWOT, should be analyzed by every organization, on various occasions, for better strategic decisions. SWOT analysis on the communication component was never developed, in the last five years, at least, ...

DESIGN OF EXPERIMENTS, A TOOL FOR STREAMLINING AN APPROVAL PROCESS, WHICH TAKES PLACE AT THE LEVEL OF CENTRAL PUBLIC ADMINISTRATION

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Iuliana Moisescu *Aurel Mihail Țîțu*

ABSTRACT:

The world of science offers numerous possibilities through development, modernization, testing, and applying knowledge to create quality, more efficient products or services. The public institution offers various services, but how they have carried the process needs improvement, as citizens are constantly expressing their dissatisfaction with the inefficiency of their activities. This paper aims to use tools used in the statistics field and apply them in public administration institutions. The role of this approach is to identify significant variables that can lead to the optimization of a complex approval process, which takes place at the level of a ministry. In our quest to improve a process, we will use the DOE statistical tool, used in areas like computer science, pharmacology, biochemistry and genetics, engineering, or medicine for the past 20 years, but hasn't been implemented in administration at its potential. This tool provides a possibility to run various determinations by a software program, which provides experimental data that can support the decision-making for process optimization.

Keywords: *public administration, DOE, optimization, process, management, experimental data*

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1. INTRODUCTION

The starting point of DOE is considered the One Factor At a Time (OFAT), a scientific method used by Fisher at the beginning of 1920 [1], to determine the best condition for increasing the growing crops using different fertilizers, running experiments on different blocks of land. The importance of his experiments runs at the Rothamsted Experimental Station, in Hertfordshire, consisted of the approach by examining various factors simultaneously, and that statisticians should be consulted first in the design of experiments rather than at the end of testing.By using this tool, which has origins in mathematical modeling, an experimenter can obtain results ...

PROCESS MANAGEMENT IN A PUBLIC ORGANIZATION PROVIDING SERVICES TO CITIZENS

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[4]Ministry of Culture, Bucharest, Romania

Constantin-Dorin Olteanu

Iuliana Moisescu

ABSTRACT:*The scientific paper proposes a pragmatic perspective of presenting some theoretical and practical aspects regarding a new approach within the studied organization, a process-based boarding. The point of view submitted is a small part of the possibilities to implement the process-based boarding. For an overview of general aspects about types of processes, categories were also submitted. An important feature was the realization of personal analysis by categories of the identified processes and the definition of the basic processes, the central processes, and the management processes realizing the connections that appear between them and based we made a current map of the processes. The next step is personal contributions regarding the improvement of the current situation aiming at the map of the institutional processes within the studied institution, making a new map of the processes with the brought changes. In the last part, some modeling methods used in modeling and optimizing organizational processes were presented. A further direction of research is the modeling of the processes within the studied public organization.*

Keywords: *process, process map, management, organization*

1.INTRODUCTION

The developments of managing in public administration evolve in small steps, and resistance to change is high.Public organizations need to change and function more performing. This aspect appears in the context of the evolution of society, of alignment with the international context and needs, to work efficiently.
Implementing a quality management system in an organization requires a process-based approach. This requires the management of processes, their inputs-outputs as well as interactions between processes. The process-based approach appears in ISO 9001:2015 where it is a requirement for an efficient quality management system. The process-based approach can also be used, in the management system of a public organization providing services to citizens. ...

AMBIENT LIGHT AND OBJECT COLOR INFLUENCE ON THE 3D SCANNING PROCESS

UTJECAJ AMBIJENTALNOG SVJETLA I BOJE OBJEKATA NA PROCES 3D SKENIRANJA

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Kenan Varda


Ernad Bešlagić


Nermina Zaimović Uzunović


Samir Lemeš

ABSTRACT:
In 3D scanning of objects with different 3D scanners, two of the factors that most affect the quality of the results obtained are the lighting conditions and the colour of scanned objects. This paper presents the influence of light and colour of objects scanned using two different 3D scanners, RangeVision PRO and Artec Eva. To estimate the effect of these factors, 3D printed models of NACA aero profiles in two different colours, black and white and in four different scenarios of the object's brightness during scanning were used. The brightness values for all scenarios are shown numerically, and the number of registered triangular surfaces on the scans was taken as a relevant result. A rotary table was used in the scanning process. It enabled the scanning of models from all sides of the object by rotating for an angle of 360°.

Keywords: *3D scanning, 3D printing, brightness influence, colour influence*

REZIME:
Kod 3D skeniranja objekata različitim 3D skenerima, dva faktora koja najviše utječu na kvalitet dobijenih rezultata su uslovi osvjetljenja i boja skeniranih objekata. Ovaj rad predstavlja utjecaj svjetlosti i boje objekata skeniranih pomoću dva različita 3D skenera, RangeVision PRO i Artec Eva. Za procjenu djelovanja ovih faktora korišteni su 3D printani modeli NACA aero profila u dvije različite boje, crnoj i bijeloj, te u četiri različita scenarija osvijetlljenosti objekta tokom skeniranja. Vrijednosti osvijetlljenosti za sve scenarije prikazane su numerički, a kao relevantan rezultat uzet je broj trouglova registrovanih skeniranjem. U procesu skeniranja korišten je rotacioni stol koji je mogućio skeniranje modela sa svih strana objekta rotacijom za ugao od 360°.

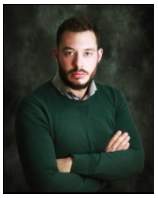
Ključne riječi: *3D skeniranje, 3D štampa, utjecaj svjetlosti, utjecaj boje*

REALIZATION OF THE ROBOTIC ARM/PLOTTER

REALIZACIJA ROBOTSKE RUKE/PISAČA

Milena Djukanovic[1*], Luka Radunovic[2], Vuk Boskovic[3] , Bai Chuang[4]
[1]University of Montenegro, Facultyof Electrical Engineering, Podgorica, Montenegro
[2]University of Montenegro, Facultyof Mechanical Engineering, Podgorica, Montenegro
[3]Technical Universityof Munich, Facultyof Mechanical Engineering, Munich, Germany
[4]School of Physics and Electronic Science, Changsha Universityof Science and Technology, Changsha, PR Republicof China


Milena Djukanovic


Luka Radunovic


Vuk Boskovic


Bai Chuang

ABSTRACT:
Nowadays, when distance is not a very important category, signature is a rare thing that cannot be easily transported. At the same time, signature is a repetitive action that in total takes a lot of our time for different kind of everyday activities. In this regard, the aim of this paper and product presented here is development of a machine/system that successfully and authentically simulates human handwriting. The unique properties allow user to be next to or far away from the machine, while having his writings stored on his own account, which makes an efficient time save.

Keywords: *simulation of human handwriting, plotter, easy portability, repetitive action, time saving*

REZIME:
U današnje vrijeme, kada udaljenost ne predstavlja vrlo bitnu kategoriju, potpis je rijetka stvar koja se ne može lako prenijeti. Istovremeno, potpis je ponavljajuća radnja koja nam ukupno oduzima mnogo vremena za različite vrste svakodnevnih aktivnosti. S tim u vezi, cilj ovog rada i proizvoda koji su ovdje predstavljeni je razvoj mašine/sistema koji uspješno i autentično simulira ljudski rukopis. Jedinstvena svojstva omogućavaju korisniku da bude pored ili daleko od mašine, dok se njegovi zapisi čuvaju na sopstvenom nalogu, što omogućava efikasnu uštedu vremena.

Ključne riječi: *simulacija ljudskog rukopisa, pisač, lako prenosiv, ponavljajuća radnja, ušteda vremena*

DYNAMIC ANALYSIS AND ATTITUDE CONTROL OF A MINISATELLITE

Rosario La Regina[1], Carmine Maria Pappalardo[2], Domenico Guida[3]
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Rosario La Regina

Carmine Maria Pappalardo

Domenico Guida

ABSTRACT:
In the last decade, the interest of many companies to undertake missions aimed at space research has increased dramatically. Currently, the focus is more and more on the large family of miniaturized satellites. This paper aims to define the main components of a minisatellite. Additionally, the torques for attitude stabilization are evaluated. The implementation system identified herein consists of magnetorquers and three reaction wheels. The simulations carried out to assess their behavior were performed in a virtual environment using SIMSCAPE-MULTIBODY. Its use has made it possible to develop control systems for the satellite under study. Finally, an effective proportional-derivative (PD) feedback controller was chosen and tuned through numerical experiments.

Keywords: *minisatellite, magnetorquers, reaction wheels, attitude control, multibody*

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1. INTRODUCTION

This paper aims to design a satellite capable of surviving in LEO(Low Earth Orbit) and interfacing with its magnetic field. Minisatellites are more launched at an altitude of 400-600(km), and descend over several months to a few years, in line with policies against the accumulation of debris in space. The minisatellite designed herein is thought of using COTS (Commercial Off-the-Shelf components), to keep costs low, and include in the hypothetical design only the minimum components for its proper operation. CubeSat is a mini-satellites classification, whose standard shape is 10x10x10 (cm), with a maximum weight of 1 (kg), defined as 1U. These units can pair together to create more complex nanosatellites, up to a composition of 12U [1]. The CubeSat standard was developed by Twiggs (Stanford University's Space Systems Development Laboratory) and Puig-Suri (California Polytechnic State University) in 1999, and the first CubeSat launched (AAU CubeSat) into orbit was in 2003 [2].After assembly, the CubeSats are placed in orbit using a mechanism called MRFOD (Morehead-Roma FemtoSat Orbital Deployer) or the more common P-POD (Poly Picosatellite Orbital Deployer) system[3-5].

DIGITALIZATION AND IMPLEMENTATION OF MODERN ICT IN TOURISM AND CREATIVE INDUSTRIES ON THE EXAMPLE OF THE CULTURAL ROUTES

DIGITALIZACIJA I PRIMJENA SAVREMENIH TEHNOLOGIJA U TURIZMU I KREATIVNIM INDUSTRIJAMA NA PRIMJERU KULTURNIH RUTA

Nenad Vujadinović[1], Anđela Jakšić-Stojanović[2]
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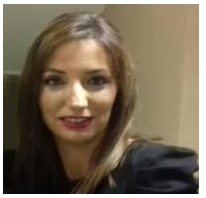
[2]University of Donja Gorica, Facultyof Cultureand Tourism, Podgorica, Montenegro

Nenad Vujadinović



Anđela Jakšić-Stojanović

ABSTRACT:
Creative industries have extremely important role in the global economy and they represent one of the key drivers of development of the world's most developed countries. They have an increasing share in GDP and significant participation in employmenton a global level. Additionally, they significantly contribute to the sustainability and inclusive growth. The creative industries represent the heart ofthe tourism industry, especially in the last decade and, according to trends and perspectives on the global tourism market, this influence will be even greater in future.The process of digitalization and implementation of modern ICT plays an extremely important role in tourism and creative industries and this paper analyzes their influence on the quality of tourist offer and level of tourists' satisfaction on the example of the cultural routes, especially through the prism of experiences.

Keywords: *creativeindustries, culturalroutes, tourism, digitalization, ICT*

REZIME:
Kreativne industrije imaju veoma značajnu ulogu u globalnoj ekonomiji i predstavljaju jedan od ključnih pokretača ekonomskog razvoja nekih od najrazvijenijih zemalja svijeta. One imaju sve veće učešće u BDP-u i sve veće učešće u zapošljavanju na globalnom nivou. Dodatno, one značajno doprinose održivom i inkluzivnom rastu. Kreativne industrije predstavljaju srce turističkog razvoja, posebno u posljednjoj deceniji, a, sudeći po trendovima na globalnom turističkom tržištu, njihov uticaj na turističku industriju će biti još veći u budućnosti. Proces digitalizacije i primjene savremenih informaciono-komunikacionih tehnologija ima veoma značajnu ulogu u kulturi i kreativnim industrijama, a ovaj rad se bavi analizom njihovog uticaja na na kvalitet turističke ponude i stepen zadovoljstva turista na primjeru kulturnih ruta.

Ključne riječi: *kreativne industrije, kulturne rute**,** turizam, digitalizacija, informaciono-komunikacione tehnologije*

NONLINEAR TRANSFORMATIONS WITH FOURIER SERIES AS APPLIED TO ELECTROTECHNICAL PROBLEMS

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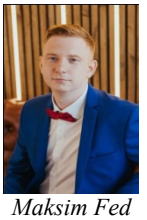
Volodymyr Chenchevoi


Serhii Serhiienko


Vira Shendryk


Andrii Nekrasov


Maksim Fed

ABSTRACT:
In recent years, the mathematical apparatus for studying the energy modes of electrical circuits, analyzing the processes of energy conversion in nonlinearities, identifying the parameters of electrical equipment using the theory of instantaneous power, which is based on methods for converting signals represented in the form of approximation dependences, in particular, Fourier series, has been developing. As a rule, processes are analyzed in the description of which nonlinear operations with Fourier series are used – their multiplication, division, exponentiation, etc. The complexity of these operations virtually eliminates analytical expressions to describe the final dependencies. When performing these mathematical operations, as a rule, the convolution operation is used, which has found wide application when working with signals in radio engineering. The execution of the above operations is available to the researcher using applied mathematical packages. In electrical problems of the above nature, it is possible to use solutions obtained without the full–fledged use of computing facilities. At the same time, another problem is solved – the study of the convolution mechanism and the receipt of intermediate results as a source material for determining the specific data of the analyzed processes. The work focuses on the issues of obtaining results using series with a finite number of members.

Keywords: *Fourier series, series multiplication, instantaneous power of electrical signals, identification of nonlinearity parameters.*

ERA OF (BIO)TECHNICIZED CORPOREALITY – FROM THE CULTURE OF REAL VIRTUALITY TO THE NEW SPHERE OF THE TRANSHUMAN REALITY

EPOHA (BIO)TEHNIZIRANE TJELESNOSTI-IZ KULTURE STVARNE VIRTUALNOSTI U NOVE SFERE TRANSHUMANE REALNOSTI

Abdel Alibegović[1], Sanjin Mahmutović[1], Halima Sofradžija[1],Sanja Raljević Jandrić
[1]University of Sarajevo, Facultyof Political Sciences, Bosnia and Herzegovina


Abdel Alibegović


Sanjin Mahmutović


Halima Sofradžija


Sanja Raljević Jandrić

ABSTRACT:
The authors are trying to contemplate still opened possibilities for the future of a mankind considering various processes of technicization in our lifeworld. Deep understanding of present-day patterns of the mankind culture, different social systems, as well as general and individual human action/behaviour – challenges us with difficult questions regarding future of a mankind like the one that is already happening before us in the shapes of (bio)technicization of different aspects of human existence. Thus, the authors are presuming that mankind will come in a new phase of transhuman reality from a position of technosocietyno matter how distant or unreal it may seem.

Keywords: *biotechnology, technicization of the lifeworld, transhumanism, culture of real virtuality, transhuman reality.*

SAŽETAK:
Autori nastoje promišljati još uvijek otvorene mogućnosti budućnosti čovječanstva, a s obzirom na svekolike procese tehniziranja našeg svijeta života. Dubinsko razumijevanje ovovremenih obrazaca kulture čovječanstva, različitih društvenih sistema, kao i općeg i pojedinačnog ljudskog djelovanja/ponašanja stavlja pred nas složena pitanja budućnosti čovječanstva kao one budućnosti koja se već odigrava pred našim očima, a u formama (bio)tehniziranja različitih aspekata ljudske egzistencije. Tako, autori polaze od pretpostavke kako će čovječanstvo iz pozicije tehnosocijalnosti doći u novu fazu transhumane realnosti, ma kako se to daleko i nestvarno činilo.

Ključne riječi*: biotehnologija, tehniziranje svijeta života, transhumanizam, kultura stvarne virtualnosti, transhumana realnost.*

EXPERIENCES OF APPLICATION OF ZOOM APPLICATION IN HIGER EDUCATION OF EXAMPLES OF TEACHING MOTHER TONGUE SPELLING

ISKUSTVA PRIMJENE ZOOM APLIKACIJE U VISOKOM OBRAZOVANJU NA PRIMJERIMA NASTAVE PRAVOPISA MATERNJEG JEZIKA

***Milena Burić*[1]**
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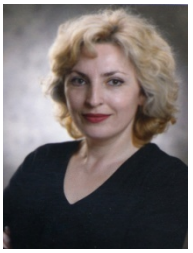


Milena Burić

ABSTRACT:
The paper concludes and exemplifies that the application of the Zoom application in the teaching of mother tongue spelling has provided the necessary tools for combining appropriate teaching methods, thus achieving primary outcomes that are reflected in the acquisition of knowledge and improvement of positive orthographic habits. It is also concluded that it is necessary to adopt normative acts that will precisely regulate the implementation of distance learning, in order to eliminate current shortcomings.

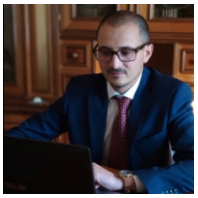
Key words: *Zoom application, spelling, spelling teaching methodology, method (dialogical, monologue, text), experiences*

REZIME:
Radom se konstatuje i egzemplifikuje da je primjena Zoom aplikacije u nastavi pravopisa maternjeg jezika pružila neophodne alate za kombinovanje odgovarajućih metoda, čime su postignuti primarni ishodi koji se ogledaju u sticanju znanja i unapređenju pozitivnih ortografskih navika. Zaključuje se, takođe, da je nužno donošenje normativnih akata koji će precizno regulisati implementaciju nastave na daljinu, u cilju eliminacije aktuelnih nedostataka.

Ključne riječi: *Zoom aplikacija, pravopis, metodika nastave pravopisa, metoda (dijaloška, monološka, tekstovna), iskustva*

IoT SYSTEM FOR STRUCTURAL MONITORING

Angelo Lorusso[1], Domenico Guida[1]
[1]Department of Industrial Engineering, University of Salerno, Fisciano, Italy


Angelo Lorusso


Domenico Guida

ABSTRACT:
Structural monitoring of civil buildings is extremely important and topical, especially in monitoring the life cycle of reinforced concrete construction. It is possible to assess the impact of weather and external factors that can affect the safety of buildings by monitoring their natural vibrations. However, conventional vibration monitoring systems are complicated to install and operate and costly. Furthermore, not all monitoring systems integrate real-time data processing and remote data storage. Taking advantage of discoveries in the field of information technology, a monitoring system based on the paradigms of the Internet of Things (IoT) has been developed to provide a viable alternative to tried-and-tested vibration monitoring systems. A prototype system consisting of a microprocessor (Raspberry Pi) and a low-cost accelerometer for microelectromechanical systems (MEMS) was used to minimize the cost and size of the system. The architecture of the IoT vibration monitoring and display system and its working mechanism are explained in all the steps. The performance of the developed IoT vibration monitoring system was visualized through a cloud application that gives the possibility to view the collected data in real-time. The future of this study is the application of Machine Learning techniques about the data acquired.

Keywords: *IoT, Sensor, Digital Twin, Structural Health Monitoring*

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1. INTRODUCTION

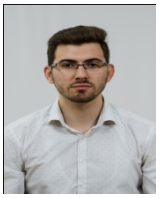
In the last decade, the problem of mechanical and physical monitoring structures for civil use has begun to undergo a radical change from the approach adopted in previous years. In fact, structures, especially those made of reinforced concrete and steel, were designed for an indefinite period of use and duration and were only checked occasionally and, usually, and usually only after unexpected events in which damage was presumed, such as earthquakes, landslides or other [1]. Thus, in addition to monitoring, the concept of maintenance was added, in the sense that proper maintenance is of fundamental importance to significantly increase the useful life of a structure or infrastructure, while also having a minimal environmental impact due to a large amount of waste materials demolished and the materials needed to renew the existing construction. So, especially for large public heritage structures, ...

POWERING THE SMART PARKING SYSTEM WITH PHOTOVOLTAIC SOLAR PANELS AT CAMPUS OF “DŽEMAL BIJEDIĆ” UNIVERSITY OF MOSTAR

NAPAJANJE SMART PARKING SISTEMA FOTONAPONSKIM SOLARNIM PANELIMA U KAMPUSU UNIVERZITETA „DŽEMAL BIJEDIĆ“ U MOSTARU

Špago Damir[1], Lavić Ammar[2], Nezirić Emir[3], Šabanović Ammar[4]
[1,2,3,4] “Džemal Bijedić”Universityof Mostar, Mostar, Bosnia and Herzegovina


Damir Špago


Ammar Lavić


Emir Nezirić


Ammar Šabanović

ABSTRACT:
The development of smart systems in all areas is a trend that is spreading every day. One of the challenges is the power supply and cost-effectiveness of smart systems.
Through this project, the development of a smart parking system and its power supply using solar photovoltaic panels can be seen. The paper describes how to make a small system (model) that contains all the necessary elements of the real system. By using the IoT solution, the hardware and software components of the system are created, and with the help of solar panels and its components, small power supply system is created.
By analyzing the work of the small system, the principles of development and operation of the system in a real environment are determined. The goal is to see the cost-effectiveness and efficiency of this type of system and the principle of development and operation of the system.

