

2023 46th ICT and Electronics Convention (MIPRO)

Human-Computer Interaction

Measuring State and Trait Attention Control Using Mouse Movements D. Wilson, J.L. Jenkins, J.S. Valacich	1
Getting What You Paid For: Assessing Participant Experience Parameters for Amazon Mechanical Turk (MTurk) Workers on Survey Response Quality M. Kumar, D. Kim, P.A. Weisgarber, J.S. Valacich, J.L. Jenkins	7
Detecting Goal-Oriented vs. Browsing Users Through Behavior Analysis J.L. Jenkins, A. Denison, J.S. Valacich, D. Wilson	13
Physiological and Socio-Behavioral Determinants of Viral Video User Engagement D. Bacic, C.A. Gilstrap, N. Jukic	19
Exploring Pie Charts and Part-To-Whole Alternatives: Eye-tracking Approach D. Bacic, A. Krbanjevic, N. Jukic	25
Parental Trust in Automated Detection of Cyberpredators L. Brandimarte	30
Mobile Technologies and Live Streaming Commerce: A Systematic Review and Lexical Analysis C.A. Gilstrap, C.M. Gilstrap	36
Dehumanized Avatars: Unethical Behavior in the Metaverse C. Castagna, S. Demir, M. Weinmann	45
Tangible Data Exploration: Creating Card Games for Sensemaking A. Wolff, A. Knutas	50
Analytics Dashboards and User Behavior: Evidence from GitHub J. Schilpp, F. Pethig, H. Hoehle	56
Using Hobbies as Proxy for Gamification Player Types S. Rantanen, A. Knutas, J. Kasurinen	62
An Eye-Tracking Solution Using Consumer Grade Webcams for Potential Concussion Diagnosis and Evaluation N. Caporusso, G. Sanders, B. Thaman, E. Hall	67

Do I Trust My Medical Professional on a Virtual Consultation? Biosensors, Human Computer Interaction and Trust-Building	73
B. Ye, C. Milewicz, S. Mujumdar, M. Khayum	
The Influence of the Internet and Social Networks on Behavioral Problems of Primary and Secondary School Students in Croatia	76
N. Flego, L. Josipovic Deranja, T. Orehovacki	
Cloud Accounting as a Factor in Protection from Cyber Attacks and Theft of Accounting Data	82
V. Vinsalek Stipic, M. Vicic	
Principles for Designing for Data Exploration for a Non-Expert Audience	88
N. Tylosky, A. Knutas, A. Wolff	
Stranded Away: Implementation and User Experience Evaluation of an Indie Platformer Game Developed Using Unity Engine	92
L. Blaskovic, A. Zuzic, T. Orehovacki	
Analyzing the Impact of Digitality and AI on HCI: Four Dimensions of Intelligent Digitality That Afford Innovative Designs	98
D. Teeni	
Evaluating the Impact of Different User Engagement Elements on Software Applications	103
M. Hajarian, P. Diaz, I. Aedo	
Smart Industries and Digital Ecosystems	
Digitalization of Innovation Networks: Theoretical and Empirical Issues	109
V. Omelyanenko, I. Pidorycheva, H. Shevtsova, O. Omelianenko, N. Rudenko, O. Yurchenko	
Sensor System for Real-time Water Quality Monitoring	114
E. Simonoska, D. Capeska Bogatinoska, I. Dimitrievski, R. Malekian	
Proposal of Prediction Model for Smart Agriculture Based on IoT Sensor Data	120
J. Fondaj, M. Hamiti, S. Krrabaj, B. Selimi, E. Idrizi	
BIM Based Information Management in Renewable Energy Projects	126
M. Ljuban, M. Curavic, L. Budin, I. Duilo, M. Delimar	
Case Management Model Design for Obtaining Documentation Using FieldWork 4 RES Application in Renewable Energy Sources Projects	133
Z. Tolvajcic, T. Ugrina, M. Curavic, I. Duilo, L. Budin, M. Delimar	
Influence of Personal Recommendations towards Electricity Consumption on Consumer Behavior	138
J. Hejjova, J. Bucko	