Keywords: *Smart parking, energy efficiency, solar energy – PV panels, IoT*

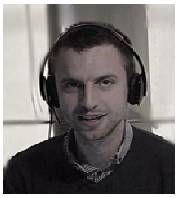
REZIME:
Razvoj pametnih sistema u svim oblastima je trend koji se širi svakim danom. Jedan od izazova je napajanje i isplativost pametnih sistema. Kroz ovaj projekat može se vidjeti razvoj pametnog parking sistema i njegovo napajanje pomoću solarnih fotonaponskih panela. U radu je opisano kako napraviti mali sistem (model) koji sadrži sve potrebne elemente realnog sistema. Korištenjem IoT rješenja kreiraju se hardverske i softverske komponente sistema, a uz pomoć solarnih panela i njegovih komponenti stvara se mali system napajanja. Analizom rada malog sistema utvrđuju se princip i razvoja i rada sistema u realnom okruženju. Cilj je sagledavanje isplativosti i efikasnosti ovakvog sistema i principa razvoja i rada sistema.

Ključne riječi: *Smart parking, Energetska efikasnost, Solarna energija – PV paneli, IoT*

DECISION-MACING MODEL ON NEW TECHNOLOGIES FOR THE PRODUCTION OF MINI HYDROPOWER PLANTS IN BOSNIA AND HERZEGOVINA

MODEL ODLUČIVANJA O NOVIM TEHNOLOGIJAMA ZA PROIZVODNJU MINI HIDROELEKTRANA U BOSNI I HERCEGOVINI

Bijelić Zdravko[1], Bijelić Mitar[2]
[1]Institute in the making „Logos“, Novi Sad, Serbia
[2]TNT Express INC, Franklin, WI, USA

Zdravko Bijelić *Mitar Bijelić*

ABSTRACT:
The economic and technological development of Bosnia and Herzegovina on the basis of natural resources and new technological and managerial knowledge is a historic opportunity to get out of poverty faster. Bosnia and Herzegovina has used 33% of its hydropower potential. Mass construction of mini hydropower plants based on equipment produced by domestic companies is at the same time a chance for reindustrialization based on new digitalized technology. Industrialization on the basis of new technologies would create conditions for reduced departure of young, highly educated personnel of technical-technological profiles. The paper presents an original scientific model. The model was developed on the principles of the scientific doctrine "Economy of optimum, optimal technological progress and optimal business".

Keywords: *new technologies, development, optimization model, knowledge economy.*

REZIME:*Ekonomski i tehnološki razvoj Bosne i Hercegovine na bazi prirodnih resursa i novih tehnoloških i upravljačkih znanja je istrorijska prilika za brži izlazak iz siromaštva. Bosna i Hercegovina ima iskorišćene hidroenergetske potencijale svega 33%. Masovna gradnja mini hidroelektrana na bazi opreme koju bi proizvodile domaće kompanije je istovremeno šansa za reindustrijalizaciju na osnovama nove digitalizovane tehnologije. Industrijalizacija na bazi novih tehnologija stvorila bi uslove za smanjeni odlazak mladih, visoko obrazovanih kadrova tehničko-tehnoloških profila. U radu je prikazan orginalan naučni model. Model je razvijen na principima naučne doktrine „Ekonomija optimuma, optimalni tehnološki progres i optimalno privređivanje“.*

Ključne riječi: *nove tehnologije, razvoj, model optimizacije, ekonomija znanja.*

ARTIFICIAL INTELIGENCY SUPPORT TO COMPLEX HYDRO ENERGY SYSTEMS

Svetlana Stevovic[1], Dragoljub Mirjanic[2], Sabahudin Hadrovic[3], Dusan Golubovic[4]
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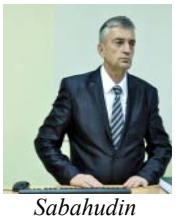
Svetlana Stevović


Dragoljub Mirjanić


Sabahudin Hadrović


Dusan Golubović

ABSTRACT:
Energy is one of the most important issue on the world today. Analizing, optimizations and proofing of feasibility of the renewable energy solutions, as a represent of sinergy within the real environment, is one of the bigest challanges for the scientists and engineers. Research of the hydro energy systems encompase the maximum of different interests with the requirement of multicriteria harmonization of the conditions, limitations and tasks. Artificial inteligency offers the possibilities for fuzzy expert system development with the goal of incorporating all the conflicting purposes by the new mathematic. This manuscript present the extract from the comprehensive research conducted on the subject of water potential development as fuzy expert hydro energy system. Phormulas and theoterical postulats are tested and prooven on the holistic smart practice of hydro energy sistems in Bosnia and Herzegovina.

Keywords: *artificial inteligency, fuzzy expert system, hydro energy, conflicting purposes, green accumulators.*

APSTRAKT:
Energija je danas jedno od najvažnijih pitanja u svetu. Analiziranje, optimizacija i dokazivanje izvodljivosti rešenja obnovljivih izvora energije, kao reprezenta sinergije u realnom okruženju, jedan je od najvećih izazova za naučnike i inženjere. Istraživanje hidroenergetskih sistema obuhvata maksimum različitih interesnih grupa uz zahtev višekriterijumskog usklađivanja uslova, ograničenja i zadataka. Veštačka inteligencija nudi mogućnosti za razvoj fazi ekspertskog sistema sa ciljem inkorporiranja svih konfliktnih namena uz pomoć nove matematike. Ovaj referat predstavlja izvod iz sveobuhvatnog istraživanja, sprovedenog na temi iskorišćenja vodnog potencijala, kao fazi ekspertskog hidro energetskog sistema. Formule i teoterijski postulati su testirani i dokazani preko holističke pametne prakse hidroenergetskih sistema u Bosni i Hercegovini.

Ključne reči: *veštačka inteligencija, fazi ekspertski sistem, hidroenergija, konfliktne namene, zeleni akumulatori.*

IMPLEMENTATION OF DISTRIBUTED INFORMATION SYSTEMS IN SOLVING PROBLEMS OF ENERGY CONSUMPTION MONITORING

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Liudmila Kamenskaia


Valentyn Moiseenko


Vira Shendryk


Sergii Kamenskyi


Sergii Shendryk

ABSTRACT:
The proposed study overcomes the problem of heterogeneity and inconsistency of information, the complexity of providing information support for energy management processes of geographically distributed objects. It is proposed to reduce this problem to solve the problems of structural and parametric synthesis of distributed energy management systems. The influence of the complexity of the topological structure of the system is determined. The influence of the time criterion on the process of monitoring and decision-making in the energy management of geographically remote objects is noted. An example is given of the integration of different energy management systems and their modernization following the levels of information management they provide. A study of the proposed methodology during the energy management of remote homogeneous objects - operating stations of the mobile operator. The proposed methodology has proven its effectiveness.

Keywords: *energy management, sustainable development, distributed information systems, structural synthesis, parametric synthesis.*

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1. INTRODUCTION

Nowadays, separate, subject-oriented information systems are used in this process to automate energy management and perform various functions, but this does not allow them to cooperate quickly and efficiently with each other.
The economic activity of organizations, which is associated with the use of various objects distributed in space, is quite complex to monitor and analyze the processes that take place in it. At the level of energy management of the organization due to the use of diverse information systems that manage energy processes, it is impossible to achieve a sufficient level of efficiency. ...

METHODS OF CREATIVE THINKING AS AN APPROACH IN THE RESEARCH OF INFRARED THERMOGRAPHY IN ACTIVE ATHLETES

METODE KREATIVNOG RAZMIŠLJANJA KAO PRISTUP U ISTRAŽIVANJU INFRACRVENE TERMOGRAFIJE KOD AKTIVNIH SPORTAŠA

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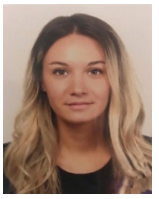
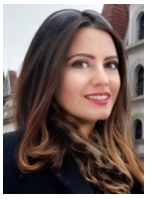

Antonija Petrov


Ivana Salopek Čubrić


Goran Čubrić

ABSTRACT:
Creativity is the ability to look at things in a new and unusual light, the ability to see and solve problems in a special and unusual way. Every creative problem has many solutions, and with creative thinking they are upgraded or changed. Knowledge of creativity methods is useful in many occupations that depend on innovation, and especially in scientific research. This paper will present methods of creativity, which serve as a useful tool in scientific research work based on the use of infrared thermography in active athletes.

Keywords: *creativity, scientific, infrared thermography, active athletes*

REZIME:
Kreativnost je sposobnost sagledavanja stvari u novom i neobičnom svjetlu, sposobnost sagledavanja i rješavanja problema na poseban i neobičan način. Svaki kreativni problem ima mnoga rješenja, a kreativnim razmišljanjem ona se nadograđuju ili mijenjaju. Poznavanje metoda kreativnosti korisno je u mnogim zanimanjima koja ovise o inovativnosti, a posebno u znanstveno-istraživačkom radu. U radu će biti prikazane metode kreativnosti koje služe kao koristan alat u znanstveno-istraživačkom radu temeljene na primjeni infracrvene termografije kod aktivnih sportaša.

Ključne riječi: *kreativnost, znanstveno-istraživački, infracrvena termografija, aktivni sportaši*

MOBILE APPLICATION MTRANSPORTERS

MOBILNA APLIKACIJA MTRANSPORTERI

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Suad Sućeska

ABSTRACT:
Mobile application mTransporteri (mTransporters) has purpose to get contact data of transport firms from remote Web site using smartphone. Obtained dataset is displayed in table with fields as follows: Firma (Firm), telefon (telephone), SMS, and email. It also enables to direct contact of transport firms by tap on appropriate contact data: phone, SMS or email. It is written for mobile operating system Android, based on programming language JAVA. The application supports Android from version 25 to the latest.

Keywords: *mobile application, transport firms, contact data, remote Web site, Android.*

REZIME:
Mobilna aplikacija mTransporteri je namjenjena za dobivanje kontaktnih podataka o transportnim firmama sa udaljenog Web site-a pomoću smartphone-a. Dobiveni podaci se prikazuju u tabeli sa kolonoma: Firma, telefon, SMS, i email. Ona takođe omogućava i direktno kontaktiranje transportnih firmi tapom na određeni kontaktni podatak: telefon, SMS, ili email. Napisana je za mobilni operativni sistem Android, koji bazira na programskom jeziku JAVA. Aplikacija podržava Android od verzije 25 pa do najnovije.

Ključne riječi: *mobilna aplikacija, transportne firme, kontaktnipodaci, udaljeni Web site, Android.*

MULTICRITERIA DECISION SUPPORT SYSTEM FOR MOTORWAYS SAFETY MANAGEMENT

MULTIKRITERIJALNI SUSTAV POTPORE ODLUČIVANJU UPRAVLJANJE SIGURNOŠĆU NA AUTOCESTAMA

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Sadko Mandžuka


Luka Dedić


Goran Kos


Marko Šoštarić

ABSTRACT:
The paper describes the decision support system for safety management on the motorway section. The system is based on the estimation of the probability of traffic accidents on the motorway - Crash potential. Based on this assessment, the system recommends active measures to reduce the likelihood of their actual occurrence. The paper presents a model based on the ANFIS methodology and is based on measuring the values of selected traffic flow parameters and external factors that affect the flow of traffic. This approach is important for improving existing algorithms for managing variable traffic signs on highways.

Keywords: *road safety, crash potential, intelligent transport system, ANFIS system*

SAŽETAK:
U radu je opisan sustav podrške odlučivanju za upravljanje sigurnošću na dionici autoceste. Sustav se temelji na procjeni vjerojatnosti nastanka prometnih nesreća na autocesti – sudarni potencijal. Na temelju te procjene sustav preporučuje aktivne mjere za smanjenje vjerojatnosti njihovog stvarnog nastanka. U radu je prikazan model koji se temelji na ANFIS metodologiji i temelji se na mjerenju vrijednosti odabranih parametara prometnog toka i vanjskih čimbenika koji utječu na tijek prometa. Ovaj pristup važan je za poboljšanje postojećih algoritama za upravljanje promjenjivim prometnim znakovima na autocestama.

Ključne riječi: *cestovna sigurnost, sudarni potencijal, inteligentni transportni sustavi, ANFIS sustav*

OVERVIEW OF RESILIENCE PROCESS IN TRANSPORT MANAGEMENT SYSTEMS

NOVI PRISTUP PROCJENE OTPORNOSTI SUSTAVA UPRAVLJANJA PRIJEVOZOM

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Lucija Bukvić

Jasmina Pašagić Škrinjar

Pero Škorput

Maja Tonec Vrančić

ABSTRACT:
This paper proposes an overview of transport system vulnerability assessment models that allow identifying critical links for the development of future high quality transport management systems (TMS). The challenges of increasing congestion and negative environmental impacts, shifting trips from personal vehicles to other transport options is generally seen as one of the most important actions. In terms of resilience and business continuity, transport systems need to be efficient as well as robust, as their vulnerability may cause various negative impacts. The methodological approach is particularly useful for planning resilient response in the preparedness stage, prioritizing investment for mitigation and adaptation, and prioritizing the rehabilitation (access restoration) of the disrupted links in the response and recovery stages. Resilience accounts for not only the ability of the system to absorb externally induced changes, but also cost-effective and efficient, adaptive actions that can be taken to preserve or restore performance post-event
Keywords:*transport management system, resilience, transport network, vulnerability, attack*

REZIME:
Ovaj rad predlaže pregled modela procjene ranjivosti sustava upravljanja prijevozom koji omogućuju identificiranje kritičnih veza za razvoj budućih visokokvalitetnih sustava upravljanja prijevozom (Transport management systems). Izazovi kao što su povećanjezagušenja i negativnih utjecaja na okoliš, potiču prijelaz s osobnih vozila na druge modove prijevoza što se općenito smatra jednom od najvažnijih akcija u oporavku. U smislu otpornosti i kontinuiteta poslovanja, transportni sustavi moraju biti učinkoviti i robusni, jer njihova ranjivost može uzrokovati različite negativne učinke. Metodološki pristup posebno se koristi za planiranje odgovora u fazi pripravnosti, prioritiziranje ulaganja u sustave za ublažavanje napada, te davanje prioriteta oporavku (obnavljanju pristupa) prekinutih veza u fazama odgovora. Otpornost ne objašnjava samo sposobnost sustava da apsorbira promjene izazvane izvana, već isplative, učinkovite i prilagodljive radnje koje se mogu poduzeti za očuvanjei ponovnu implementaciju prethodnih performansi nakon utjecajaincidentnog događaja.
Ključnereči: *sustav upravljanja prijevozom, otpornost, prometna mreža, ranjivost, napad*

CONCEPT OF ROAD TRAFFIC NOISE MONITORING IN THE FUNCTION OF ENVIRONMENTAL AND HEALTH PROTECTION

KONCEPT MONITORINGA BUKE CESTOVNOG SAOBRAĆAJA U FUNKCIJI ZAŠTITE OKOLIŠA I ZDRAVLJA

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Osman Lindov


Adnan Omerhodžić

ABSTRACT:
Traffic noise is one of the most significant negative impacts on the environment. Road traffic is the largest source of noise in urban areas. The negative consequences of the impact of road traffic noise in urban areas due to the high concentration of the population are particularly pronounced in the segment of the impact on human health. Therefore, an adequate treatment of road traffic noise requires a comprehensive noise monitoring concept. The comprehensive concept of road traffic noise monitoring is the basis for the management and implementation of noise reduction measures within the permitted and acceptable levels. This paper will present the basics of the concept of road traffic noise monitoring with special reference to the impact of road traffic noise on human health. Possibilities of application of innovative tools and procedures in the monitoring process in the function of reducing road traffic noise and protection of human health will also be presented.

Keywords: *road traffic noise, noise monitoring, environmental and health protection*

REZIME:
Buka iz sabraćaja predstavlja jedan od najznačajnih negativnih uticaja na okoliš. Cestovni saobraćaj je najveći izvor buke u urbanim sredinama. Negativne posljedice uticaja buke cestovnog saobraćaja u urbanim sredinama zbog velike koncentracije stanovništva, posebno su izražene u segmentu uticaja na zdravlje ljudi. Zbog toga, za adekvatan tretman buke cestovnog saobraćaja potreban je sveobuhvatan koncept monitoringa buke. Sveobuhvatan koncept monitoringa buke cestovnog saobraćaja predstavlja osnovu za upravljanje i implementaciju mjera za smanjenje buke u okvire dozvoljenih i prihvatljivih nivoa. U ovom radu će biti predstavljeneosnove koncepta monitoringa buke cestovnog saobraćaja sa posebnim osvrtom na uticaj buke cestovnog saobraćaja na zdravlje ljudi. Također će biti predstavljene mogućnosti primjene inovativnih alata i postupaka u procesu monitoringa u funkciji smanjenja buke cestovnog saobraćaja i zaštite zdravlja ljudi.

Ključne riječi: *buka cestovnog saobraćaja, monitoring buke, zaštita okoliša i zdravlja*

DIGITALIZATION OF THE RAILWAY TRANSPORT SYSTEM - THE APPLICABILITY OF BLOKCHAIN TECHNOLOGY IN THE CONTEXT OF THE INDUSTRIAL REVOLUTION 4.0

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Cătălin-Laurențiu Bulgariu

ABSTRACT:
At a stage where more and more industries are trying to cope with new challenges and problems of any kind, influenced by a constantly changing market, the main response to the situation seems to be the technological (r)evolution and the adaptation of the new standards corresponding to the paradigms of industry 4.0. In this context, the rail transport system can provide a strong response by implementing new technologies and digitizing processes, being in a position to exploit the opportunities of change. In view of the positive impact of blockchain technology, which can revolutionize each sector of activity, the advantages of its applicability in the railway industry could improve many aspects of the quality of the system. This paper aims to present a detailed analysis of the main features of blockchain technology, its benefits and applicability in the rail transport system. The need for research in this regard lies in the need of the system to adapt to new challenges, to increase the quality of services and attractiveness. As this technology is still at an early stage, this work opens new knowledge horizons, opens new research directions and helps to understand the phenomenon.

Keywords: *Digitalization, railway system, blockchain, decentralization, Industry 4.0*

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1. INTRODUCTION

The digitalization of the railway system means a leap of quality and a prominent answer to several problems of operation and attractiveness. Still in an early stage, the new blockchain technology that seems to revolutionize several aspects of our social life, has a vast applicability in several areas and its usefulness in the field of transport can revolutionize this system in many ways. In this paper is presented blockchain technology in the context of the industrial revolution 4.0, applicabilities and utility in the field of railway transport. Among the main aspects of blockchain technology are safety, transparency, data security and speed of operations [1]. ...

OBJECT DETECTION AND REINFORCEMENT LEARNING APPROACH FOR INTELLIGENT CONTROL OF UAV

INTELIGENTNO UPRAVLJANJE BESPILOTNIH LETELICA BAZIRANO NA DETEKCIJI OBJEKATA I MAŠINSKOM UČENJU OJAČAVANJEM

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Zoran Miljković


Đorđe Jevtić

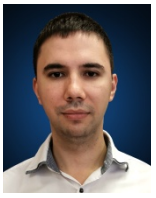
ABSTRACT:
In recent years, the development of deep learning models that can generate more accurate predictions and operate in real-time has brought both opportunities and challenges across the various domains of robotic vision. This breakthrough enables researchers to design and deploy more challenging tasks on intelligent mobile robots, which require emphasized abilities of learning and reasoning. In this paper, a new method for intelligent robot control, based on deep learning and reinforcement learning is proposed. The fundamental idea of this work is how the UAV equipped with a monocular camera can learn significant information about the object of interest in the context of its localization and navigation. For such purpose, the object detection system based on Tiny YOLOv2 architecture is employed. Furthermore, bounding box data generated by a convolution neural network is utilized for depth estimation and determining object boundaries.
Keywords: *unmanned aerial vehicles (UAV), autonomous localization and navigation, Q-learning, convolution neural networks, deep learning, intelligent control*

REZIME:
Razvoj modela dubokog učenja koji mogu da generišu tačnije predikcije i da se primenjuju u realnom vremenu doneo je poslednjih godina kako mogućnosti, tako i izazove u različitim domenima robotskog gledanja. Ovaj iskorak omogućava istraživačima da razvijaju i rešavaju kompleksnije zadatke primenom inteligentnih mobilnih robota, koji zahtevaju izražene sposobnosti učenja i zaključivanja. U ovom radu predložena je nova metodologija za inteligentno upravljanje robota, zasnovana na dubokom učenju i mašinskom učenju ojačavanjem. Osnovna ideja koja je razmatrana u okviru rada jeste kako bespilotna letelica opremljena kamerom može da nauči korisne informacije o objektu od značaja u cilju realizacije zadataka lokalizacije i navigacije. U tu svrhu, primenjen je sistem za detekciju objekata baziran na Tiny YOLOv2 arhitekturi. Osim toga, koordinate okvira regiona u kome se nalaze objekti, generisane od strane konvolucione neuronske mreže, korišćenesu za ocenu (estimaciju) udaljenosti i određivanje granica objekta.
Ključne reči:*bespilotne letelice, autonomna lokalizacija i navigacija, mašinsko Q-učenje, konvolucione neuronske mreže, duboko učenje, inteligentno upravljanje*

REAL-TIME MOBILE ROBOT PERCEPTION BASED ON DEEP LEARNING DETECTION MODEL

MODEL PERCEPCIJE MOBILNOG ROBOTA NA BAZI DETEKCIJE OBJEKATA U REALNOM VREMENU PRIMENOM DUBOKOG MAŠINSKOG UČENJA

Aleksandar Jokić, Milica Petrović, Zoran Miljković
University of Belgrade – Faculty of Mechanical Engineering, Belgrade, Serbia



Aleksandar Jokić *Milica Petrović* *Zoran Miljković*

ABSTRACT:
The recent advances in deep learning models have enabled the robotics community to utilize their potential. The mobile robot domain on which deep learning has the most influence is scene understanding. Scene understanding enables mobile robots to exist and execute their tasks through processes such as object detection, semantic segmentation, or instance segmentation. A perception system that can recognize and locate objects in the scene is of the highest importance for achieving autonomous behavior of robotic systems. Having that in mind, we develop the mobile robot perception system based on deep learning. More precisely, we utilize an accurate and fast Convolution Neural Network (CNN) model to enable a mobile robot to detect objects in its scene in a real-time manner. The integration of two CNN models (SSD and MobileNet) is performed and implemented on mobile robot RAICO (Robot with Artificial Intelligence based COgnition). The experimental results show that the proposed perception system enables a high degree of object recognition with satisfying inference speed, even with limited processing power provided by Nvidia Jetson Nano integrated within RACIO.
Keywords: *perception system, mobile robots, convolutional neural networks,object detection*

REZIME:
Intenzivni napredak u oblasti razvoja dubokog mašinskog učenja omogućio je istraživačima da primene modele dubokog učenja i u drugim oblastima, među kojima je i mobilna robotika. Oblast razvoja mobilnih robota na koju duboko učenje ima uticaj je razumevanje scene. Razumevanje scene omogućava mobilnim robotima da uspešno izvršavaju svoje zadatke u okviru procesa kao što su detekcija objekata, semantička segmentacija ili segmentacija instanci. Sistem percepcije koji može da prepozna i lokalizuje objekte u sceni od izuzetne je važnosti za postizanje autonomnog ponašanja robotskih sistema. Imajući to u vidu, u okviru ovog rada razvijen je sistem percepcije mobilnih robota zasnovan na dubokom učenju. Detaljnije rečeno, korišćen je tačan i efikasan model konvolucione neuronske mreže kako bi bila moguća detekcija objekata u realnom vremenu. Izvršena je integracija dva CNN modela (SSD i MobileNet) koji su implementirani u okviru mobilnog robotskog sistema RAICO. Rezultati eksperimenta pokazuju da predloženi sistem percepcije omogućava visok stepen prepoznavanja objekata sa zadovoljavajućom brzinom izvršavanja, čak i sa ograničenim procesorskim mogućnostima koje obezbeđuje Nvidia Jetson Nano procesorska ploča mobilnog robota RAICO.
Ključne reči: *Sistem percepcije, mobilni roboti, konvolucione neuronske mreže, detekcija objekata*

INDICATORS THAT MODEL THE QUALITY OF ELECTRIC VEHICLES AND SERVICES PRVIDED

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Aurel Mihail Țițu

Gheorghe Neamțu

ABSTRACT:
Quality assurance in road transport is a necessity and is defined by those instruments through wich the profile organizations obtain maximum profit on the competitive market. Expert estimate that in the next 30-40 years, carbon-based fossil fuels will be depleted. Through its programs, the European Union has set itself safe and precise targets, so that by 2050 it can completely decarbonise transports systems, especially road transport. In this sense, humanity must reorient itself in terms of ensuring the needs of mobility to the needs of mobility to other modes of transport. The electric vehicle is a viable and efficient alternative to meet future transport needs by car. However, particular characteristics, of a tehnical nature, specific to the means of transport with electric propulsion can lead to a decrease in the quality of road transport services, will create and produce discomfort, delays, failure to perform tasks, transport plans and programs, produce stress, insecurity, peoples distrust and customers. The scientific research presents an analysis of the main indicators that determine the quality of electric, but also of the services provided, and at the end presentation of corrective measures. We presented a SWOTanalisys of the electric car, in order to define their advantages or disadvantages compared to the classic car and an analysis of the impact of research programs in this fieldby European authorities on the development, implementation and popularization of green vehicles. In this context, the authors offer their own point of view on the importance, of the place and role of green vehicles in the sustainable development of the road transport system.

Keywords: *electric vehicle, ecological road transport, quality indicators, non-conformities, sustainable development*

THE ATTRACTIVENESS OF THE RAILWAY TRANSPORT SYSTEM - MOBILITY AND THE CORRELATION WITH SAFETY AND SECURITY

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Cătălin-Laurențiu Bulgariu

ABSTRACT:
A transport system must be based on its characteristics that define it and determine its performance and quality. Any malfunction of the system can affect the safety and security of a society. The railway system is one of the main components of society and one of the basic pillars of its economy. Rail transport is and will remain one of the main transport systems in the world, and the future of this system depends on understanding the main notions that define it and the synergy of its components. Mobility is currently facing significant challenges and several factors are affecting the way people move. These factors are usually linked to the way of life and mobility needs of the human being, leading to social constraints and environmental problems, overcrowding of networks and undersized transport infrastructures. In this context, the high potential of the rail system within clean and sustainable modes of transport, gives it the opportunity to increase. The paper synthesizes the fundamental concepts that define the interconnections between the attractiveness of the railway transport system, mobility, safety and security. A system-wide perspective on railway requirements in the context of increasing attractiveness is presented in this study. This paper provides an overview of the current state and trends of what can be defined as the basis for sustainable and safe mobility.

Keywords: *Railway system, mobility, attractiveness, safety and security, quality*

NEW TRENDS AND APPROACHES IN THE DEVELOPMENT OF CUSTOMER RELATIONSHIP MANAGEMENT

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Amel Kosovac


Alem Čolaković


Muhamed Begović

ABSTRACT:
Today we are talking about saturated service markets characterized byfilled distribution channels, intense price competition, and slowed sales growth. A secure tool for successful business in a saturated market are existing customers of the company. A business-focused more on retaining existing customers than attracting new ones involves using the principles of Customer Relationship Management (CRM). CRM implies making key decisions regarding the company's relationship withcustomers, so with the development of artificial intelligence and data science, this area has become an ideal field for the application of these methods.The level of automation is continuously increasing and will be emphasized in the coming period.By taking advantage of innovative technologies and integrating them into CRM systems, companies can achieve a better market advantage. In this paper, we analyzenew trends in customer relationship management that need to be addressed in the coming years. We explore the advantages and disadvantages of new technologies and how they affect the user experience and business revenues of service companies.

Keywords: *CRM, customer, customer experience, new trends, data*

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1. INTRODUCTION

New challenges during the previous years and the requirements for high-quality service create a new business environment for service companies. The current dynamics of the environment impose new rules of conduct for market participants, especially those that offer services. Service companies are adapting to these changes to operate successfully. The service industries are setting up new business models, process and technology challenges. The modern business environment is characterized by relatively rapid changes in market conditions and a large amount of information available to consumers and market participants.Successful companies know that performance management processes and the right data flow, from which information and knowledge flow, have a crucial impact on their success.

LEVEL OF ATMOSPHERIC POLLUTION FROM THE HYBRID VEHICLE

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Gheorghe Neamțu


Aurel Mihail Țîțu

ABSTRACT:
Worldwide, 21% of total CO_2emissions are due to the transport sector, with the road sector accounting for three quarters of polluting gas emissions, of wich 15% are CO_2emissions resulting from the burning of fossil fuels in motor vehicles. Most polluting gases are produced by passenger transport (45.1%), respectively by freight transport vehicles (29.4%). Based on these figures and data, we can say that the main culprit for air pollution, excludung industry and other transportation systems, are all cars that still use to obtain fossil fuels based on carbon. The present research refers to the analysis of the level of pollution with noxious substances eliminated in the atmosphere by the existing thermal engine on this type of vehicle. Impact on the environment through the exhaust gas pollution presented in the paper, by analyzing the results obtained with measuring equipment, wich acurately reproduces and records data of the level of polluants measured on the exhaust pipe. The values of the results are processed graphically by means of specific sofware. The proposed research is an authors point of view that was argued based on the results obtained from tests performed on mixed routes, using methods of ecological (defensive) driving, but alsothe dynamic radar control system of cruising speed throughout the range speed. We also analyzed how certain external factors such as air temperature and humidity, but also road traffic, influence the polluants and the average fuel consumption. At the end of the scientific paper, the results of the research are presented and the level of pollution and the way in which this car shows its friendship with the environment were established.

Keywords: *Hibryd vehicle, pollution, car polluants, average fuel consumption, road traffic.*

MULTIMODAL JOURNEY ROUTE SELECTION AS DECISION-MAKING PROCESS

IZBOR MULTIMODALNE RUTE KAO PROCES ODLUČIVANJA

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ABSTRACT:
In recent years, special attention has been paid to the area of travel behavior, perceptions, and preferences for multimodal mobility, but also to the comprehensive facts about what multimodal mobility means for people, for their activities and their daily routines. Travel planning behaviour (choice of travel mode) can be understood as a decision-making process based on accumulated experience as well as developed behavioural patterns during the journey, etc. The paper describes a decision support system for multimodal travel planners based on a behavioural decision-making model.

Keywords*: multimodal travel; user preferences; decision theory, decision support system*

REZIME:
Posljednjih nekoliko godina posebna pažnja pridaje se području putničkog ponašanja, percepcijama i preferencijama multimodalne mobilnosti, ali i sveobuhvatnim činjenicama o tome što što multimodalna mobilnost znači za ljude, njihove aktivnosti i dnevne rutine. Ponašanje planiranja putovanja (izbor načina putovanja) može se shvatiti kao proces donošenja odluke koji se temelji na prikupljenim doživljajima, kao i razvijenim obrascima ponašanja tijekom putovanja, itd. Rad opisuje sustav podrške odlučivanju namijenjen multimodalnim putnim planerima, zasnovan na bihevioralnom modelu odlučivanja.

Ključne riječi: *Multimodalno putovanje; korisničke preferencije; teorija odlučivanja; sustav za podršku odlučivanju*

STABILITY ANALYSIS OF SELF-PROPELLED HYDRODYNAMIC IRRIGATION MACHINES USED FOR FOOD INDUSTRY CROPS

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ABSTRACT:
Some critical limit conditions for the stability of the self-propelled hydrodynamic irrigation machine used for food industry crops, have been studied, and experimental and numerical tests have been carried out for their determination. The strength forces necessary for the machine overturn have been calculated by a computer code realized in Matlab R2019a, and the corresponding values are listed as function of the soil slope angle Ψ of the weight W and the pipeline strength force., With this aim, different operative conditions for the considered machine have been examined so that the pipeline strength force, under the following conditions:
- water filled pipeline of and empty pipeline;
- dry and wet soil.
By analyzing the data measured in the open field, on a considered machine with a coil diameter of 3 m, the different contributes to the total rewinding strength have been examined during the considered tests. Further, it has been possible to deduce that by changing; only the value of the water pressure, the total value of the rewinding strength force increased by 100 daN, which is clearly due; to the changing pressure which increases the stiffness of the polyethylene pipeline.
Moreover, other very dangerous limit conditions were determined during the rewinding phase of the pipeline on overflooded soil (also due to a rain storm), with a pipeline completely unwound on the soil and sunk into it. In these critical conditions, it has been noted that, to perform the operating phase, it is possible to reach a very high T value, which can cause the machine overturning even for $\Psi = 0$ (horizontal case).

Keywords: *Irrigating Machine, Machine stability, Machine overturn.*

LOCAL DYNAMICS AND GLOBAL STABILITY OF CERTAIN SECOND ORDER RATIONAL DIFFERENCE EQUATION IN THE FIRST QUADRANT WITH QUADRATIC TERMS

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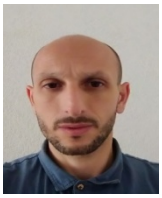
*Jasmin Bekteševi*ć


*Vahidin Hadžiabdi*ć


Midhat Mehuljić


Adnan Mašić

ABSTRACT:
In this paper we present a local dynamics and investigate the global behavior of certain second order rational difference equation of type

$$x_{n+1} = \frac{ax_n x_{n-1} + ax_{n-1}^2 + bx_{n-1}}{cx_n + cx_{n-1} + d},$$

with positive parameters a, b, c, d $(a \neq c)$ *and initial conditions. We establish the relations for local stability of equilibriums and necessary conditions of existence of period-two solution. We then use this result to give global behavior results and determine the part of the basins of attraction of all equilibrium points.*

Keywords: *local stability, global stability, equilibrium.*

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1. INTRODUCTION

In this paper we study the local and global stability character, the periodic nature and the boundedness of solutions of rational second order difference equation of type

$$x_{n+1} = \frac{ax_n x_{n-1} + ax_{n-1}^2 + bx_{n-1}}{cx_n + cx_{n-1} + d}, \qquad n = 0,1,2,\ldots \tag{1}$$

We restrict our attention to positive parameters a, b, c, d with condition $a \neq c$ and initial conditions x_1 and x_0 are arbitrary nonnegative numbers which will make our results more special but also more precise and applicable. Some special cases of Eq.(1), more precisely, difference equation of type

$$x_{n+1} = \frac{bx_{n-1}}{cx_n + cx_{n-1} + d}, \qquad n = 0,1,2,\ldots \tag{2}$$

were investigated in [1]. It is an amazing fact that the Eq.(2) contains a large nuber of equations whose dynamics have not been thoroughly understood yet and remain a great challenge for further investigation. As it was shown in [1] such equation can exhibit the whole range of different global behaviors such as global asymptotic stability of the equilibrium, global periodicity ...

ANALYSIS AND BEHAVIOR OF A COMPETITIVE SYSTEM OF DIFFERENTIAL EQUATIONS

ANALIZA I PONAŠANJE KONKURENTNOG SISTEMA DIFERENCIJALNIH JEDNAČINA

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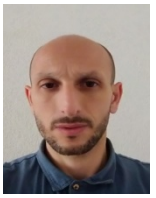
Jasmin Bekteševič


Mirsad Trobradović

ABSTRACT:
The aim of this study was to investigate a certain competitive system of ordinary differential equations is observed. The analysis of local stability was studied in detail. Using nullclines, an insight into the global behavior of this system of equations was obtained. From the biological point of view, it is necessary to emphasize the persistence of the given system for certain values of parameters a and b. At the end, a graphical representation of the obtained results is shown.

Keywords: *equilibrium point, sadlle point, source, sink, comb, eigenvalues, stability, Jacobian matrix.*

REZIME:
Cilj ovog istraživanja bio je ispitati određeni konkurentni sistem diferencijalnih jednčina. Detaljno je proučena analiza lokalne stabilnosti. Pomoću nulklina dobiven je uvid u globalno ponašanje ovog sistema jednačina. S biološkog stajališta potrebno je naglasiti postojanost zadanog sustava za određene vrijednosti parametara a i b. Na kraju je dat grafički prikaz dobivenih rezultata.

Ključne riječi: *tačke ekvilibrijuma,sedlasta tačkat, tačka izvora, tačke ponora, tačke komb, svojstvene vrijednosti, stabilnost, Jacobijeva matrica*

ELECTROCHEMICAL SENSORS BASED ON MOLECULARLY IMPRINTED POLYMERS AND DIFFERENT CARBON MATERIALS FOR ANTIBIOTICS DETECTION

ELEKTROHEMIJSKI SENZORI NA BAZI MOLEKULARNO UTISNUTIH POLIMERA I RAZNIH KARBONOVIH MATERIJALA ZA DETEKCIJU ANTIBIOTIKA

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WafaaHikal


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ABSTRACT:
This paper is an overview of recent advances and new trends in electrochemical sensors for the detection of a wide range of antibiotics such as tetracyclines, macrolides, and many others. Given the increasing presence of antibiotics in various media from food, drink, rivers, it proved necessary to develop antibiotic sensors that can be applied easily and quickly in-situ, and which will be highly sensitive and selective, all withthe aim of controlling food safety and improving human health.The electrochemical sensors studied in this paper refer to molecularly imprinted polymers (MIPs), as well as those based on glassy carbon electrode (GCE) ...

Keywords: *electrochemical sensors - molecularly imprinted polymer – antibiotics – carbon – graphene.*

REZIME:
Ovaj rad predstavlja pregled najnovijih dostignuća i novih trendova u elektrohemijskim senzorima za detekciju širokog spektra antibiotika, kao što su tetraciklini, makrolidi i mnogih drugih. S obzirom na sve veću prisutnost antibiotika u raznim medijima iz hrane, pića, rijeka, pokazalo se neophodnim razviti senzore za antibiotike koji se mogu lako i brzo primijeniti na licu mjesta, a koji će biti visoko osjetljivi i selektivni, a sve u cilju kontrole ispravnosti hrane i poboljšanja zdravlja ljudi. Elektrohemijski senzori izučavani u ovom radu odnose se na molekularno utisnute polimere (MIP), kao i one na bazi staklene ugljikove elektrode (GCE) ...

Ključne riječi: *elektrohemijski senzori - molekularno utisnuti polimer - antibiotici - ugljenik - grafen.*

THE INFLUENCE OF COVID-19 PANDEMIC ON DIGITALIZATION OF MEDICAL SERVICES IN MONTENEGRO

UTICAJ PANDEMIJE COVID-19 NA DIGITALIZACIJU MEDICINSKIH USLUGA U CRNOJ GORI

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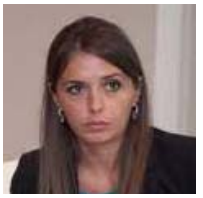

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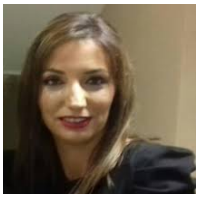

Anđela Jakšić-Stojanović

ABSTRACT:
Despite the significant number of negative consequences caused by COVID- 19 pandemicon the global level, the fact is that it has simultaneously stimulated the process of digitalization not only in various business segments, but also in everyday life. Due to numerous lock downs, restrictive measures and fear of pandemic, people have started to use modern technologies much more intensively realizing their numerous advantages, especially in terms of saving time and money. The most intensive changes were particularly noticeable in developing countries, such as Montenegro, especially in the sectors of health and education. This paper deals with the influence of COVID-19 pandemic on digitalization of medical services in Montenegro.

Keywords:*COVID-19, digitalization, ICT, medical services, Montenegro*

REZIME:
Uprkos značajnom broju negativnih posjledica koje je pandemija COVID-19 izazvala na globalnom nivou, činjenica je da je ona istovremeno podstakla proces digitalizacije ne samo u različitim segmentima poslovanja, već i u svakodnevnom životu. Zbog zatvaranja granica, restriktivnih mera i straha od pandemije, ljudi su počeli mnogo intenzivnije da koriste savremene informacione tehnologije uviđajući njihove brojne prednosti, posebno kada su u pitanju ušteda vremena i novca. Najintenzivnije promjene su se dogodile u zemljama u razvoju kao što je Crna Gora, i to posebno u sektorima zdravstva i obrazovanja. Ovaj rad se bavi uticajem pandemije COVID-19 na digitalizaciju medicinskih usluga u Crnoj Gori.