Advanced and Smart Maintenance of Induction Motors Based on an Algorithm for Motor Faults Recognition	146
S. Tvoric, T. Djuran, V. Jancic, D. Sente	
Analytics Use Cases for Landside Traffic Optimization in the Catchment Area of the Airport: Case Study of Zagreb Airport	153
M. Tica, I. Stimac, K. Vidovic, S. Vojvodic, I. Stipanovic	
 Microelectronics, Electronics and Electronic Technology	
Back-Hopping in Ultra-Scaled MRAM Cells	159
M. Bendra, S. Fiorentini, J. Ender, R.L. de Orio, T. Hadamek, N.P. Jorstad, B. Pruckner, S. Selberherr, W. Goes, V. Sverdlov	
Tunneling Attenuation and Leakage Current in MoS2 Nanoribbon MOSFETs	163
I. Prevaric, M. Matic, M. Poljak	
Transport Properties and Device Performance of Quasi-One-Dimensional MoS2 FETs	168
M. Matic, M. Poljak	
Bandgap Narrowing in Silicene Nanoribbons with Metal Edge Contacts	173
M. Poljak, M. Matic	
Determining Graphene and Substrate Quality from the Coupled Hall Mobility Measurements and Theoretical Modeling	179
K. Japiec, M. Matic, R. Lukose, M. Lisker, M. Lukosius, M. Poljak	
Stress-dependent MOSFET Model for Use in Circuit Simulations	184
A. Zamboki, L. Gocan, J. Mikulic, N. Bako, G. Schatzberger, T. Markovic, A. Baric	
Low-Power Frequency-Locked Loop Circuit with Static Frequency Offset Cancellation	190
L. Gocan, A. Zamboki, N. Bako, J. Mikulic, G. Schatzberger, T. Markovic, A. Baric	
Low-Power CMOS Frequency Comparator	196
M. Kovac, M. Potocny, D. Arbet, R. Ondica, R. Ravasz, V. Stopjakova	
Measurement System for Characterization of a Resistor Array in 180-nm CMOS Technology	202
I. Frankovic, F. Mikic, J. Mikulic, N. Bako, G. Schatzberger, A. Baric	
Performance Analysis of 1-MHz Voltage-Controlled Ring Oscillator Designed in 180-nm CMOS Technology for Phase-Locked Loop	208
A. Trazivuk, A. Baric	
Analysis of Energy Consumption for SPI and I2C Communications in Ultra-Low Power Embedded Systems	213
J. Zidar, I. Aleksi, T. Matic	

Genetic Algorithm Based Optimization of Circular Planar Coil Geometry With Homogeneous Magnetic Field Distribution	218
D. Bilandzija, D. Vinko, L. Filipovic	
Analysis of the Effect of Differential-Mode and Common-Mode Impedance Matching on the Common-Mode Rejection Ratio of a Differential Electro-Optical Voltage Probe	223
H. Stimac, A. Baric	
Measurement Setup for Characterizing Immunity of Integrated Circuits to Pulsed Electric Fields Using the IC Stripline	229
C. Cetin, M. Magerl, C. Stockreiter	
Characterization of Ground Bounce and Conducted Emissions of Integrated Isolated DC-DC Converter	234
A. Krizanic, R. Blecic, A. Broznic, A. Baric	
Characterization of Class-E Resonant Converter Operating in MHz-Range	239
I. Krois, A. Baric	
Design and Characterization of the Output Network of a High-Current Buck Converter	242
K. Solaja, R. Blecic, A. Broznic, A. Baric	
Developing a Model of Buck Converter for EMI Filter Optimization by Circuit Simulations	247
J. Baca, R. Blecic, A. Broznic, A. Baric	
Implementation of Voltage Regulation in a Spread-Spectrum-Clocked Buck Converter	253
J. Kundrata, A. Baric	
Uninterruptible Power Supply System for Railway Infrastructure with Power Factor Correction and Immunity to Energy Strike	259
A. Hecimovic, L. Patrlj, V. Sunde, Z. Ban	
Reduction of Current Harmonics in Data Center Power System Using Single-Phase Shunt Active Power Filter	265
V. Zelenicic, M. Miletic, K. Raic Raguz, D. Sumina, I. Erceg	

Optoelectronics and Photonics

Polarisation Based Entanglement Distribution Quantum Networking	271
M.J. Clark, R. Wang, S. Bahrani, M. Peranic, O. Alia, M. Loncaric, Z. Samec, A. Radman, M. Stipcevic, R. Nejabati, D. Simeonidou, J. Rarity, S.K. Joshi	
Monolithic Receiver with Nine Single-Photon Avalanche Diodes	275
A. Kuttner, S. Marschner, B. Steindl, K. Schneider-Hornstein, M. Hofbauer, H. Zimmermann	