Ključne riječi: *COVID-19, digitalizacija, informacione tehnologije, medicinske usluge, Crna Gora*

ASSESSING COMFORT-RELATED PROPERTIES OF SPORTSWEAR MATERIALS

PROCJENA SVOJSTAVA MATERIJALA ZA SPORTSKU ODJEĆU VEZANIH UZ UDOBNOST

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Ivana Salopek Čubrić

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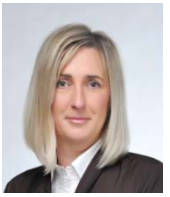

Ines Katić Križmančić

ABSTRACT:
The investigation of comfort-related parameters of materials used for sportswear is of extreme importance for the optimal performance of an athlete. The evergoing mission of textile scientists is to make further improvements to the material design in order to increase and maintain optimal comfort during intensive sports activities, especially if the activity is performed in hot or cold environmental conditions. The aim of this paper is to investigate essential material properties related to comfort, i.e. heat resistance and moisture management. In the experimental part of this paper are conducted measurements on a number of materials used for the production of sportswear. For the measurements are used the sweating guarded hotplate (SGHP) and moisture management tester (MMT). The results are discussed and recommendations for design improvement are given.

Keywords: *yarn, knitted fabric, material, comfort, sport*

REZIME:
Istraživanje parametara udobnosti materijala koji se koriste za sportsku odjeću od iznimne je važnosti za optimalnu izvedbu sportaša. Stalna misija tekstilnih znanstvenika je daljnje poboljšanja dizajna materijala kako bi se povećala i održala optimalna udobnost tijekom intenzivnih sportskih aktivnosti, posebno ako se aktivnost izvodi u toplim ili hladnim uvjetima okoline. Cilj ovog rada je istražiti bitna svojstva materijala vezana za udobnost, preciznije otpornost na toplinu i upravljanje vlagom. U eksperimentalnom dijelu ovog rada provedena su mjerenja na nizu materijala koji se koriste za proizvodnju sportske odjeće. Za mjerenja su korišteni uređaji SGHP i MMT. Uz raspravu rezultata, dane su preporuke za poboljšanje dizajna.

Ključne riječi: *pređa, pletivo, materijal, udobnost, sport*

TENSILE PROPERTIES OF SPORTSWEAR MATERIALS IN DRY AND WET STATE

VLAČNA SVOJSTVA MATERIJALA ZA SPORTSKU ODJEĆU U SUHOM I MOKROM STANJU

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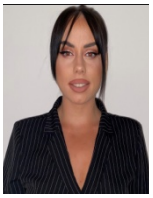
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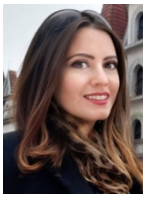
Ivana Salopek Čubrić


Goran Čubrić

ABSTRACT:
The structure and properties of sportswear materials need to be designed to fulfill and retain a desirable level of comfort during intensive activity. Heavy sweating is more commonly associated with warm-weather exercise, so minimizing sweat is very important for a number of next-to-skin materials. The accumulation and retention of sweat on materials affect a number of materials properties. The aim of this paper is to investigate and quantify the influence of sweating (i.e. wetting) on tensile properties of different material structures, and to make a comparison to tensile properties of materials in the dry state.

Keywords: *yarn, knitted fabric, material, tensile properties, dry, wet*

REZIME:
Struktura i svojstva materijala za izradu sportske odjeće moraju biti dizajnirani na način da ispune i zadrže poželjnu razinu udobnosti tijekom intenzivnih aktivnosti. Intenzivno znojenje se češće povezuje s vježbama u toplom okruženju pa je smanjenje znojenja vrlo važno za brojne materijale koji naliježu na kožu. Nakupljanje i zadržavanje znoja na materijalima utječe na brojna svojstva materijala. Cilj ovog rada je istražiti i kvantificirati utjecaj znojenja (tj. vlaženja) na vlačna svojstva različitih struktura materijala te napraviti usporedbu vlačnih svojstava materijala u suhom stanju.

Ključne riječi: *pređa, pletivo, materijali, vlačna svojstva, suho, mokro*

DAILY STREAMFLOW MODELLING IN THE NALLI RIVER USING RECURRENT NEURAL NETWORKS

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Halit Apaydin


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ABSTRACT:
Prediction of streamflow is important in managing surface water resources, especially in agricultural production. The streamflow process is a function of different variables, primarily the spatial and temporal distribution of meteorological parameters, catchment and river physical characteristics. The complex nonlinear relationship between streamflow and influential variables can be expressed through various methods such as stochastic, probabilistic, empiric or black box models.
In this research, the daily streamflow of the Nalli River, located in Ankara, Turkey, has been modelled by using four different architectures of the recurrent neural network (RNN). LSTM, BiLSTM, GRU and Simple RNN architectures were selected. The input dataset includes daily streamflow, precipitation and their antecedent values. The dataset is divided into two subsets: training (70%) and testing (30%) datasets of a total of 6939 daily measurements (1997–2015). All four RNN variants were coded in the Python programming language. The results of the methods were compared with each other based on the correlation coefficient (CC), Nash–Sutcliffe model efficiency coefficient (NS), mean absolute error and mean square error.
The results showed that the LSTM method is more accurate than other deep learning methods, as it can estimate the input current in the training period with a precision (CC) of 97% and in the test period with a precision of 96%. According to the results, it can be stated that due to their accuracy, deep learning methods can be used to predict the flow of the Nalli River.

Keywords: *Recurrent neural network, deep learning, Python software, streamflow prediction*

CONSUMPTION OF CEREALS IN BOSNIA AND HERZEGOVINA- THE HEALTH RISK CALCULATION

POTROŠNJA ŽITARICA U BOSNI I HERCEGOVINI-PRORAČUN RIZIKA PO ZDRAVLJE

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Aida Šapčanin


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ABSTRACT:
Various cereal, like: corn, wheat, buckwheat, triticale, barley, rye, oats and spelt are traditionally used in the daily diet of the population in Bosnia and Herzegovina. The aim of this study was to determine the content of heavy metals that may be present in cereals due to the soil on which they are grown and severe air pollution.The study was performed to measure the content of iron (Fe), cobalt (Co), copper (Cu), chromium (Cr), nickel (Ni), arsenic (As), lead (Pb) and cadmium (Cd) in cereals A estimated daily intakes (EDIs) and noncarcinogenic risk was calculated by hazard index (HI). HI index of analyzed cereal samples was higher than 1 and indicate a potential health risk. Generaly, the consumers should pay attention to the excessive heavy metal accumulation in cereals caused probably by agriculture soil conditions, practice or storage before the cereals are sold in the markets.

Keywords:*heavy metal, cereals, health risk calculation.*

REZIME:
U svakodnevnoj prehrani stanovništva Bosne i Hercegovine tradicionalno se koriste razne žitarice, kao što su: kukuruz, pšenica, heljda, tritikale, ječam, raž, zob i pira. Cilj ovog istraživanja bio je utvrditi sadržaj teških metala koji mogu biti prisutni u žitaricama zbog tla na kojem se uzgajaju i jakog onečišćenja zraka. Istraživanje je provedeno mjerenjem sadržaja željeza (Fe), kobalta (Co), bakra (Cu), kroma (Cr), nikla (Ni), arsena (As), olova (Pb) i kadmija (Cd) u žitaricama. Procijenjeni dnevni unos (EDI) i nekancerogeni rizik izračunati su i iskazani indeksom opasnosti (HI). HI indeks analiziranih uzoraka žitarica bio je veći od 1 i ukazuje na potencijalni zdravstveni rizik. Općenito, potrošači bi trebali obratiti pozornost na prekomjerno nakupljanje teških metala u žitaricama uzrokovano uvjetima poljoprivrednog tla, praksom ili skladištenjem prije nego što se žitarice prodaju na tržnicama.

Ključne riječi: *žitarice, teški metali, proračun zdravstvenog rizika.*

THE PLACE AND ROLE OF SCIENTIFIC RESEARCH IN THE CURRENT GLOBAL MEDICAL CONTEXT

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[2] *ROHEALTH - Health and Bioeconomy Cluster*

Flaviana Rotaru

ABSTRACT:
This paper aims to address the general considerations and changes occurringin current medical systems using as a case study the science model of improving the health system, addressing elements of current interest, namely, medicine and translational research during COVID-19 pandemic with respect to flexibility, adaptability and resilience. In line with the current realities of the COVID-19 pandemic, the economic burden raised amidst medical systems and actors as well as the gaps in traditional healthcare systems that were just currently highlighted by this global spread emergency demonstrated that, new methods, proper tools, availability of funding and increase adaptability of systems is what spearheads future changes. The current situation shows that we must not wait for threats to arise and address them afterwards but instead, we need to be prepared and capable of immediate response adapted to each situation, a preparedness fostered firstly by scientific research.With respect to those stated above, frameworks that can contribute by establishing properly coordinated and integrated adapted approaches and medical countermeasures is required. Secondly, new funding and new procurement methods is of greatest importance.The speed of response in situations such as global health threats is crucial as it has been proven, thus, production capacities for vaccines, medicines discovery and manufacturing, wide scale data sharing and tailored research and innovation plans are the key to a determined and successful response. From all these realities to be analyzed, in the current paper we will approach the changes impacting current medical research worldwide and required future changes that need addressing in order to better respond to future global medical threats through translational medicine.

Keywords: *medical research, health systems,COVID-19 pandemic, translational medicine*

1. INTRODUCTION

Translational medicine and translational research gained a lot of ground in the last decades due to the arising necessity of multidisciplinary collaboration and complex knowledge for adapted problem solving.As a new field, translational medicine has come to solid ground in the last decade more and more as a standalone discipline being recognised in professional societies and having dedicated journals.

MODEL TO ESTIMATE MERCHANTABLE WOOD OF BEECH (Fagus sylvatica L) IN SOUTHWEST BOSNIA AND HERZEGOVINA

MODEL PROCJENE ZAPREMINE KRUPNOG DRVETA BUKVE (Fagus sylvatica L) U SJEVEROZAPADNOJ BOSNI I HERCEGOVINI

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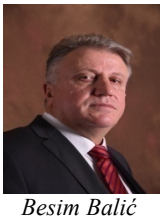
Admir Avdagić


Besim Balić


Ahmet Lojo


Jusuf Musić

ABSTRACT:
Beech (Fagus sylvatica L.) is the most widespread tree species in Central Europe. Due to its high ecological and economic value, beech is one of the most desirable broadleaves species in the forestry industry.Volume models and tables used in this moment in Bosnia and Herzegovina are based on the German volume tables constructed for even-aged forests. It is assumed that there are certain differences in the tree volumes, because they used volume coefficients from German tables. The aim of this study was to find a best regression model to estimate merchantable wood of beech from diameter at breast height and height of tree compering a different models. In this paper we tested 24 different regression models using method of multi – regression analysis.According to regression indicators (coefficient of determination, coefficient of correlation, standard error, F value) Meyer's model was chosen as the "best" ($V_7=a_0+a_1 \cdot d_{1,3}+a_2 \cdot d_{1,3} \cdot h+a_3 \cdot d_{1,3}^2+a_4 \cdot d_{1,3}^2 \cdot h$) *with standard error of 0,217 m^3. The selected model is easy to apply in practice and easy to implement in computer or mobile application.*
Keywords:*merchantable wood volume, beech, regression model*

REZIME:
Bukva (Fagussylvatica L.) je najrasprostranjenija vrsta drveća u Centralnoj Evropi. S obzirom na njenu veliku ekološku i ekonomsku vrijednost bukva je jedna od najpoželjnijih lišćarskih vrsta za šumarstvo. Zapreminske tablice koje se koriste u Bosni i Hercegovini u ovom trenutku konstruisane su na osnovu njemačkih zapreminskih tablica za jednodobne šume. Zapreminski koeficijenti iz navedenih tablica su preuzeti pa se pretpostavlja da postoje određene razlike u zapremini stabala. Osnovni cilj ovog istraživanja je pronaći najbolji regresioni model za procjenu zapremine krupnog drveta bukve na osnovu prečnika na prsnoj visini i visine stabala, pri tome poredeći više različitih modela. U ovom radu testirali smo 24 različita regresiona modela koristeći metoda multipleregresione analize. Na osnovu regresionih pokazatelja (koeficijenta determinacije, koeficijenta korelacije standardne greške i F vrijednosti),Meyerov model je izabran kao najpogodniji ($V_7=a_0+a_1 \cdot d_{1,3}+a_2 \cdot d_{1,3} \cdot h+a_3 \cdot d_{1,3}^2+a_4 \cdot d_{1,3}^2 \cdot h$), *sa greškom procjene 0,217 m^3. Izabrani model je pogodan za korištenje i primjenu u praksi te jednostaan za implementiranje u računarsku ili mobilnu aplikaciju.*
Ključne riječi: *zapremina krupnog drveta, bukva,regresioni model*

BIOAVAILABILITY OF Co AND Zn IN SOME PLANT SPECIES DEPENDING ON THEIR CONCENTRATION IN THE SUBSTRATE

BIORASPOLOŽIVOST Co I Zn KOD NEKIH BILJNIH VRSTA U ZAVISNOSTI OD NJIHOVE KONCENTARCIJE U SUPSTRATU

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Alma Leto


Svetlana Hadžić


Dženan Vukotić


Ahmedin Salčinović

ABSTRACT:
The aim of this study was to examine the influence of different concentrations of Co and Zn in the substrate in the protected area on their bioavailability in five plant species: nettle (Urtica dioica), spelled (Triticum spelta), spinach (Spinacea oleracea), phacelia (Phacelia tanacetifolia) and buckwheat. Fagopyrum esculentum). The results of the research showed that in the mentioned plant species the concentration of these metals in both the root and the aboveground organs increased with the increase of their concentration in the substrate. Spinach and spelled had a statistically significantly higher total Co content, while nettle and buckwheat had a statistically significantly lower total Co content at all Co concentrations in the substrate. Spinach had statistically significantly the highest total Zn content, and phacelia had statistically significantly the lowest total Zn content. The values of phyto-translocation potential showed that all observed plant species, except spelled, at all concentrations of Co and Zn have an index greater than 1, which classifies them as plant species suitable for translocation of these two heavy metals.
Keywords: *heavy metals, cobalt, zinc, phytoremediation, concentration, substrate*

REZIME:
Fitoremedijacija, kao relativno nova metoda,koristi zelene biljke u procesu remedijacije zemljišta. Cilj ovog rada bio je ispitati kako različite koncentracije Co i Zn u supstratu u zaštićenom prostoru utiču na njihovu bioraspoloživost za pet biljnih vrsta: kopriva (Urtica dioica),spelta (Triticum spelta), špinat (Spinacea oleracea), facelija (Phacelia tanacetifolia) heljda (Fagopyrum esculentum). Rezultati su pokazali da je kod navedenih biljnih vrsta koncentracija ovih metala i u korjenu i u nadzemnim organima rasla sa povećanjem njihove koncentracije u supstratu. Špinat i spelta su imali statistički značajno veći ukupan sadržaj Co, dok su kopriva i heljda imale statistički značajno manji ukupan sadržaj Co kod svih koncentracija Co u supstratu. Špinat je imao statistički značajno najveći ukupan sadržaj Zn, a facelije je imala statistički značajno najmanji ukupan sadržaj Zn. Vrijednosti fitotranslokacionog potencijala pokazale su da sve promatrane biljne vrste, osim spelte, kod svih koncentracija Co i Zn imaju indeks veći od 1 što ih svrstava u biljne vrste pogodne za translokaciju ova dva teška metala
Ključne riječi: *teški metali, kobalt, cink, fitoremedijacija, koncentracija, supstrat*

THERMAL WASTE TREATMENT

TERMIČI TRETMAN OTPADA

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Mirsad Đonlagić


Dalila Ivanković


Fuad Ćatović

ABSTRACT:
Population growth and the development of society generate threateningly large amounts of waste. If nothing is done in terms of waste management, we are threatened with suffocation and denial of a healthy and ecologically clean environment.In this paper we will give general information about waste as well as waste management and try to point out possible solutions for waste disposal, volume reduction and utilization of such treated waste.The paper explains the general principles of thermal treatment of waste and presents the principles of operation of individual incinerators.

Keywords: *waste, waste management, thermal treatment of waste, waste incinerator, economic analysis*

REZIME:
Rastom populacije i razvojem društva stvaraju se prijeteći velike količine otpada. Ukoliko se u smislu rješenja otpada ne uradi ništa prijeti nam gušenje i i uskraćivanje zdrave i ekološki čiste životne sredine.Uovom radu date su opće informacije o otpadu kao i gospodarenju otpadom i prezentirana su neka uspješna i moguća rješenja odlaganja otpada , smanjivanja volumena kao i iskorištavanje tretiranog otpada.U radu su objašnjenje opći principi termičke obrade otpada i prikazani principi rada nekoliko tipova spalionica.

Ključne riječi*: otpad , gospodarenje otrpadom, termička obrada otpada , spalionica otpada, ekonomska analiza*

THE IMPLEMENTATION OF NEW TECHNOLOGIES IN TOURISM AND HOSPITALITY INDUSTRY - PRACTICES AND CHALLENGES

PRIMJENA SAVREMENIH TEHNOLOGIJA U TURIZMU I HOTELIJERSTVU-ISKUSTVA I IZAZOVI

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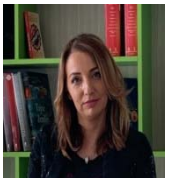
[2]University of Donja Gorica, Faculty of Culture and Tourism, 81000 Podgorica, Montenegro

Zoran Đikanović



Anđela Jakšić-Stojanović

ABSTRACT:
New technological innovations such as 5G mobile network, artificial intelligence, mobile devices, smartphones and wearables, applications, cryptocurrency and blockchain significantly changed the tourism and hospitality industry. In order to be competitive on the global tourist market, destinations have to create completely new paradigm which should be based on innovations, implementation of modern ICT technologies,attractive and innovative tourist products and services and authentic tourists experiences based on "3E" concept (Excitement, Entertainment, Education) and focused onthe needs, demands and expectations of tourists.Only such platform would enable particular destination to attract specific target groups, create satisfied and loyal tourists, reach competitive advantage and create attractive image on the global tourist market.

Keywords: *ICT technologies, digitalization, online business, tourism, hospitality, innovations*

REZIME:
Nove tehnološke inovacije kao što su 5G mreža, vještačka inteligencija, mobilni uređaji, pametni telefoni, aplikacije, kripto valute i blockchain tehnologije su značajno promijenile hotelsku i turističku industriju. Kako bi bile konkurentne na međunarodnom turističkom tržištu, destinacije moraju da kreiraju potpuno novu paradigmu koja je zasnovana na primjeni savremenih ICT tehnologija, atraktivnim i inovativnim turističkim proizvodima i uslugama i autentičnim doživljajima zasnovanim na konceptu „3E“ (Uzbuđenje, Zabava, Obrazovanje) i fokusirana na zadovoljenje želja, potreba i očekivanja turista. Jedino takva platforma može omogućiti privlačenje specifičnih ciljnih grupa, stvaranje zadovoljnih i lojalnih turista, sticanje konkurentske prednosti i kreiranje prepoznatljivog imidža na globalnom turističkom tržištu.

Ključne reči: *ICT tehnologije, digitalizacija, online biznis, turizam, hotelijerstvo, inovacije*

CHALLENGES OF THE NEW METHODOLOGICAL PLATFORM OF CARBON ACCOUNTING IN TOURISM

IZAZOVI NOVE METODOLOŠKE PLATFORME KARBONSKOG RAČUNOVODSTVA U TURIZMU

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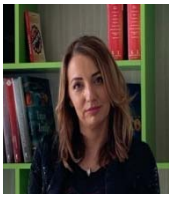
Milica Daković-Tadić



Anđela Jakšić-Stojanović

ABSTRACT:
The impact of climate changes as well as climate emergencies is growing continuously, especially due to the increase of the concentration of the greenhouse gases in the atmosphere and its impact on the environment. That's the main reason why modern studies are focused on green economy, green tourism and carbon accounting in order to establish the platform of the global financial system of carbon risk management, reducing emissions to zero. This paper tends to identify and define the most important challenges related to sustainability, corporate social responsibility and innovation through the prism of the accounting perspective.

Keywords: *green tourism, green economy, green transport, green buildings, climate changes, carbon accounting*

REZIME:
Uticaj klimatskih promjena kao i klimatskih vanrednih situacija u kontinuitetu raste, posebno zbog povećanja koncentracije stakleničkih gasova u atmosferi i njihovog uticaja na životnu sredinu. To je ključni razlog zašto su moderne studije usmjerene na zelenu ekonomiju, zeleni turizam i karbonsko računovodstvo kako bi se uspostavila platforma globalnog finansijskog sistema upravljanja rizikom od ugljenika, smanjujući njegovu emisiju na nulu. Ovaj rad teži da identifikuje i definiše najznačajnije izazove koji se odnose na održivost, korporativnu društvenu odgovornost i inovacije iz računovodstvene perspektive.

Ključne riječi: *zeleni turizam, zelena ekonomija, zeleni transport, zelene građevine, klimatske promjene, karbonsko računovodstvo*

STATISTICAL LITERACY AS A KEY COMPETENCY FOR INDUSTRY 4.0

STATISTIČKA PISMENOST KAO KLJUČNA KOMPETENCIJA U INDUSTRIJI 4.0

Đono Belma[1], Delalić Adela[2], Arnaut-Berilo Almira[3], Orlić Merima[4]
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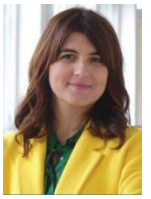
Đono Belma


Delalić Adela


Arnaut-Berilo Almira


Orlić Merima

ABSTRACT:
In the last few years of intensive technological growth, statistical literacy has become an essential knowledge that everyone should possess in a world driven by an enormous amount of information. Accordingly, it has been recognized as one of the key competencies in a modern society and it is necessary to continuously insist on improving statistical knowledge and skills, through all forms of education.Aiming to assess the situation in our society, a survey was conducted among students and employees in Sarajevo Canton, devised to measure the level of understanding of statistics from everyday life. The survey questionnaire is designed to cover the main aspects of statistical literacy, which include reading charts, interpreting data from tables, understanding the statements placed in a particular context, etc.Although the general conclusion is that statistical literacy in Sarajevo Canton is at a relatively satisfactory level, recommendations are given for the promotion and greater integration of statistics in all aspects of life.

***Keywords**: statistics, statistical literacy, statistical interpretation*

SAŽETAK:
U nekoliko posljednjih godina intenzivnog tehnološkog razvoja, statistička pismenost je postala esencijalno znanje koje svi treba da posjeduju u svijetu vođenom ogromnom količinom informacija. Shodno tome, prepoznata je kao jedna od ključnih kompetencija u savremenom društvu i neophodno je kontinuirano insistirati na unapređenju statističkih znanja i vještina, kroz sve oblike obrazovanja. U cilju procjene situacije u našem društvu, među studentima i zaposlenim u Kantonu Sarajevo je sprovedeno istraživanje osmišljeno za mjerenje nivoa razumijevanja statistike iz svakodnevnog života. Anketni upitnik je koncipiran tako da pokrije glavne aspekte statističke pismenosti koji uključuju čitanje grafikona, interpretaciju podataka iz tabela, razumijevanje tvrdnji stavljenih u određeni kontekst i sl. Iako je generalni zaključak da je statistička pismenost u Kantonu Sarajevo na relativno zadovoljavajućem nivou, date su preporuke za promovisanje i veću integraciju statistike u svim aspektima života.

***Ključne riječi**: statistika, statistička pismenost, statistička interpretacija*

TECHNOTOURISM – A NEW CULTURE OF TRAVEL?

TEHNOTURIZAM – NOVA KULTURA PUTOVANJA?

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Melika Arifhodžić

ABSTRACT:
Tourism continuously undergoes transformations that are dominantly shaped by the development of economy and technology, which primarily affect circumstances and the standards of life in general. Technologies, especially IT, have great impact on tourism on all sides of its process, where innovations are built in almost everyday basis. Along with the worldwide imposed protection measures against Coronavirus emerges a new travelling culture defined by technology, in terms of travel preparation and visiting localities, or in new tourism forms such as virtual tourism. All these circumstances reflect a special and irreplaceable role of technology not only in modern tourism but „omnipresence of technology that is visible in all aspects of social life [**1**].

Keywords: *tourism, technology, authenticity, Coronavirus, technotourism*

SAŽETAK:
*Turizam kontinuirano prolazi kroz transformacije dominantno oblikovane razvojem privrede i tehnologije koje prvenstveno utiču na uslove i standard života općenito, što primarno ima uticaje na uslove i život općenito a potom i na same turističke procese i njegovu organizaciju. Tehnologija, posebno IT, ima veliki utjecaj na turizam u svim stranama njegovog procesa, gdje se inovacije pojavljuju gotovo svakodnevno. Uz uspostavljene mjere zaštite protiv koronavirusa, pojavljuju se nove kulture putovanja određene tehnologijom, u smislu pripreme i posjeta lokalitetima, ili pak, virtualnih posjeta destinacijama. Ove okolnosti reflektiraju nezamjenjivu ulogu tehnologije na samo u savremenom turizmu već i „sveprisutnost tehnologije koja je primjetna u svim aspektima društvenog života“ [**1**] .*

Ključne riječi*:turizam, tehnologija, kultura, korona virus, tehnoturizam*

BIOCOAGULANTS AND BIOFLOKULANTS IN WATER AND WASTEWATER TREATMENT TECHNOLOGY

BIOKOAGULANTI I BIOFLOKULANTI U TEHNOLOGIJI TRETMANA VODE I OTPADNE VODE

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Suvada Suvalija


Amra Serdarevic


Alma Dzubur


Nerma Lazovic

ABSTRACT:
Continuous and rapid improvements in water and wastewater treatment technology are indispensable to protect environment and to provide a reliable and safe potable water supply. New concerns are present due to the use of conventional chemical coagulants and flocculants to remove colloidal particles from water and wastewater. Although ability of these chemicals to efficiently remove pollutants is fact, these chemicals may cause negative environmental and human health impacts. In order to minimize these impacts, an alternative solution may be the use of organic coagulants and flocculants, known as biocoagulants and bioflocculants. In this regard, a number of studies are currently being conducted to investigate different types of biocoagulants and bioflocculants, their performance and impact on health and environment. This article presents the advantages, limitations and challenges of employing biocoagulants and bioflocculants in water and wastewater treatment technology.

Keywords: *coagulation, flocculation, environmental impact, human health, biocoagulants, bioflocculants*

REZIME:
Kontinuirana i brza poboljšanja tehnologije prerade vode i otpadnih voda neophodna su za zaštitu okoliša i za pouzdanu i sigurnu opskrbu pitkom vodom. Prisutni su novi problemi zbog upotrebe konvencionalnih kemijskih koagulanata i flokulanata za uklanjanje koloidnih čestica iz vode i otpadnih voda. Iako je sposobnost ovih kemikalija da učinkovito uklanjaju čestice zagađenja činjenica, te kemikalije mogu uzrokovati negativne utjecaje na okoliš i zdravlje ljudi. Kako bi se ti utjecaji sveli na najmanju moguću mjeru, alternativno rješenje može biti uporaba organskih koagulanata i flokulanata, poznatih kao biokoagulanti i bioflokulanti. S tim u vezi, trenutno se provode brojne studije kako bi se istražile različite vrste biokoagulanata i bioflokulanata, njihov učinak i utjecaj na zdravlje i okoliš. Ovaj članak prikazuje prednosti, ograničenja i izazove primjene biokoagulansa i bioflokulanata u tehnologiji prerade vode i otpadnih voda.

Ključne riječi: *koagulacija, flokulacija, utjecaj na okoliš, ljudsko zdravlje, biokoagulanti, bioflokulanti*

WATER SENSITIVE URBAN DESIGN PRINCIPLES

PRINCIPI URBANOG DIZAJNA OSJETLJIVOG NA VODU

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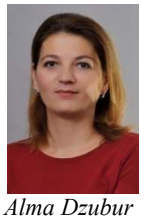
Suvada Suvalija


Biljana Buhavac


Amra Serdarevic


Alma Dzubur

ABSTRACT:
Pluvial floods, which are increasingly present in urban areas, create a turning point in thinking about the principles of urban design and stormwater management. Namely, architects - urban planners have recently recognized the potential value of water with green infrastructure (GI) in the urban environment, as a key component of multipurpose land use and adaptation to climate change. Also, sanitary engineers recognize GI as a potential that can be used in combination with existing drainage systems. The introduction of GI (as a decentralized method for stormwater management) minimizes the negative consequences of urbanization and climate change. Water Sensitive Urban Design (WSUD) is a concept that supports the management of urban water systems in an integrated way through better water positioning in urban design processes. The result of applying the WSUD principles is a water-sensitive city (WSC) in which water is a resource that is managed in a way that makes the city more pleasant to live in and safer.

Keywords: *green infrastructure, stormwater management, water sensitive city, urban floods, water cycle*

REZIME:
Pluvijalne poplave, koje su sve prisutnije u urbanim sredinama, stvaraju prekretnicu u razmišljanju o principima urbanog dizajna i upravljanja oborinskim vodama. Naime, arhitekte - urbanisti su nedavno prepoznali potencijalnu vrijednost vode sa zelenom infrastrukturom (GI) u urbanoj sredini, kao ključnu komponentu višenamjenskog korištenja zemljišta i prilagođavanja klimatskim promjenama. Takođe, sanitarni inženjeri prepoznaju GI kao potencijal koji se može koristiti u kombinaciji sa postojećim sistemima odvodnje. Uvođenje GI (kao decentralizovane metode za upravljanje oborinskim vodama) minimizira negativne posljedice urbanizacije i klimatskih promjena. Urbanistički dizajn osjetljiv na vodu (WSUD) je koncept koji podržava upravljanje urbanim vodovodnim sistemima na integriran način kroz bolje pozicioniranje vode u arhitektonskom projektovanju. Rezultat primjene principa WSUD je grad osjetljiv na vodu (WSC) u kojem je voda resurs kojim se upravlja na način da grad čini ugodnijim za život i sigurnijim.

Ključne riječi: *zelena infrastruktura, upravljanje oborinskim vodama, grad osjetljiv na vodu, urbane poplave, ciklus vode*

ROBOTICS ENGINEERING DEVELOPMENT PROSPECTS FOR THE NEXT PERIOD

PERSPEKTIVA RAZVOJA ROBOTIČKOG INŽENJERSTVA ZA NAREDNI PERIOD

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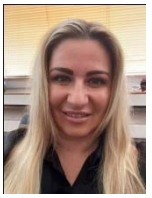
Branislav Dudić


Pavel Kovač


Borislav Savković


Alexandra Mittelman

ABSTRACT:
Over the last 5 years, the global market has noticed a record in the number of robots delivered and manufactured, by different famous world producer. The total robot market is around $ 45 billion. As for the countries that are the largest customers of robots are China, South Korea, Japan, the USA and Germany. The goal of the paper is to show the very significant role in development of industrial robots, to show the situation on the world market and to show what are the innovations and investments in the field, as well to give guide on how the market will behave in the next period and , value of new robot installations in the automotive industry value of new robot installations in the electronics industry, the demand for robotics in the metal and machinery industry and sales value of new robot installations in the plastic and chemical products.

Keywords: *Robots, innovation, technology, production, businesses, sales, demand, value*

REZIME:
Tokom poslednjih 5 godina, globalno tržište je zabeležilo rekord u broju isporučenih i proizvedenih robota različitih poznatih svetskih proizvođača. Ukupno tržište robota je oko 45 milijardi dolara. Što se tiče zemalja koje su najveći kupci robota su Kina, Južna Koreja, Japan, SAD i Nemačka. Cilj rada je da prikaže veoma značajnu ulogu u razvoju industrijskih robota, da prikaže stanje na svetskom tržištu i da pokaže koje su inovacije i investicije u ovoj oblasti, kao i da da vodič kako će se tržište ponašati. u narednom periodu, kao i vrednosti novih robotskih instalacija u automobilskoj i elektronskoj industriji, potražnja za robotikom u metalnoj i mašinskoj industriji i prodajna vrednost novih robotskih instalacija u plastičnim i hemijskim proizvodnim procesima.

Ključne reči: *Roboti, inovacije, tehnologija, proizvodnja, preduzeća, prodaja, potražnja, vrednost*

GLOBAL PERIOD-DOUBLING BIFURCATION OF A CERTAIN SECOND-ORDER QUADRATIC RATIONAL DIFFERENCE EQUATIONS

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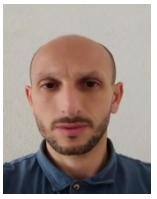
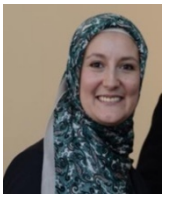
Midhat Mehuljić


Jasmin Bektešević


Vahidin Hadžiabdić


Naida Mujić

ABSTRACT:
In this paper we considered local dynamics of the following difference equation $x_{n+1} = \frac{\alpha x_n^2+\beta x_n+\gamma x_{n-1}}{Ax_n^2+Bx_n+Cx_{n-1}}$*, where* $\alpha,\beta,\gamma,A,B,C\geq 0$ *and* $\alpha+\beta+\gamma>0$ *,* $A+B+C>0$ *and where the initial conditions* x_{-1} *and* x_0 *are arbitrary nonnegative real numbers such that* $x_{-1}+x_0>0$*. The local stability of the equilibrium was fully examined for all values of parameters* $\alpha,\beta,\gamma,A,B,C\geq 0$*. It has been shown that a single equilibrium point can be a locally asymptotically stable, saddle or non-hyperbyllic point, but it cannot be a repeller for any of the parameter values. Also, for certain values of the coefficients, the global asymptotic stability of the equilibrium is shown.*

Keywords: *boundedness*, *difference equation, equilibrium, global stability, local dynamics.*

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1. INTRODUCTION

In this paper we investigate the global dynamics of the following difference equation

$$x_{n+1} = \frac{\alpha x_n^2+\beta x_n+\gamma x_{n-1}}{Ax_n^2+Bx_n+Cx_{n-1}},\ n = 0,1,\ldots \qquad (1)$$

where *where* $\alpha,\beta,\gamma,A,B,C\geq 0$ *and* $\alpha+\beta+\gamma>0$ *,* $A+B+C>0$ *and where the initial conditions* x_{-1} *and* x_0 *are arbitrary nonnegative real numbers such that* $x_{-1}+x_0>0$*. This equation is a special case of the general rational difference equation of the second order with quadratic terms in the numerator and denominator*

$$x_{n+1} = \frac{Ax_n^2+Bx_nx_{n-1}+Cx_{n-1}^2+Dx_n+Ex_{n-1}+F}{ax_{n+}^2bx_nx_{n-1}+cx_{n-1}^2+dx_n+ex_{n-1}+f},\ n = 0,1,\ldots \qquad (2)$$

Many special cases of Eq.(1) have been studied before. Special cases:

$$x_{n+1} = \frac{\gamma x_{n-1}}{Bx_n+Cx_{n-1}},\ n = 0,1,\ldots \qquad (3)$$

TECHNOSPHERE - ALCHEMY OF TECHNIQUE
TEHNOSFERA – ALHEMIJA TEHNIKE

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[1]University of Sarajevo, Faculty of Political Sciences, Bosnia and Herzegovina


Halima Sofradžija


Fahira Fejzić Čengić


Abdel Alibegović


Enita Kapo

ABSTRACT:
Technology has reshaped the world. In the digital age, technology creates a new reality, a technosphere that brings radical changes to the world and life, at all levels of human experience. There is no end in sight to the technological modification of the world, nor are the consequences known - we are talking only about the possibilities of technology. The hyperreality of the technosphere is fascinating precisely because of its seductiveness. Changing our experiences in technoculture invites us to rethink new social rationality.

Keywords: *technoculture, technosphere, technology, network society, society digitalization,*

SAŽETAK:
Tehnologija je preoblikovala svijet. U digitalnom dobu tehnologija stvara novu realnost, tehnosferu koja donosi upravo radikalne izmjene svijeta i života, na svim nivoima ljudskog iskustva. Tehnološkom modificiranju svijeta ne nazire se kraj, niti se znaju posljedice – govorimo samo i jedino o mogućnostima tehnologije. Hiperrealnost tehnosfere fascinantna je upravo zbog svoje zavodljivosti. Promjena naših iskustava u tehnokulturi poziva nas na promišljanje nove društvene racionalnosti.

Ključne riječi: *tehnokultura, tehnosfera, tehnologija, umreženo društvo, digitalizacija društva*

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1. INTRODUCTION

Modern society is marked with accelerated historical transformations as well as with recognizable changes of existing paradigms, in the light of progress of new media, information technology, and communication technologies. In digital era technology makes a new reality, some authors named “ the culture of real virtuality ”, here we think first of Manuel Castells ...

EXPERIMENTAL STATISTICAL MODELING OF THE PRESSING PROCESSOF VIBROPRESSED CONCRETE ELEMENTS USING TAGUCHI'S METHOD

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Aurel Mihail Țițu


Gheorghe Ioan Pop


Alina Bianca Pop


Constantin Oprean

ABSTRACT:
The experimental research presented in this paper was carried out in an organization whose activity object is the production of vibro-pressed concrete elements.The aim of the research is to optimize the vibropressing process, aiming to reduce the percentage of vibropressed concrete elements whose thickness and tensile strength do not fall within the tolerance range.The experimental statistical modeling method used is Taguchi's method and the major factors influencing the vibropressing process that the authors chose after applying the dispersion analysis are the pressing pressure, the pressing time, the water / cement ratio and the type of cement used. The results of the research provide information on the features that need to be improved. A solution related to the final configuration is proposed in order to fulfill the research objective. The conclusions obtained using a well-established method in the field of quality assurance and management have opened a new research horizon with immediate applicability.

Keywords: *pressing process, vibro-pressed concrete, experimental statistical modeling, Taguchi's method, quality assurance and management*

DETERMINATION OF CHANGE IN COFFICIENCY OF FLOW AND COEFFICIENT OF RAINWATER INFILTRATION INTO BODY OF WASTE LANDFILL BY SULJIC METHOD

ODREĐIVANJE PROMJENE KOEFICIJENTA PROTOKA I KOEFICIJENTA INFILTRACIJE OBORINSKIH VODA U TIJELO DEPONIJE OTPADA METODOM SULJIC

***Suljić Nedim*[1]**
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Nedim Suljić

ABSTRACT:
Landfilling is the simplest and most widespread way of disposing of waste. From the beginning of 2016 to the end of 2020, measurements of rainwater infiltration were carried out at municipal landfills in Bosnia and Herzegovina. Measurements were made as a function of the amount of previous rains, air temperature, air humidity, dynamic compressibility modulus of the landfill body and the body temperature of the landfill to a depth of 30 cm.
Based on that, a polynomial equation with the infiltration curve was obtained, ie the amount of infiltrated water into the body of the landfill as a function of time.
This equation may be applicable in this part of Europe. The ultimate goal is to define the amount of leachate due to the sizing of the drainage system at the base of the municipal waste landfill.

Keywords: *infiltration, precipitation, landfill, infiltration time, infiltration curve*

REZIME:
Deponovanje je najjednostavniji i najrašireniji način zbrinjavanja otpada. Od početka 2016. godine do kraja 2020. godine, na komunalnim deponijama u Bosni i Hercegovini, provedena su mjerenja infiltracije oborinskih voda. Mjerenja su rađena u funkciji količine prethodnih kiša, temperature zraka, vlažnosti zraka, dinamičkog modula stišljivosti tijela deponije i temperature tijela deponije u dubini do 30 cm. Na osnovu toga, dobijena je polinomna jednačina sa krivom infiltracije, odnosno količine infiltrirane vode u tijelo deponije u funkciji od vremena.
Navedena jednačina može biti primjenjiva na području ovog dijela Evrope. Krajnji cilj je definisanje količine procjednih voda zbog dimenzioniranja drenažnog sistema u temelju deponije komunalnog otpada.