Occupancy Determination by Backscattered Visible Light Sensing O. El Ouahabi, C. Fragner, A.P. Weiss, E. Leitgeb	280
An Experimental Investigation of Whispering Gallery Mode Microsphere Resonators for Sensing, Lasing, and Nonlinear Optical Applications S. Thekke Thalakkal, D. Ristic, D. Zhivotkov, G. Nunzi Conti, M. Ivanda	286
Data Science and Biomedical Engineering	
Missing Values Interpolation in PurpleAir Sensor Data Based on a Correlation with Neighboring Locations Using KNIME Analytics Platform S. Omanovic, A. Midzic, Z. Avdagic, D. Pozderac, A. Toroman	291
Spectral Analysis, Agglomerative, Mean Shift and Affinity Propagation Algorithms, Use on the Content from Social Media for Low-Resource Languages M.H. Hoti, J. Ajdari, X. Zenuni, M. Hamiti	296
Interactive Redescription Set Mining and Exploration I. Kozjak, M. Mihelcic	303
Fake News Detection: A Comprehensive Survey E. Tata, J. Ajdari, N. Besimi	309
Graphical User Interface to Perform Glacier Simulations with PISM M. Urbanc, M. Depolli	315
Computational Performance Aspects of CROCO-BFM Coupling F. Strnisa, M. Vodopivec, G. Kosec	321
OpenMP Offloading and OpenACC Programming Model Approach for Object-Oriented Plasma Device Algorithms E. Krishnasamy, I. Vasileska, L. Kos, P. Bouvry	326
Benchmark DPC++ Code and Performance Portability on Heterogeneous Architectures N. Mijic, D. Davidovic	331
A View into the Future of Academic Publishing Z. Sojat, K. Skala	338
Biped Robot Walking Based on Deep Reinforcement Learning T. Tadic, P. Curkovic	344
Human Intention Recognition in Collaborative Environments Using RGB-D Camera J. Maric, L. Petrovic, I. Markovic	350

ROS Framework for Distributed Control of Networks of Dynamical Systems M. Rossi, A. Jokic	356
Heart Rate Variability Monitoring with Savvy ECG Sensor during Dental Surgery I. Tomasic, A. Prkic, A. Lesin, D. Kalibovic Govorko, N. Tomasic, I. Medvedec Mikic	363
Optimizing Heartbeat Classification Using Bézier Interpolation M. Gusev, N. Petrovski, L. Tonkovikj	369
Fetal Monitoring: Multi-Channel Fetal ECG Denoising Based on Artificial Intelligence Approach D.D. Taralunga	375
ECG Compression Based on Successive Differences M. Gusev, M. Jovanov, A. Shekerov, G. Temelkov	379
Smart Glasses for Gait Analysis of Parkinson's Disease Patients I. Kiprijanovska, F. Panchevski, S. Stankoski, M. Gjoreski, J. Archer, J. Broulidakis, I. Mavridou, B. Hayes, T. Guerreiro, C. Nduka, H. Gjoreski	385
Attention-based U-net: Joint Segmentation of Layers and Fluids from Retinal OCT Images M. Melinscak	391
Recognizing Activities of Daily Living Using Multi-sensor Smart Glasses S. Stankoski, B. Sazdov, J. Broulidakis, I. Kiprijanovska, B. Sofronievski, S. Cox, M. Gjoreski, J. Archer, C. Nduka, H. Gjoreski	397
Reconstruction of Short Genomic Sequences with Graph Convolutional Networks L. Vrcek, X. Bresson, T. Laurent, M. Schmitz, M. Sikic	403
Fortuna Detects Novel Splicing in Drosophila scRNASeq Data B. Borozan, L. Borozan, D. Severdija, D. Matijevic, S. Canzar	410
Using De Novo Metagenome Assembly for Improved Metagenomic Classification J. Lipovac, K. Krizanovic	416
Hyperparameter Optimization of Graph Neural Networks for mRNA Degradation Prediction V. Vodilovska, S. Gievska, I. Ivanoska	423
Examination of Different Representations of Proteins Using Protein Ray-based Descriptor and Deep Learning Models G. Mirceva, A. Naumoski, A. Kulakov	429