Ključne reči: *infiltracija, padavine, deponija otpada, vrijeme infiltracije, kriva infiltracije*

ROLE OF THE LANDFILL CAPPING SYSTEM IN THE LEACHATE PRODUCTION

ULOGA SISTEMA ZA POKRIVANJE DEPONIJA U PRODUKCIJI PROCJEDNIH VODA

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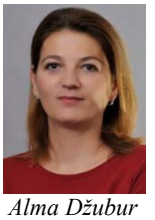
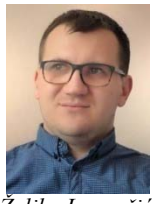
Amra Serdarević


Suvada Šuvalija


Alma Džubur


Željko Lozančić

ABSTRACT:
Waste disposal at the landfill is always related to environmental issues. One of the biggest problem of waste disposal is related to the production of landfill gas and leachate. A modern approach to landfill leachate management consider a landfill as a system. It is not always necessary to put in focus a choice of a leachate treatmenttechnology. New approaches are based on leachate minimization, including landfill capping, surface water drainage, and reduction of the rainwater percolation through the waste layers. Also, landfill operation and even a type of waste received by landfill can significantly affect the efforts deemed necessary for leachate treatment. Landfill in Canton Sarajevo has been facing problems with leachate for many years. To reduce the amount of leachate, different landfill covers have been considered. This paper presents a review of landfill closure procedures that may directly affect the reduction of leachate production and a case study of the Sarajevo landfill.
Keywords:*landfill, leachate,multi-layerbarrier, liner, environmental impact*

REZIME:
Odlaganje otpada na deponije uvijek je povezano s pitanjima okoliša. Jedan od najvećih problema zbrinjavanja otpada vezan je za proizvodnju deponijskog plina i procjednih voda. Savremeni pristup upravljanju procjednim vodama posmatra deponiju kao cjeloviti sistem. Nije uvijek potrebno staviti u fokus izbor tehnologije obrade procjednih voda. Novi pristupi temelje se na minimiziranju procjednih voda, uključujući zatvaranje deponija, odvodnju površinskih voda i smanjenje procjedjivanja kišnice kroz slojeve otpada. Također, način deponovanja, pa čak i vrsta otpada primljenog na deponiju, mogu značajno utjecati na napore koji se ulažu za potrebne tretmanaprocjednih voda. Deponija u Kantonu Sarajevo već dugi niz godina se suočava sa problemom procjednih voda. Kako bi se smanjila količina procjednih voda, razmatrani su različiti tipovi slojeva za pokrivanje deponije. U ovom radu prikazan je osvrt na postupke zatvaranja deponija što može direktno utjecati na smanjenje produkcije procjednih voda te primjer pokrivanja sarajevske deponije.
Ključne riječi: *odlagalište, procjedne vode, višeslojna barijera, geokompoziti, slojevi, utjecaj na okoliš*

SUSTAINABLE CONSTRUCTION SCHEDULING THROUGH UTILIZATION OF OPTIMIZATION TOOLS

ODRŽIVO PLANIRANJE GRADNJE UZ KORIŠTENJE OPTIMIZACIJSKIH ALATA

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Borna Dasović


Uroš Klanšek

ABSTRACT:
This paper presents an overview of current practices in sustainable construction scheduling through the use of optimization tools. Over the years, the sustainability of construction projects has become a significant concern in the construction industry. The use of optimization tools in planning construction projects can contribute to more efficient scheduling practices. Through efficient scheduling, project managers can reduce project costs, decrease energy consumption, and minimize the environmental footprint of construction. Greener construction can be achieved in many ways during the execution phase, but a significant part of it can be accomplished before construction begins. This paper presents practices for sustainable construction scheduling supported with optimization tools divided into three main categories - economic, environmental, and social. The paper shows the advantages and limitations of addressed approaches, along with the conclusions and recommendations for further research.

Keywords: *construction, project management, optimization, sustainable scheduling*

SAŽETAK:
Ovaj rad predstavlja pregled trenutne prakse u održivom planiranju gradnje korištenjem alata za optimizaciju. Tijekom godina, održivost građevinskih projekata je postala važna tema u građevinskoj industriji. Korištenje alata za optimizaciju u planiranju građevinskih projekata može doprinijeti učinkovitijim praksama planiranja. Kroz učinkovito planiranje, voditelji projekata mogu smanjiti troškove projekta, potrošnju energije i minimizirati ekološki otisak gradnje. Zelenija gradnja može se postići na mnogo načina tijekom izvedbene faze, ali značajan dio toga se može postići i prije početka gradnje. Ovaj rad predstavlja pregled najsuvremenijih praksi za održivo planiranje gradnje podržane alatima za optimizaciju koje su podijeljene u tri glavne kategorije - ekonomsku, ekološki i društvenu. U radu su prikazane prednosti i ograničenja razmatranih pristupa, te zaključci i preporuke za daljnje istraživanje.

Ključne riječi: *građevinarstvo, projektni menadžment, optimizacija, održivo planiranje*

INTEGRATION OF UAV AND TERRESTRIAL PHOTOGRAMMETRY FOR CULTURAL AND HISTORICAL HERITAGE RECORDING AND 3D MODELLING: A CASE STUDY OF THE 'SEBILJ' FOUNTAIN IN SARAJEVO, BOSNIA AND HERZEGOVINA

INTEGRACIJA UAV I TERESTRIČKE FOTOGRAMETRIJE U SVRHU DOKUMENTOVANJA KULTURNO-HISTORIJSKOG NASLJEĐA I 3D MODELIRANJA : STUDIJA SLUČAJA ČESME SEBILJ U SARAJEVU, BOSNA I HERCEGOVINA

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[1, 2, 3]University of Sarajevo, Faculty of Civil Engineering
[4]MGBH d.o.o. Sarajevo


Admir Mulahusić


Nedim Tuno


Jusuf Topoljak


Faris Gačanović

ABSTRACT:
The main topic of this research is the feasibility and efficiency of using DSLR cameras and unmanned aerial vehicle (UAV) to create a 3D model of the historical monument (Sebilj iconic fountainin Sarajevo), by connecting two data sets in one common whole. The complexity of a 3D model representation and the geometric accuracy (absolute and relative) confirmed that the combination of terrestrial and aerial photo grammetry is the optimal solution. Thus, obtained results in dicates that this type of combination can be used in various branches of engineering, as well as for the purposes of design, reconstruction and restoration o fhistorical buildings.

Keywords: *DSLR, UAV, photogrammetry, cultural heritage, Mavic, 3D model*

REZIME:
Glavna tema ovoga istraživanja je izvodljivost i efikasnost upotrebe DSLR kamere i bespilotne letjelice kako bi se izradio 3D model kulturno-historijskog objekta (poznata Sebiljčesma u Sarajevu), putem povezivanje dva seta podataka u jednu cjelinu Nivo detaljnosti 3D modela i geometrijska tačnost (apsolutna i relativna) potvrđujuda kombinacija terestričke i aero fotogrametrije predstavlja optimalno rješenje. Dakle, ostvareni rezultati govore da ovu vrstu fotogrametrijske metode moguće koristiti u raznim granama inženjerstva, kao i kodprojektovanja, obnove i restauracije kulturno-historijskih objekata.

Ključne riječi:*DSLR, UAV, fotogrametrija, kulturno nasliješe, Mavic, 3D model*

STRENGTHENING TIMBER STRUCTURE WITH FIBER REINFORCED POLYMER – AN OVERVIEW

PRIMJENA POLIMERA OJAČANIH VLAKNIMA U DRVENIM KONSTRUKCIJAMA

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Merima Salčin


Žana Džubur


Fuad Ćatović


Edin Džiho

ABSTRACT:
This paper presents the application of FRP composite materials as reinforcements in timber structures. New requirements in the construction require improvement of the mechanical properties of timber, ie. optimal use of positive properties which is achieved by combining two materials into a single structural element. The combined action leads to better utilization of the cross section, so that reinforcement prevents the occurrence of premature failure in critical zones. Accelerated reduction of natural resources leads to a reduction of raw materials for the production of construction materials, which is a prerequisite for finding alternative materials, new recycling technologies and primarily sustainable development. The results of the research are important for the industry of glued laminated timber, thanks to the improvement of construction characteristics, more efficient use of wood resources can be enabled by using lower-grade timber.

Keywords: *timber, glulam, strength, flexural behaviour, beams, Polymer-matrix composites*

REZIME:
Ovaj rad prikazuje primjenu FRP kompozitnog materijala kao ojačanja u drvenim konstrukcijama. Novi zahtjevi u građevinarstvu zahtijevaju poboljšanje mehaničkih karakteristika drveta. Kombinovano djelovanje dovodi do boljeg iskorištavanja poprečnog preseka, tako da ojačanja sprečavaju nastanak preranog loma u kritičnim zonama.Ubrzano smanjenje prirodnih resursa dovodi do smanjenja sirovina za proizvodnju građevinskih materijala, što je preduslov pronalaženja alternativnih materijala, novih tehnologija recikliranja i prvenstveno održivog razvoja. Rezultati istraživanja značajni su za industriju proizvodnje lijepljenog lameliranog drveta, zahvaljujući poboljšanju konstrukcijskih karakteristika, može biti omogućena efikasnijaupotreba drvnih resursa iskorištavanjem drvenegrađe niže klase.

Ključne riječi: *drvo,lijepljeno lamelirano drvo, ojačanje, savijanje, greda, FRP kompozit*

CONCEPTUAL PRINCIPLES OF NEARLY ZERO ENERGY BUILDINGS (nZEB)

KONCEPTUALNI PRINCIPI IZGRADNJE ZGRADA NULTE ENERGIJE (nZEB)

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Aida Husetić


Dženan Omeradžić


Emina Japić

ABSTRACT:
Unlike low-energy and passive buildings, near-zero energy construction requires almost nothing or a very small percentage of primary energy. Requirements for nZEB, defined by EU directives, stipulate that a very small or zero percentage of the primary energy consumed by a building is obtained from renewable sources, either on the building or in its immediate surroundings. The paper presents an analysis of the planning process of the building, starting from the location where it is built, the functional organization of space, the requirements in terms of primary energy consumption for space heating and cooling and hot water preparation. Attention will also be paid to the types and methods of installation of building materials used for such facilities, types and orientation of glazed facade openings (U factor), thermal insulation, airtightness of the outer shell, and other parameters to achieve nZEB standards, energy efficiency, the cost-effectiveness of construction and environmental protection.

Keywords: *nZEB concept, energy efficiency, outer shell, U factor*

REZIME:
Za razliku od niskoenergetskih i pasivnih zgrada, energetski gotovo nulta gradnja zahtijeva skoro ništa ili veoma mali procenat primarne energije. Zahtjevi za nZEB, definirani, direktivama EU, propisuju da se vrlo mali ili nulti procenat primarne energije koju zgrada troši dobija iz obnovljivih izvora, bilo na zgradi ili u njenom direktnom okruženju. Rad prikazuje analizu procesa planiranja zgrade, počevši od lokacije na kojoj se gradi, funkcionalne organizacije prostora, zahtjeva u pogledu potrošnje primarne energije za grijanje i hlađenje prostora i pripremu tople vode. Također će se obratiti pažnja na vrste i načine ugradnje građevinskih materijala koji se koriste za ovakve objekte, vrste i orijentaciju ostakljenih fasadnih otvora (U faktor), toplinsku izolaciju, zrakonepropusnost vansjkog omotača i ostale parametre s ciljem lakšeg postizanja standarda nZEB, energetske učinkovitosti, ekonomičnosti izgradnje i očuvanja okoliša.

Ključne riječi: *Koncept nZEB, energetska efikasnost, vanjska ovojnica, U faktor*

RECYCLING OF BUILDING MATERIALS AS A PRINCIPLE OF SUSTAINABLE CONSTRUCTION

RECIKLAŽA GRAĐEVINSKIH MATERIJALA KAO PRINCIP ODRŽIVE GRADNJE

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Aida Husetić


Emina Japić


Dženan Omeradžić

ABSTRACT:
Research shows that to achieve sustainable construction, it is necessary to assess the impact of the production and use of construction materials on the environment. Construction waste recycling offers many opportunities in terms of reducing the total amount of energy required, Co2 emissions, and environmental protection in general. The principles on which it is based must take into account the analysis of the composition of construction waste, its price, the origin of materials, the service life of materials, environmental impact (in production and operation), impact on human health, and final recyclability.
Construction waste accounts for approximately 36%of total waste in Europe, so its reduction, ie recycling, and reuse is a factor of significant savings and achieving a high principle of sustainable construction. This paper will give examples of criteria for recycling construction waste, analysis of materials and their production processes in terms of environmental pollution and energy consumption, recycling criteria in terms of feasibility and cost-effectiveness of re-installation.

Keywords: *construction waste, recycling, sustainable construction*

REZIME:
Reciklaža građevinskog otpada pruža niz mogućnosti u pogledu smanjenja ukupne količine potrebne energije, emisije CO_2 i zaštite okoliša općenito. Principi na kojima se ona zasniva moraju uzeti u obzir analizu sastava građevinskog otpada, njegovu cijenu, porijeklo materijala, životni vijek materijala, uticaj na okoliš (u proizvodnji i eksploataciji), uticaj na ljudsko zdravlje i finalna reciklabilnost.
Građevinski otpad čini približno 36% ukupnog otpada u Evropi pa je njegovo smanjenje, odnosno reciklaža i ponovno korištenje faktor značajnih ušteda i postizanja visokog principa održive gradnje. Kroz ovaj rad će se dati primjeri kriterija za reciklažu građevinskog otpada, analiza materijala i njihovih proizvodnih procesa s aspekta zagađenja okoliša i potrošnje energije, kriteriji za reciklažu s aspekta mogućnosti i ekonomičnosti ponovne ugradnje.

Ključneriječi: *građevinski otpad, riciklaža, održiva gradnja*

THE IMPACT OF CHANGING REGULATION PLANS ON OUTDOOR VENTILATION STUDIED BY COMPUTATIONAL FLUID DYNAMICS

Muhamed Hadžiabdić[1], Dina Šamić[2], Haris Lulić[3], Sanela Klarić[4]
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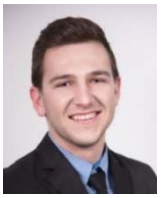
Muhamed Hadžiabdić


Dina Šamić


Haris Lulić


Sanela Klarić

ABSTRACT:
The transformation processes in transitional cities are often so accelerated that the urban analysis of micro climatic parameters is set aside. This is particularly dangerous in the valley cities, such as Sarajevo, struggling with poor air quality. The causes of the poor air quality are numerous, but mainly related to traffic emissions and use of fossil fuels for domestic heating. The focus of this paper is on the correlation between urban morphology on one side and wind permeability, ventilation efficiency and related pollution level on another. We have employed CFD simulation to investigate the air pollutant dispersion in a district of Sarajevo for scenario of low wind (1 m/s) for three different urban forms. The results show significant time and spatial variations in air pollutant concentration for three urban forms. This research is stressing out general importance of incorporating realistic micro-climatic simulations (CFD being one of them) in the urban planning procedures in Sarajevo, as a mandatory control mechanism, prior to the implementation or variation of any urban and regulation plan.
Keywords: *outdoor ventilation; CFD; sustainable urban development*

REZIME:
Procesi transformacije u tranzicijskim gradovima često su toliko ubrzani da se urbanistička analiza mikroklimatskih parametara ostavlja po strani. Ovo je posebno opasno u kotlinskim gradovima, poput Sarajeva, koji imaju loš kvalitet zraka. Uzroci lošeg kvaliteta vazduha su najvećim dijelom rezultat emisija polutanata iz saobraćaja i individualnih ložištaza grijanje domaćinstava. Fokus ovog rada je na korelaciji između urbane morfologije s jedne strane i propusnosti vjetra, efikasnosti ventilacije i povezanog nivoa zagađenja s druge strane. Koristili smo CFD simulaciju da istražimo disperziju zagađivača zraka u okrugu Sarajeva za scenario slabog vjetra (1 m/s) za tri različita urbana oblika. Rezultati pokazuju značajne vremenske i prostorne varijacije u koncentraciji zagađivača zraka za tri urbana oblika. Ovo istraživanje naglašava opći značaj uvođenja realističnih mikroklimatskih simulacija (CFD je jedan od njih) u urbanističke procedure u Sarajevu, kao obaveznog kontrolnog mehanizma, prije implementacije ili izmjene bilo kojeg urbanističkog i regulacionog plana.
Ključne riječi: *vanjska ventilacija; CFD; održivi urbani razvoj*

FRESH MORTAR PROPERTIES INCORPORATING RED MUD AND CRUSHED BRICK

OSOBINE SVJEŽIH MALTERA SA DODATKOM CRVENOG MULJA I LOMLJENE OPEKE

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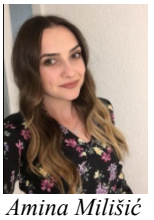
[3,4] Dzemal Bijedic University of Mostar, Faculty of Civil Engineering, Mostar, B&H


Selma Husnić


Amina Milišić


Marko Ćećez


Merima Šahinagić-Isović

ABSTRACT:
Fresh mortar properties with addition of red mud as replacement for cement and crushed brick as replacement for aggregate (sand) were analyzed and are presented in this paper. Red mud is a by-product in Bayer's process of alumina production. It is classified as dangerous if not stored correctly. Chemical composition of red mud includes iron, aluminum, silicon and calcium oxides, which classifies it as good candidate for researchas partial replacement for cement. Cement industry is itself largeenvironmental polluterparticipating with about 8% of total CO_2 emission in atmosphere. On the other side, use of the recycled aggregate as replacement for natural aggregate in production of composite materials such as mortars and concrete is current trend. The technology of production would result in sustainable and eco-friendly mortars.

Keywords: *sustainability, industrial waste, red mud, mortar, sand*

REZIME:
U ovom radu istražene su i predstavljene osobine svježih maltera sa dodatkom crvenog mulja kao djelimične zamjene za cement i lomljene opeke kao djelimične zamjene za agregat (pijesak).Crveni mulj je nusprodukt Bayerovog procesa proizvodnje glinice. Klasificira se kao opasan materijal ako nije ispravno deponovan. Hemijski sastav crvenog mulja uključuje željezne, aluminijeve, siclicijske i kalcijumske okside, što čini materijal dobrim kandidatom za istraživaja kao djelimične zamjene za cement. Cementna industrija je veliki zagađivač sa ukupno oko 8% emisije CO_2u atmosferu. S druge strane, upotreba recikliranih agregata, kao zamjena za prirodne agregate je trend u proizvodnji kompozitnih materijala kao što su malteri i betoni. Tehnologija proizvodnje ovakvih maltera rezultirala bi u održivom i eco-friendly malteru.

Ključneriječi: *održivost, industrijski otpad, crveni mulj, malter, pijesak*

BENEFITS AND RISKS OF APPLYING INTERNET OF BODIES TECHNOLOGY (IoB)

KORISTI I RIZICI PRIMJENE TEHNOLOGIJE INTERNET TIJELA (IoB)

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[1]*University of Sarajevo, School of Economics and Business, Sarajevo*

Savo Stupar

Mirha Bičo Ćar

ABSTRACT:
Recent technological advances have enabled the emergence of new Internet of Bodies (IoB) technology, as an extension of the Internet of Things technology, where the Internet of Things connects to the human body through a large number of convenient devices and sensors attached or even implanted in the human body.This technology and its rapid spread as a network of human bodies and big data through connected sensors, offers enormous social and health benefits. At the same time, IoB technology generates new challenges related to data management related to the privacy and sovereignty of the individual, as well as new risks of discrimination and bias in the field of employment, education, finance, use of health insurance services, etc.

Keywords*: Artificial Intelligence, Internet of Things, Internet of Bodies, Machine Learning, Internet of Everything*

SAŽETAK:
Najnovija tehnološka dostignuća omogućila su nastanak nove tehnologije Interneta tijela (Internet of Bodies ili skraćeno IoB), kao proširenje tehnologije Internet stvari (Internet of Things), gdje se Internet stvari povezuje sa ljudskim tijelom putem velikog broja prikladnih uređaja i senzora koji su pričvršćeni ili čakim plantirani, odnosno ugrađeni u ljudsko tijelo. Ova tehnologija i njeno brzo širenje kao mreže ljudskih tijela i velikih podataka (Big Data) putem povezanih senzora, nudi ogromne društvene i zdravstvene prednosti. U isto vrijeme IoB tehnologija, generiše nove izazove u vezi sa upravljanjem podacima koji se odnose na privatnosti i suverenost pojedinca, kao i na nove rizike diskriminacije i pristrasnosti u oblasti zapošljavanja, obrazovanja, finansija, korišćenja usluga zdravstvenog osiguranja itd.

Ključne riječi*:Vještačka inteligencija, internet stvari, internet tijela, mašinsko učenje, internet svega*

JOB INSECURITY AND PSYCHOLOGICAL SAFETY IN THE WORKPLACE: EVIDENCE FROM BOSNIA AND HERZEGOVINA

NESIGURNOST POSLA I PSIHOLOŠKA SIGURNOST NA RADNOM MJESTU: NALAZI IZ BOSNE I HERCEGOVINE

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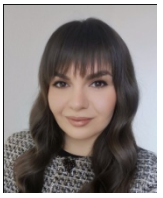
[1,2,3]University of Sarajevo, School of Economics and Business, Sarajevo, Bosnia and Herzegovina


Amra Kožo


Ina Hodžić


Mirha Bičo-Ćar

ABSTRACT:
This study explores job insecurity and psychological safety in the workplace in terms of objective (contract type) and subjective (socio-demographic) factors. Job insecurity refers to a subjectively perceived and undesired possibility to lose the present job in the future. Psychological safety in the workplace is observed as a climate where employees are comfortable expressing and being themselves. We assessed job insecurity with the Job Insecurity Scale developed by De Witte (2000), while psychological safety was measured with the Psychological Safety scale developed by Edmondson (1999). The study findings revealed differences in job security regarding career stage, professional position, and contract type, while differences in psychological safety were confirmed in distinct career stages. Lastly, study findings and implications of results are discussed.

Keywords: *job insecurity, psychological safety in the workplace, workplace*

REZIME:
Ovaj rad istražuje nesigurnost posla i psihološku sigurnost na radnom mjestu kroz prizmu objektivnih (ugovor o radu) i subjektivnih (socio-demografskih) faktora. Nesigurnost posla se definiše kao subjektivan doživljaj i neželjena odnosno nevoljna mogućnost gubitka trenutnog posla u budućnosti. Psihološka sigurnost na radnom mjestu se posmatra kroz klimu u kojoj je zaposlenima ugodno da se izražavaju i budu ono što jesu. Kao mjerni instrument za nesigurnost posla korištena je skala nesigurnosti posla autora De Witte (2000) dok je za psihološku sigurnost na radnom mjestu korištena skala psihološke sigurnosti razvijena od strane Edmondson (1999). Rezultati studije pokazuju razlike u percipiranoj nesigurnosti posla po osnovu karijernih faza, pozicije u organizaciji i vrste ugovora. Takođe, rezultati upućuju i da se nivo psihološke sigurnosti na radnom mjestu razlikuje po karijernim fazama. Na kraju, rad donosi diskusiju rezultata i njihovih implikacija na praksu.

Ključneriječi: *nesigurnost posla, psihološka sigurnost na radnom mjestu, radno mjesto*

THE APPLICATION OF GAMIFICATION IN A BUSINESS ENVIRONMENT: THE MOST COMMON THEMES AND ELEMENTS

PRIMJENA GAMIFIKACIJE U POSLOVNOM OKRUŽENJU: NAJČEŠĆE TEME I ELEMENTI

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Anes Torlaković

Ljiljan Veselinović

Mirha Bičo Ćar

ABSTRACT:
‘Gamified’ experiences can focus on business processes or outcomes; can be applied to a large number of industries and are important elements in new technology applications. Gamification is a still-growing research topic in both commercial and scientific domains. Our results show that the determined research themes include impact, experience, engagement, innovation, motivation, user acceptance and social issues. In addition to that, this paper provides direction to understanding gamification and game elements implemented by businesses. The implementation of a variety of gamification elements was documented and these include but are not limited to goals setting, virtual simulations, leaderboards, rewards, points, framing of tasks and levels.

Keywords: *gamification, business, literature review*

SAŽETAK:
'Gejmificirana' iskustva mogu se fokusirati na poslovne procese ili ishode; mogu se primijeniti u velikom broju industrija i važni su elementi u primjeni novih tehnologija. Gejmifikacija je još uvijek rastuća istraživačka tema u komercijalnim i naučnim domenima. Naši rezultati pokazuju da određene teme istraživanja primjene gejmifikacije uključuju analizu uticaj, iskustvo, angažman, inovativnost, motivaciju, prihvaćanje od strane korisnika i društvena pitanja. Osim toga, ovaj rad daje smjernice za razumijevanje gejmifikacije i elemenata igre koje primjenjuju kompanije. Primjena različitih elemenata gejmifikacije je dokumentovana i oni uključuju, ali nisu ograničeni, na postavljanje ciljeva, virtuelne simulacije, rang liste, nagrade, bodove, oblikovanje zadataka i nivoe.

Ključne riječi*: gejmifikacija, biznis, pregled literature*

DIGITALIZATION OF THE OPERATIONS OF INSURANCE COMPANIES WITH SPECIAL REFERENCE TO THE FINANCIAL REPORTING OF INSURERS IN MONTENEGRO

DIGITALIZACIJA POSLOVANJA DRUŠTAVA ZA OSIGURANJE SA POSEBNIM OSVRTOM NA FINANSIJSKO IZVJEŠTAVANJE OSIGURAVAČA U CRNOJ GORI

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Milijana Novović-Burić

Anđela Jakšić-Stojanović

ABSTRACT:
Financial reporting in Montenegro has been digitized, and as such it enables the implementation of accounting activities at a relatively acceptable level. However, due to the dominant presence of IT outsourcing, incompatibility of programs and systems etc., insurance companies in Montenegro face many problems, and that is why the process of changing and adapting the existing IT system to the requirements of regulators and markets should be realised as soon as possible. This paper aims to show the importance of digitalization of the operations of insurance companies in Montenegro, i.e. the commitment of companies to IT changes, especially in the field of financial reporting.

Key words: *information technologies,insurance, digitalization, financial reporting, Montenegro*

REZIME:
Finansijsko izvještavanje u Crnoj Gori je digitalizovano i kao takvo omogućava realizaciju računovodstvenih aktivnosti na relativno prihvatljivom nivou. Međutim, zbog dominantne prisutnosti IT outsourcing-a, nekompatibilnosti programa i sistema itd. prisutni su i značajni problemi sa kojima se društva za osiguranje u Crnoj Gori suočavaju, zbog kojih je što prije neophodno pokrenuti izmjene i prilagođavanje postojećeg IT sistema zahtjevima regulatora i tržišta.Ovim radom se želi ukazati na značaj digitalizacije poslovanja društava za osiguranje u Crnoj Gori, odnosno opredijeljenosti kompanija na IT promjene, naročito u domenu finansijskog izvještavanja.

Ključne riječi: *informacione tehnologije**,** osiguranje, digitalizacija, finansijsko izvještavanje, Crna Gora*

GREEN ACCOUNTING WITH SPECIAL REFERENCE TO MONTENEGRO

ZELENO RAČUNOVODSTVO S POSEBNIM OSVRTOM NA CRNU GORU

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Milijana Novović


Ana Lalević


Anđela Jakšić

ABSTRACT:
The problem of environmental protection has been in focus for many decades and different professions, including accounting, are taking part in solving it. In this regard, the emergence of the concept of green accounting arose as a necessary consequence to integrate within the existing business policy of the company environmental dimension that will allow continuity in achieving business efficiency while respecting the principles of sustainability of the system as a whole. Green accounting concept is still in initial phase, especially in developing countries which was confirmed by a pilot survey conducted in Montenegro i 2021. Therefore, the aim of this paper is to point out this very important issue, especially among academics and researches in order to contribute to sustainable development at global and national level, and additionally improve the quality of negotiations regarding chapter 27 and Montenegro's integration into the European Union.

Key words: *green accounting, GHG concept, pilot survey, Montenegro*

REZIME:
Kako problem očuvanja životne sredine već decenijama dobija ozbiljne globalne razmjere, to učešće u njegovom rješavanju uzimaju razne struke, među kojima i računovodstvena. S tim u vezi, pojava koncepta zelenog računovodstva nastala je kao nužna posljedica da se unutar postojeće poslovne politike preduzeća integriše ekološka dimenzija koja će omogućiti kontinuitet u postizanju efikasnosti poslovanja uz poštovanje principa održivosti sistema kao cjeline. Koncept zelenog računovodstva je još uvijek u fazi povoja, posebno u zemljama u razvoju, što je potvrdilo i pilot istraživanje sprovedeno u Crnoj Gori. Stoga je cilj ovog rada da ukaže na ovu veoma značajnu temu, posebno u akademskim i istraživačkim krugovima kako bi se doprinijelo održivom razvoju na globalnom i nacionalnom nivou i dodatno unaprijedila pregovaračka pozicija Crne Gore u poglavlju 27 i njen ulazak u Evropsku Uniju.

Ključne riječi: *zeleno računovodstvo, GHG koncept, pilot anketno istraživanje, Crna Gora*

IMPACT OF THE KNOWLEDGE AND INNOVATION CULTURE ON NON-FINANCIAL PERFORMANCE OFSERBIAN SMEs

UTICAJ KULTURA ZNANJA I INOVACIJA NA NEFINANSIJSKE PERFORMANSE MALIH I SREDNJIH PREDUZEĆA USRBIJI

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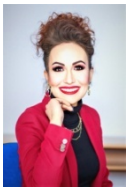
[2]Faculty of technical sciences, University of Novi Sad, Novi Sad, Serbia



Katarina Pavlović

Vesna Rašković Depalov

ABSTRACT:
Knowledge and innovation culture are at the core of any company's competitiveness today and small and medium enterprises are no exception. In this paper results of an empirical study have been presented related to the impact of knowledge and innovation culture on non-financial performance indicators (NFPI) of small and medium entreprises (SMEs) in the Republic of Serbia. As it has been shown in numerous research findings that mesauring NFPIs of SMEs, may be more relevant than measuring financial ones, this was used as the basis of the research, aimed to examine if knowledge and innovation culture influence NFPIs of SMEs in the Republic of Serbia. The case presented includes randomly selected SMEs in the Republic of Serbia, for which no similar research data have been presented in the literature. Three hypothesis were tested and proved. Research results are presented and discussed in this paper with appropriate conclusion drawn and suggestions for the pursue of the research in the future.
Keywords: *knowledge culture, innovation culture, non-financial performance indicators, small and medium enterprises, competitivness.*

REZIME:
Kulture znanja i inovacija nalaze se u srži konkurentnosti svake kompanije danas, a mala i srednja preduzeća ne predstavljaju izuzetak.Uovom radu,prezentovani su rezultati empirijskih istraživanja, koji se odnose na uticaj kulture znanja i inovacione kulture na nefinansijske indikatore performansi (NFIP) malih i srednjih preduzeća (MSP) u Republici Srbiji. Mnogobrojna istraživanja pokazuju da su merenja NFIP u MSP relevantnija od finansijskih, što je poslužilo kao osnova za ovo istraživanje, a sa ciljem da se, po prvi put, istraži da li kultura znanja i inovaciona kultura utiču na NFIP u MSP u Republici Srbiji. Testirane su i dokazane tri hipoteze. Rezultati su prezentovani i objašnjeni u radu, a date su isugestije za dalja istraživanja.
Ključne reči: *kultura znanja, inovaciona kultura, nefinansijski indikatori preformansi, mala i srednja preduzeća, konkurentnost.*

CLUSTER ANALYSIS IN PYTHON: AN EXAMPLE OF MARKET SEGMENTATION

KLASTER ANALIZA U PYTHON-u: PRIMJER SEGMENTIRANJA TRŽIŠTA

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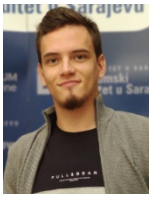
Amar Aladžuz


Adela Delalić


Lamija Šćeta

ABSTRACT:
The usual statistical packages differ in their advantages, disadvantages and handling, and each of them has its specific characteristics. The feature that distinguishes Python from its closest free and open-source competitor, R, is its simple syntax. Unlike classic statistical software such as SPSS, Stata or SAS, Python is free but not as user-friendly as SPSS or SAS. However, the freedom in creating own codes/functions gives greater opportunities when conducting and correcting analyses, visualizations, etc. Python also has a very well-developed community where it is easy to find literature, instructions and articles, and support when problems arise. Also, it is considered to be the richest program that has packages in many fields, including Deep Learning and Machine Learning. However, the disadvantage is that not all statistical methods and tests are available. Utilizing the example of market segmentation, the purpose of this paper is to present the coding method and advantages of using Python in classifying statistical units by performing cluster analysis.

Keywords: *Python, Cluster analysis, Market segmentation*

REZIME:
Uobičajni statistički paketi se razlikuju po svojim prednostima, nedostacima i upravljanju i svaki od njih ima svoje karakteristike. Ono što razlikuje Python od njegovog najbližeg free i open source konkurenta, R-a, jeste njegova jednostavna sintaksa. Python je za razliku od klasičnih statističkih softvera (SPSS, Stata, SAS) besplatan, ali ne tako user friendly kao SPSS ili SAS. Međutim, upravo sloboda u kreiranju sopstvenih kodova/funkcija daje veće mogućnosti prilikom sprovođenja i korigovanja analiza, vizualizacije i sl. Python ima jako razvijenu zajednicu gdje je lako pronaći literaturu, uputstva i članke te podršku pri pojavi problema. Smatra se da je Python najbogatiji program koji ima pakete u mnogim poljima, uključujući Deep Learning i Machine Learning. Međutim, nedostatak je što nisu dostupne sve statističke metode i testovi. Ovaj rad prezentira prednosti korištenja Pythona u svrhu klasifikacije statističkih jedinica provođenjem klaster analize.

Keywords: *Python, Klaster analiza, Segmentiranje tržišta*

PERCEPTION OF THE ROLE OF PRIVATE INDIVIDUALSPARTICIPATING IN THE EXCHANGE OF GOODS AND SERVICESTHROUGH DIGITALPLATFORMS IN THE COLLECTION OF VATREVENUES

PERCEPCIJA ULOGE POJEDINACA KOJI UČESTVUJU U RAZMJENI DOBARA IUSLUGA PUTEM DIGITALNIH PLATFORMI U PRIKUPLJANJUPRIHODA OD PDV

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[1,2]University of Sarajevo, Faculty of Law, Department of Legal and Economic Sciences

Imamović-Čizmić Kanita

Ramić Lejla

ABSTRACT:
This paper is aiming to reveal perception of the role of private individuals participating in the exchange of goods and services through digital platforms in the collection of VAT revenues using OECD supporting measures and models for efficient and effective collection of VAT on online sales. The paper introduction will present core components and theoretical framework.In the second part of the paper,the authors will present and analyze the results of research that will include randomly selected private individuals from BiHparticipating in the exchange of goods and services through digital platformsin collecting VAT revenues. Finally, the paper is streaming to examine the proposed model rules by OECD and their significance on shaping the future tax policy and system.

Keywords: *effective VAT collection, sharing and gig economy, new economic operators, OECD models andrules*

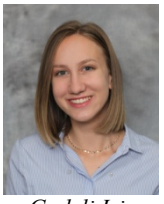
SAŽETAK:
Rad ima za cilj istražiti percepciju uloge pojedinacakoji učestvuju u razmjeni dobara i usluga putem digitalnih platformi u prikupljanju prihoda od PDV-a korištenjem OECDovih mjera podrške i modela za efikasnu i efektivnu naplatu PDV-a u online prodaji. U uvodu rada bit će predstavljene ključne komponente i teorijski okvir.U drugom dijelu rada, autorice će predstaviti i analiziratirezultate istraživanja koje će obuhvatiti nasumično odabrane pojedince iz BiHkoji učestvuju u razmjeni dobara i usluga putem digitalnih platformiu prikupljanju prihoda od PDV. Konačno, rad je usmjeren na ispitivanjepredloženih OECD modela u prikupljanju prihoda od PDV i njihovog značaja za oblikovanje budućeporezne politike i sistema u sharing i gig ekonomiji.

Ključne riječi: *efikasno prikupljanje PDV-a, sharing i gig ekonomija, novi poslovni modeli, OECD modeli i pravila*

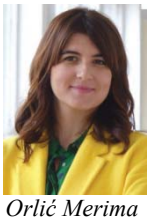
STATISTICAL ANXIETY, OBSTACLE TO 21ST CENTURY SKILLS DEVELOPMENT

STATISTIČKA ANKSIOZNOST, PREPREKA RAZVOJU VJEŠTINA 21. VIJEKA

Gudelj Iris[1], Delalić Adela[2], Arnaut-Berilo Almira[3], Orlić Merima[4]
[1] FOR FIVE dma, Sarajevo
[2,3,4] University of Sarajevo, School of Economics and Business, Sarajevo


Gudelj Iris


Delalić Adela


Orlić Merima


Arnaut-Berilo Almira

ABSTRACT:
Due to the flow of large amounts of quantitative information from various sources, critical thinking and quantitative reasoning skills are becoming increasingly important in everyday life. However, a large part of the population avoids reading and analyzing statistical data from their environment. "Discomfort that occurs when attending a statistical course or performing statistical analysis such as collecting, processing and interpreting data" is defined as statistical anxiety, and is often the result of misperceptions and prejudices about statistics, insufficient mathematical skills and one's own and others' negative experiences from the past. The aim of this paper is to examine the extent to which statistical anxiety is present among students in Sarajevo Canton, using the partial STARS (Statistical Anxiety Rating Scale) scale. The conclusions drawn from the research results will serve as an argument for the timely introduction of applied statistics at all levels of education, with the aim of developing knowledge and skills necessary for critical and analytical thinking from the earliest ages.
***Keywords**: statistics, statistical anxiety, STARS model*

SAŽETAK:
Zbog protoka velikog obima kvantitativnih informacija iz različitih izvora, vještine kritičkog razmišljanja i kvantitativnog zaključivanja postaju sve važnije u svakodnevnom životu. Ipak, veliki dio stanovništva izbjegava čitanje i analiziranje statističkih podataka iz njihovog okruženja. „Nelagoda koja se javlja u trenucima pohađanja statističkog predmeta ili vršenja statističke analize kao što je prikupljanje, obrada i interpretiranje podataka“ definiše se kao statistička anksioznost, a često je rezultat pogrešne percepcije i predrasuda o statistici, nedovoljnih matematičkih vještina i vlastitih i tuđih negativnih iskustava iz prošlosti. Cilj ovog rada je ispitati u kojoj mjeri je statistička anksioznost prisutna među studentima u Kantonu Sarajevo, koristeći se djelimičnom STARS (Statistical Anxiety Rating Scale) skalom. Zaključci izvedeni iz rezultata istraživanja će poslužiti kao argument za pravovremeno uvođenje primijenjene statistike u svim nivoima obrazovanja, s ciljem razvoja znanja i vještina neophodnih za kritičko-analitičko promišljanje, još od najranijih uzrasta.
***Ključne riječi**: statistika, statistička anksioznost, STARS model*

DIFFERENCES OF THE EMPLOYEE PERCEPTION TO THE MAIN JOB DESIGN PARAMETERS IN THE CONTEXT OF DIGITALIZATION

RAZLIČITOSTI PECEPCIJE ZAPOSLENIH SPRAM GLAVNIH PARAMETARA OBLIKOVANJA POSLA U KONTEKSTU DIGITALIZACIJE

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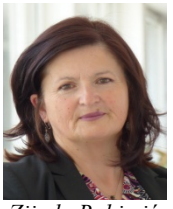
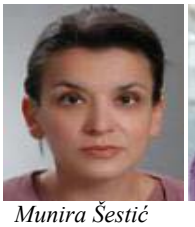

Zijada Rahimić


Elvir Ćizmić


Munira Šestić


Anes Hrnjić

ABSTRACT:
The paper is aiming to reveal employee perception differences with the main parameters of job design in the post-industrial society influenced by the Fourth Industrial Revolution. Authors present the results of research conducted in Bosnia and Herzegovina related to the impact of employee differences on their perception of the key design parameters and content of job taken in consideration employee separate observation and statistical testing of employee perception differences according to their hierarchical position, gender, level of education and work experience. The results of the research could be a starting point in creating future guidelines in the processes of job design, recruitment and selection, training and developmentin the context of 4IR.

Keywords: *Job digitalization, Job design parameters, Employee perception, Employee differences*

REZIME:
Rad ima za cilj da utvrdi različitosti percepcije zaposlenih vezano za glavne parametre oblikovanja posla u postindustrijskom društvu pod uticajem Četvrte industrijske revolucije. Autori predstavljaju rezultate istraživanja provedenog u Bosni i Hercegovini o uticaju razlika među zaposlenicima na njihovu percepciju zadovoljstva spram ključnih parametara oblikovanja i sadržaja posla, uzimajući u obzir odvojeno posmatranje i stitističko testiranje različitosti percepcije zaposlenih prema njihovoj hijerarhijskoj poziciji, spolu, obrazovanju i radnom iskustvu. Rezultati istraživanja mogu poslužiti kao polazište pri kreiranju budućih smjernica u procesima oblikovanja posla, regrutovanja i selekcije, obuke i razvojau kontekstu 4IR.