Enabling Hyperparameter-Tuning of AI Models for Healthcare Using the CoE RAISE Unique AI Framework for HPC	435
M. Riedel, C. Barakat, S. Fritsch, M. Aach, J. Busch, A. Lintermann, A. Schuppert, S. Brynjolfsson, H. Neukirchen, M. Book	

Telecommunications & Information

Smart Work Order	441
Z. Bosic, P. Gusic, M. Zubcic, M. Markovic, T. Zitnik	
Bringing Children Closer to Science and the Universe with New Technology	448
P. Lahovsky, A. Ljubek, K. Misura, M. Zilak	
An Overview of 3D Holographic Visualization Technologies and Their Applications in Education	454
A. Keselj, K. Zubrinic, M. Milicevic, M. Kuzman	
An Analysis of the TR069 (CWMP) Protocol	460
I. Basicovic	
Implementation of Automated Testing Solution for Voice Services	466
M. Ivancic, N. Stokic, T. Zilic	
RFID Inventory Management System Sampling Optimization Based on Zebra Android Framework	472
I. Benke, I. Hedji, E. Cirikovic	
Study of Data Transfer Nodes Infrastructure in Enabling Big Data Movement between Research and Cloud Storage Networks	477
D. Regvart, M. Mikuc, V. Dakic	
Using Low Power Wide Area Networks to Provide out of Band Management for Data Centers	482
J. Redzepagic, Z. Moric, D. Regvart	
Establishing the Guidelines for Using Refurbished Hardware in Creating New Data Centers to Lower the Amount of E-Waste	486
J. Redzepagic, V. Dakic, Z. Moric	
The Challenges to Information Security in Croatian Chamber of Economy during COVID-19 Pandemic	491
D. Lucic	
Do Croatian Citizens Want the Digitalization of Elections? Differences in Socio-Demographic Characteristics	496
V. Pavlovic Vinogradac, B. Cerin, D. Vandjelic, A. Priscan	

PAPA for IoT - Role of Data Accuracy in IoT Deployment and Data-centric Decision-Making	500
M. Vermanen, J. Naskali, V. Harkke, J. Koskinen	
User Input Search - Custom Motion Estimation Algorithm Optimized for UAVs	506
J. Benjak, D. Hofman	
FOGO - An Optimized Fog and Edge Computing Method for VANETs	511
R. Corluka, I. Matos, D. Damjanovic, J. Balen	
On Signal Attenuation in 5G Higher Frequencies Transmissions with Different Area Scenario	517
T. Iliev, I. Stoyanov, I. Penkov, G. Mihaylov, A. Fazylova, G. Balbayev, I. Beloev, S. Kosunalp	
Outage Probability Determining for Wireless Systems in the Presence of Beaulieu-Xie Fading and Co-channel Interference Rayleigh Modeled	523
D. Krstic, S. Suljovic, D.S. Gurjar, S. Yadav	
 Computers in Education	
Applying TAM (Technology Acceptance Model) to Predict Effective ICT Use of Preschool Teachers during the COVID-19 Pandemic	527
T. Velki, M. Miocic	
Data Acquisition and Corpus Creation for Phishing Detection	533
I. Dundjer, S. Seljan, M. Odak	
Information Extraction from Security-Related Datasets	539
S. Seljan, N. Tolj, I. Dundjer	
A Gamified Learning Scenario for Introducing Pupils to the Scientific Method through Experimentation and Programming	545
D. Kager, A. Marinsek	
The Reality of Digital Teaching of History in Croatia	551
M. Hajdarovic	
Increasing Students' Motivation and Improving Outcome by Changing the Course Examination from Test to Project on a University Course	555
D. Bele, D. Kucak, D. Pasic	
Model for Assessing E-Learning Courses Considering Multiple Visual and Technical Indicators	560
M. Bankovska, D. Borissova, K. Rasheva-Yordanova	
Teaching Computer Security in a Secondary School	566
J. Mottl	

What Do We Know about Learning – Conversations with chatGPT J. Henno, H. Jaakkola, J. Makela	572
A Treasure Trove at Your Fingertips: Analysis of Contents from Europeana with Regard to Their Copyright Status M. Duic	578
QR Codes as an Educational Tool for Implementing the BYOD Approach in Physics Lessons M. Drushlyak, Y. Sabadosh, P. Mulesa, E. Diemientiev, A. Yurchenko, O. Semenikhina	584
Windows Admin GUI Model for Learning PowerShell Commands D. Tulicic, D. Delija, G. Sirovatka, M. Mrkoci	590
Education of Teachers at Higher Education towards Changing Education Expectations D. Palova, I. Korobanicova	596
Simulation of Corporate Work-life as a Part of Higher Education D. Palova, M. Vejacka	602
Potential Implementation of Augmented Reality Technology in Education M. Brizar, D. Kazovic	608
Challenges of Adoption of Cloud Computing Solutions in Higher Education: Case Study Republic of Kosovo L. Shala Riza, J. Ajdari, M. Hamiti	613
Augmenting Student Education Using the RealityScan Application for Generating 3D Content V.V. Kozov, B. Ivanova	619
Implementation of a Facilitative Approach to Teaching Mathematical Disciplines to Future Mathematics Teachers by Means of the MAPLE Package I.V. Shyshenko, Y.O. Chkana, O.V. Martynenko, O.M. Udovychenko, I.I. Stotskyi, O. Semenikhina	625
Digital Technologies in the Activities of Physical Culture and Sports Specialists: Features of Professional Training P. Rybalko, O. Shukatka, S. Lazorenko, V. Kyselov, N. Skachedub, Y. Kozeruk Paryshkura	631
Exploring the Pedagogical Use of AI-Powered Chatbots Educational Perceptions and Practices E. Rakovac Bekes, V. Galzina	636
Automatic Evaluation of Student Software Solutions in a Virtualized Environment M. Fabijanic, G. Djambic, B. Skracic, M. Kolaric	642

Digital Literacy of Students at the Faculty of Humanities and Social Sciences Zagreb: An Empirical Study R. Vrana	648
Effective Educational Ukrainian Practices of the Formation of Media Literacy Y. Rudenko, S. Ahadzhanova, K. Ahadzhanov-Honsales, O. Bieliaieva, A. Korovai, O. Semenikhina	654
The Formation of Infomedia Literacy of Students in a Media Tournament M. Yachmenyk, I. Kharchenko, O. Semenog, N. Kyrylenko, M. Ostroha, S. Bohoslavskyi, O. Semenikhina	660
Digital Technologies in Teaching Physics: An Analysis of Existing Practices A. Yurchenko, Y. Khvorostina, V. Shamonina, M. Soroka, O. Semenikhina	666
Fostering Critical and Computational Thinking in the Field of Primary and Secondary Education in non-STEM Subjects by Using Data Sets and Applications I. Vlahovic, I. Ogrizek Biskupic	672
Gamification in Education: Building an Escape Room Using VR Technologies A. Staneva, T. Ivanova, K. Rasheva-Yordanova, D. Borissova	678
The Ubiquity of Mathematics in the Practical Basics of Computing and Programming M. Bednjanec, D. Bednjanec, B. Kuhar	684
From Classroom to Online Environment – The Comparison Analysis of the E-Learning Standards Before and during the COVID-19 Pandemic K. Aleksic-Maslac, P. Vranesic, B. Sinkovic	688
Validating a Model of Smart Service System, Supporting Teachers to Create Educational Maze Video Games A. Antonova	693
STREAM Education - Potential for Engaging Students in Generating Innovative Green Ideas and Development of Transversal Skills K. Dyulgerova, D. Atanasova, M. Milanova	699
When User Experience Design Meets LMS Desktop Users: How to Mitigate Mobile-Oriented Interface? M. Banek Zorica, J. Klindzic	705
Survey of Recent Research Topics on Effective Use of Communication Tools in Higher Education M. Nurminen, H.-M. Jarvinen, J. Viteli, M. Saari, P. Rantanen	710
Does Daily Use of Digital Technologies Influence the Reading and Information Literacy of 15-year-old Students? V. Lang, A. Spornjak, A. Sorgo	716