Ključne riječi: *Digitalizacija posla, Oblikovanje posla, Percepcija zaposlenih, Razlike među zaposlenima*

THE IMPACT OF JOB DESIGN PARAMETERSON EMPLOYEE SATISFACTION AND EFFECTIVENESS IN DEVELOPING COUNTRIES WITHIN DIGITIZATION CONTEXT

UTICAJ PARAMETARA OBLIKOVANJA POSLA NA ZADOVOLJSTVO I EFEKTIVNOST ZAPOSLENIH U ZEMLJAMA U RAZVOJU U KONTEKSTU DIGITALIZACIJE

Elvir Čizmić[1], Zijada Rahimić[2], Munira Šestić[3], Azra Ahmić[4]
[123]University of Sarajevo, School of Economics and Business, Bosnia and Herzegovina
[4]International University Travnik, Faculty of Economy, Bosnia and Herzegovina


Elvir Ćizmić


Zijada Rahimić


Munira Šestić


Azra Ahmić

ABSTRACT:
The paper presents the results of research focusing on key parameters of job design that influence employee satisfaction and effectiveness in Bosnia and Herzegovina in context of the 4IR and digitalizationusing regression model. The research sample consists 125 randomly selected respondents both from public and private sector organizations, different manufacturing and service businesses, and companies of different sizes. The paper is aiming to shape possible future guidelines that could be venerated in job designing process respecting cultural, legislative, organizational, technological and especially individualidiosyncratic employee features in developing countries.

Keywords: *Job design, Technical system, Work Assignment, Worker features, Satisfaction and Performances*

REZIME:
U radu su prikazani rezultati istraživanja fokusiranog na ključne parametre oblikovanja poslova koji utiču na zadovoljstvo i efektivnost zaposlenih u Bosni i Hercegovini u kontekstu 4IR-a i digitalizacije korištenjem regresionog modela. Uzorak istraživanja čini 125 nasumično odabranih ispitanika iz organizacija javnog i privatnog sektora, različitih proizvodnih i uslužnih djelatnosti, te kompanija različitih veličina. Rad ima za cilj da oblikuje moguće buduće smjernice koje bi se trebale poštovati u procesu dizajniranja posla uvažavajući kulturne, zakonodavne, organizacione, tehnološke i posebno individualne idiosinkratične karakteristike zaposlenih u zemljama u razvoju.

Ključne riječi:*Oblikovanje posla, Tehnički sistem, Radni zadatak, Karakteristike, Zadovoljstvo i performanse zaposlenika*

MODEL OF THE CIRCULAR ECONOMY AND ITS APPLICATION IN INDUSTRY PRACTICE: A CASE STUDY OF SERBIA

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[1]Faculty of Mechanical Engineering, University of Niš, Serbia


Milena Rajić


Marko Mančić


Zorana Kostić


Pedja Milosavljevic

ABSTRACT:
Circular Economy has been in focus as the effective approach for sustainability, waste management, eco-design of products and services, preserving energy resources and energy efficiency measures in industry. As European Union has launched a series of plans, reports, and planned activities in the field of Circular Economy with the aim to set the priorities and expand its application in Europe, forming a proper model for the industrial application has been recognized as a priority. The aim of this paper is to propose a model for the requirements of application of Circular Economy in industrial organizations. Production organizations have been identified as the largest generators of solid waste, wastewater, energy etc. It is necessary to identify the status of circular economy application within the production organizations to set the basic requirements for sustainable development. It would be helpful to establish the environmental and economic indicators for the industry. This paper proposes the Plan-Do-Check-Act model which is the basis of the ISO 9001 as a starting point. The proposed model has been verified in industrial organizations in Serbia. The scientific benefit of the proposed model is the creation of a functionally applicable model of circular economy, applied in practice.

Keywords: *circular economy, industrial organizations, production processes, sustainability, industrial management*

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1. INTRODUCTION

Circular economy (CE) has been identified as an emerging applied concept that has impact on many disciplines: sustainable development, business approach and economics. There are currently numerous indicators that define circularity [1-7] connecting circular economy with sustainability, few studies that compare circular indicators with environmental performance [8-10], but also connecting this approach with social parameters [11-13]. Circular economy is defined as one the most prospective approach for organizations to address current and future challenges in terms of sustainability [14-15]. ...

VIRTUAL REALITY IN MARKETING: CONSUMER AND RETAIL PERSPECTIVES

VIRTUALNA REALNOST U MARKETINGU: POTROŠAČKA I MALOPRODAJNA PERSPEKTIVA

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Denis Berberović


Adi Alić


Merima Činjarević

ABSTRACT:
Although 'extended reality' has been conceptualized decades ago, with the current proliferation of new technologies its application in marketing practice has just recently come to light. Marketing practitioners have found numerous ways of applying new technologies in their practice. Significant advancements have been made particularly with the usage of virtual reality in the domains of consumption and retailing. Through virtual reality consumers gain both purchase and consumption experiences which are beyond the reality they live in. At the same time by using virtual reality retailers create innovative shopping experiences aimed at increasing passion for consumption. This paper presents the theoretical framework in which virtual reality is embedded, followed by discussion of virtual reality from consumer and retailer perspectives.

Keywords: *marketing, consumer, retail, new technologies, virtual reality*

REZIME:
Iako je'proširena realnost' konceptualizirana prije nekoliko decenija, sa napretkom novih tehnologija je tek nedavno ugledala svjetlost dana. Marketari su u praksi našli brojne načine apliciranja novih tehnologija. Značajan napredak je napravljen posebno sa korištenjem virtuelne realnosti u domenu potrošnje i maloprodaje. Kroz virtuelnu realnost potrošači dobijaju doživljaj kupovine i potrošnje koji su značajno drugačiji od realnosti u kojoj žive. Istovremeno, korištenjem virtuelne realnosti maloprodavci kreiraju inovativne kupovne doživljaje koji imaju za cilj povećanje strasti za potrošnjom. Ovaj rad prezentira teoretski okvir u kojem je smještena virtuelna realnost, praćena diskusijom o virtuelnoj realnosti iz perspektiva potrošača i maloprodaje.

Ključne riječi: *marketing, potrošač, maloprodaja, nove tehnologije, virtuelna realnost*

THE MODERN PARADIGM OF ADVERSE WORKING CONDITIONS IMPACT ON SERBIAN SMEs FROM EMPLOYEES PERSPECTIVE: EMPIRICAL AND STATISTICAL FINDINGS

SAVREMENA PARADIGMA UTICAJA NEGATIVNIH USLOVA RADA NA MSP U SRBIJI IZ UGLA ZAPOSLENIH: EMPIRIJSKI I STATISTIČKI NALAZI

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[3] Megatrend University ofBelgrade, Facultyof Management, 19000 Zaječar, Serbia

Borko Somborac

Aleksandra Penjišević

Ivan Lazović

ABSTRACT:
In the development of adverse working conditions (AWCs) both inside and outside organizations, various behavioral factors begin to decline due to such circumstances. The conventional paradigm exploits the view that in conditions of crisis and radical changes in the organizational environment, working conditions significantly deteriorate, as well as the response of employees to such forces. It is a fact that COVID-19 has completely transformed the job delivery process, the interaction between employees, as well as employees expectations, and business stability. Although working conditions during the pandemic period are undoubtedly worse, this research reveals employees perception that adverse working conditions are not a strong indicator of reduced job satisfaction, as well as job quality and employees loyalty. This position can open new entrepreneurs perspectives in understanding the employees response that will enable the positive behavioral continuum in full contribution to more effectively achieving the organizational goals in turbulent times.
Keywords: *small and medium enterprises, working conditions, entrepreneurship, jobsatisfaction*

REZIME:
U razvoju negativnih radnih uslova kako unutar tako i izvan organizacija, različiti faktori ponašanja počinju da opadaju usled takvih okolnosti. Konvencionalna paradigma eksploatiše stav da se u uslovima krize i korenitihpromena u organizacionom okruženju značajno pogoršavaju uslovi rada, kao i odgovor zaposlenih na takve sile. Činjenica je da je COVID-19 potpuno transformirao proces isporuke posla, interakciju između zaposlenih, kao i očekivanja zaposlenih i stabilnost poslovanja. Iako su uslovi rada tokom perioda pandemije nesumnjivo pogoršani, ovo istraživanje otkriva percepciju zaposlenih da nepovoljni uslovi rada nisu jak pokazatelj smanjenog zadovoljstva poslom, kao i kvaliteta posla i lojalnosti zaposlenih. Takva pozicija može otvoriti nove perspektive preduzetnicima u razumevanju odgovora zaposlenih koji ćeomogućiti pozitivan kontinuum ponašanja u punom doprinosu efikasnijem ostvarivanju organizacionih ciljeva u turbulentnim vremenima.
Ključne reči: *mala i srednja preduzeća, uslovi rada, preduzetništvo, zadovoljstvo poslom*

Autors Index – Indeks autora

SOCIETY FOR ROBOTICS OF BOSNIA AND HERZEGOVINA

The Society for Robotics has years of experience in education and training of personnel in Bosnia and Herzegovina. The Society for Robotics is working to increase the role of knowledge in Bosnia and Herzegovina, and thus to influence the positioning of Bosnia and Herzegovina as high as possible on an innovative scale in Europe and the world. The role of the Society for Robotics is to encourage the development of science and technology, as well as to increase their contribution to the development of society, with the widest possible application of new knowledge and new technologies. Thus, it aims to encourage the transformation of Bosnian-Herzegovinian society into a modern knowledge-based society. For these reasons, the objectives of the Society for Robotics are: scientific and technical research in the field of robotics and robotic systems; education and improvement of education in robotics, robotic systems and mechatronics; application of robots and robotic systems in the industry; establishment of laboratories for education and knowledge transfer; establishment of centers for robotics and robotic systems at universities, secondary and vocational schools; innovators in the wider field of robotic systems conducting various activities; organizing scientific and professional conferences in the country and abroad; having innovators in the field of robotics, robotic systems and mechatronics organize exhibitions; cooperation with similar societies abroad. Activities of the Society for Robotics are the following: gathering scientists, researchers, engineers, teachers and students who work in all areas of robotics; publishing and encouraging the publication of monographs, textbooks, journals and other publications in the field of robotics; helping teachers to introduce new ideas and modern methods in teaching robotics; organizing congresses, conferences, symposia, seminars, and other scientific meetings of scientists and engineers; cooperation with similar professional organizations in the country, international societies and associations; popularization and dissemination of knowledge, as well as training and assistance in the training of scientific novices and researchers.

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President Society for Robotics B&H
Prof. Safet Isić, PhD.

Secretery general
Society for Robotics B&H
Prof.Isak Karabegović, PhD.

DRUŠTVO ZA ROBOTIKU U BOSNI I HERCEGOVINI

Društvo za robotiku ima višegodišnje iskustvo u edukaciji i obrazovanju kadrova u Bosni i Hercegovini. Društvo za robotiku radi na tome da poveća ulogu znanja u Bosni i Hercegovini, a samim tim da utiče na pozicioniranje Bosne I Hercegovine na što više mjesto na inovativnoj skali u Evropi i svijetu. Uloga Društva za robotiku je da postiče razvoj nauke i tehnologije , te poveća njihov doprinos razvoju društva, uz najveću moguću primjenu novih znanja i novih tehnologija, i da na taj način podstakne transformaciju bosanskohercegovačkog društva u moderno društvo temeljno na znanju. Zbog navedenih razloga ciljevi Društva za robotiku su slijedeći: naučno-stručna istraživanja u oblasti robotike i robotskih sistema, edukacija i unapređenje obrazovanja iz robotike, robotskih sistema i mehatronike, aplikacija robota i robotskih sistema u industriji, formiranje laboratorija za edukaciju i transfer znanja, formiranje centara za robotiku i robotskih sistema na univerzitetima, srednjim i stručnim školama, održavanje aktivnosti inovatora iz šire oblasti robotskih sistema, organiziranje naučno-stručnih skupova u zemlji i inostranstvu, organiziranje izložbi inovatora iz oblasti robotike, robotskih sistema i mehatronike, saradnja sa sličnim društvima u inozemstvu. Djelatnosti Društva za robotiku su slijedeće: okupljanje naučnika, istraživača, inženjera, nastavnika, studenata i učenika koji rade u svim područjima robotike, objavljivanje i poticanje objavljivanja monografija, udžbenika, časopisa i ostalih publikacija u području robotike, pomaganje nastavnicima u uvođenju novih ideja i modernih metoda u nastavi robotike, organiziranje kongresa, konferencija, simpozijuma i seminara te ostalih naučnih okupljanja naučnika i inženjera, surađivanje sa sličnim stručnim organizacijama u zemlji, surađivanje sa sličnim međunarodnim društvima i savezima društva, populariziranje i širenje znanja kao i izobrazba i pomoć u izobrazbi znanstvenih novaka i istraživača.

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Predsjednik Društva za robotiku
Prof.dr.sc.Safet Isić

Generalni sekretar
Društva za robotiku
Prof.dr.sc. Isak Karabegović

IN MEMORIAM

Akademik
Zijad Haznadar
(1935 - 2021)

***HAZNADAR Zijad**, je rođen u Banja Luci 1935. godine. Doktorsku disertaciju odbranio je 1964. godine na ETF-u u Zagrebu. U zvanju redovnog profesora, na Fakultetu elektrotehnike i računarstva u Zagrebu, radio je od 1977. godine. Od 1968. do 1986. godine bio je urednik u časopisu "Elektrotehnika" Zagreb za područje "Elektromagnetsko polje". Funkciju prodekana ETF-a obavljao je od 1976. do 1978. godine. Predstojnik Zavoda za osnove elektrotehnike i električka mjerenja bio je od 1986. do 1988. godine i od 1998. do 2000. godine. Od 1987. godine bio je član Uredničkog odbora Međunarodne konferencije o proračunavanju elektromagnetskih polja "Compumag" London, a od 1991. godine član Međunarodnog znanstvenog komiteta Internacionalnog simpozija za magnetizam "ISEM" Tokio. Organizirao je i vodio Međunarodne simpozije "Projektiranje i proizvodnja podržani računalom – CAD/CAM", od kojih je 10 održano u Zagrebu od 1979. do 1990. godine. Osnovao je CAD laboratorij na FER-u 1990. godine. Bio je član naučnih odbora u nekoliko naučnih časopisa. Recenzirao je naučne radove za više časopisa (IEEE Transactions on Magnetics, USA i drugi). Od 1992. bio je član "Odbora za računalom vođenu proizvodnju" Razreda za matematičke, fizičke, kemijske i tehničke znanosti, koji je 1997. godine preimenovan u "Odbor za proizvodne znanosti" Razreda za Tehničke znanosti HAZU.*

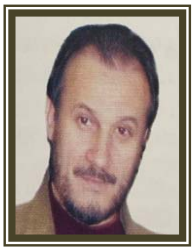
U toku 43 godine djelatnosti na ETF-u, odnosno FER-u u Zagrebu, sudjelovao je u obrazovanju preko 10 000 diplomiranih inženjera elektrotehnike. Učestvovao je kao mentor u izradi 55 magistarskih radnji i 31 doktorske disertacije. Kao autor ili koautor napisao je preko 350 naučnih i stručnih radova. Vodio je tri međunarodna projekta i šest državnih projekata. Vodio je preko 40 istraživačkih projekata od značaja za industriju u Hrvatskoj. Održao je mogo pozivnih predavanja i bio gost na mnogim konferencijama i univerzitetima. Napisao je tri skripte, te značajan i opsežan temeljni udžbenik "Elektromagnetizam" u dva sveska 1997. godine. U nakladi „IOS-Press“ objavio je monografiju "Electromagnetic Fields, Waves and Numerical Methods", Amsterdam, 2000.godine. Objavljeni radovi i cjelokupna naučna i stručna ostvarenja i nastavna djelatnost prof. Zijada Haznadara značajno su doprinijeli razvoju nauke i elektrotehničke industrije u Hrvatskoj, međunarodnoj afirmaciji Sveučilišta u Zagrebu i hrvatske znanosti u svijetu. U počasno zvanje profesora emeritusa Sveučilišta u Zagrebu imenovan je 2007. godine.

Dobitnik je hrvatske državne nagrade za znanost "Nikola Tesla" 1987. godine, nagrade "Hrvoje Požar" za razvitak energetskih znanosti 1997. godine, zlatne plakete "Josip Lončar" za doprinos razvitku FER-a 1997. godine, nagrade "J. J. Strossmayer", 1997. godine, nagrade za životno djelo Akademije tehničkih znanosti Hrvatske 2002. godine, znanstvene nagrade "Fran Bošnjaković" Senata Sveučilišta u Zagrebu 2003. godine, nagrade HAZU za najviša znanstvena i umjetnička dostignuća u Republici Hrvatskoj za 2004. godinu u području tehničkih znanosti i Državne nagrade za znanost Sabora RH, Nagrada za životno djelo 2005. godine. Djelovao je u zemlji i inozemstvu i značajno unaprijedio područje teorije elektromagnetskih polja. Redovni član Hrvatske akademije tehničkih znanosti bio je od osnivanja 1993. godine. Inozemni član Akademije nauka i umjetnosti Bosne i Hercegovine bio je od 2002. godine. Od 2003. godine bio je član "Vijeća za tehnološki razvoj" HAZU. Član Društva za robotiku u Bosni i Hercegovini bio je od osnivanja 2003. godine. Trajno sjećanje na njega bit će samo dio zahvalnosti za sve što je učinio za razvoj nauke i školovanje kadrova iz oblasti elektrotehnike.

(Izvor: CV Zijad Haznadar i Arhiva FER Zagreb)

Isak Karabegović

IN MEMORIAM



Asim Korčić
(1952 - 2022)

KORČIĆ Asim *je rođen u Bihaću 1952. godine. Nakon završene osnovne škole upisuje srednju Vazduhoplovnu vojnu školu koju uspješno završava 1972. godine. Prvi radni odnos zasnovao je u Tvornici za preradu žice Bihać 1974. godine na mjestu laboranta za ispitivanje materijala i obavljao ga je sve do 1981. godine. Nakon toga odlazi na privremeni rad u Švicarsku i zapošljava se u kompaniji „Chur Acolit Calluori“ gdje je radio sve do 1990. godine. U ratnom periodu aktivno se uključio u redove Armije RBIH gdje je stekao čin pukovnika. Nakon rata vraća se civilnim aktivnostima. Višu mašinsku školu završio je na Mašinskom fakultetu u Zenici, Univerziteta u Sarajevu, nakon čega je uspješno diplomirao na Mašinskom fakultetu Univerziteta „Džemal Bijedić“ u Mostaru. Osnovao je vlastitu kompaniju „GTP“ i obavljao poslove direktora sve do 2004. godine. Od 2005. godine bio je zaposlen na Tehničkom fakultetu Univerziteta u Bihaću kao laborant u Laboratoriji za CNC mašine, odakle odlazi u penziju 2011. godine.*
Njegov doprinos u razvoju Visokog obrazovanja u USK-u značajan je još od 1995. godine. Sa Inicijativnom grupom univerzitetskih profesora aktivno radi na osnivanju Mašinskog fakulteta Bihać, Univerziteta u Sarajevu, sve do njegovog osnivanja u martu 1996. godine. Zatim sa Inicijativnom grupom univerzitetskih profesora nastavlja da radi na osnivanju Univerziteta u Bihaću koji je osnovan Odlukom Skupštine USK-a 28. jula 1997. godine. Isto tako aktivno učestvuje u osnivanju Društva za robotiku u Bosni i Hercegovini i ostaje njegov član sve do svoje smrti. Trajno sjećanje na njega bit će samo dio zahvalnosti za sve što je učinio za razvoj Visokog obrazovanja u USK-u i Društva za robotiku u Bosni i Hercegovini.

Isak Karabegović

Nacionalni park Una bosanskohercegovačka i svjetska prirodna vrijednost

Štrbački buk, najviši vodopad na rijeci Unu i najposjećenija atrakcija u Parku

Martinbrodski slapovi, prostorno najveći kompleks slapova u Parku, nominirani su za uvrštavanje na Listu svjetske baštine UNESCO-a

Sportsko rekreativne aktivnosti

Stari grad Ostrovica

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New Technologies, Development and Application

Proceedings of the International Conference on New Technologies, Development and Application,
NT-2018, June 28-30, 2018, Sarajevo, Bosnia and Herzegovina
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New Technologies, Development and Application II

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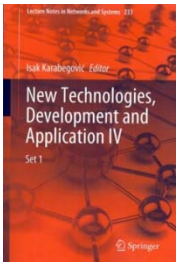

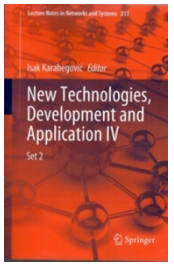

New Technologies, Development and Application IV

Proceedings of the International Conference on New Technologies, Development and Application,
NT-2021, June 24-26, 2021, Sarajevo,
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