Self-Assessment of Pre-service English Teachers' Digital Competence T.K. Harakchiyska	722
Examining the Relationship Between Students' Social Media Usage, Smartphone Checking During Lessons/Studying, and Academic Achievement (GPA) M. Kucar, V. Vidacek Hains, R. Kovacic	728
Face-to-Face and Online Communication and Etiquette in Secondary Education E. Martincevic, V. Vidacek-Hains	734
Non-Formal Education: Dynamics of Changes in the Popularity of Mass Open Online Courses N. Dehtiarova, O. Zhmud, V. Makarova, O. Hontar, M. Zakharevych	739
Comparison of Pandemic and Post-Pandemic Education at Higher Education Computer Science Course D. Palova, J. Stofa, M. Vejacka	744
AI Comics as Art: Scientific Analysis of the Multimedia Content of AI Comics in Education K. Bedi	750
Teenagers' Gaming Practices and Their Performance in STEM Courses M. Homen, V. Juricic	754
Education via ICT Due to Corona Crisis – Our View on Pros and Cons L. Reveszova	760
Comparative Analysis of Student Assessment during the COVID-19 Crisis A. Pongrac Pavlina, K. Pavlina	765
ICT Support for Successful Face-to-Face and Online Teaching Process T. Alajbeg, M. Sokele, S. Moric, F. Brkic	769
Programmable Questions in Edgar I. Mekterovic, L. Brkic, V. Krstic	775
Inclusion of Digital Competence in Educational Physics Study in Croatia and Slovenia F.M. Grgurin, R. Repnik	781
The Influence of the COVID 19 to the Future of Learning M. Krasna, T. Bratina	787
How to Measure Co-Creation in the Digital Environment of Higher Education? T. Mijac, M. Jadric, M. Cukusic	791

Classification of Text, Image and Audio Messages Used for Cyberbullying on Social Medias E. Idrizi, M. Hamiti	797
International Cooperation for Digital Innovations in Primary Schools B. Denys, B. Klimczuk	803
The Role of Informatics Textbooks in Primary School in Croatia A. Glavas, D. Markovic	807
The Use of Smartphones and Tablets for Teaching Biology at a Distance: A Comparison between Rural and Urban Schools V. Lang, A. Songo	813
Using VIDI-X Microcomputers in High School and College Education B. Balon, A. Skendzic, M. Simic	817
How Well Students Perceive Their Understanding of Logic Programming Course Content? S. Lovrencic, V. Sekovanic	824
Prototyp of an Optical - Electrical Measuring System for the Determination of the Gravitational Constant for Teaching Purposes C. Ungermanns, W. Werth, A. Schondorfer, C. Madritsch	829
Computers in Education H. Jaakkola, J. Henno, J. Makela	833
ICT and Changes in Education and Professional Activity of Journalists M. Galic	840
Physics-Electronics Practical Work Model Accessible and Manipulable Remotely via the Web L. Yade, A.D. Gueye, P.L.T. Sow, A. Ndiaye	845
How to Use E-Learning App in Education and Presentation of Erasmus Project M. Sertic, T. Cosic, M. Kerstner	850
Educational Processor with Single-cycle Instructions SVEU16 S. Ribic, K. Hodzic	855
Student Perspectives on Source-Code Plagiarism: Case Study of Three Programming Courses M. Novak	861
Utilizing Robotics in Maths in Primary Education: A Case Study A. Goltsiou, C. Sofianopoulou	867
Web Application for Learning Mathematics N. Stojkovikj, L.K. Lazarova, M. Ananieva	872

Teachers' Expectations for Digivisio 2030 – A Joint Higher Education Digital Transformation Project in Finland	877
J. Multisilta, T. Mattila, K. Lempinen	
Digital Culture and Students' Awareness of Their Participation in This Phenomenon	882
L. Bandic, P. Peric, T. Babic	
Students' Perception of Influencer Marketing on Instagram	888
D. Blazevic, T. Babic	
Tolerance for Disagreement in Communication via Instagram	894
D. Njegovan, B. Frigan, T. Babic	
Using Drones in Teaching Computer Science	899
P. Vostinar	
A Critical Analysis of Students' Cheating in Online Assessment in Higher Education: Post-COVID-19 Issues and Challenges Related to Conversational Artificial Intelligence	905
G. Bubas, A. Cizmesija	
Pair Programming Education Aided by ChatGPT	911
B. Banic, M. Konecki, M. Konecki	
Evaluating Learners' Reactions to an Online Training Programme: A Case Study of Maldives National University	916
I. Balaban, J. Badari, I. Ruzic	
The Impact of Short and Very Short Videos on the Effectiveness of Teaching and the Principles of Their Development	922
J. Zufic, S. Bodis	
Teacher's Motivation for Applying the Unplugged MEMA Method for Early Programming Teaching	926
S. Babic, M. Cicin-Sain	
 Distributed Computing and Cyber-Physical Systems	
Comparing the Use of Custom-built and Commercial Off-the-shelf Data Gathering Devices in IoT Systems	930
M. Saari, J. Harjamaki, M. Nurminen, P. Rantanen	
Challenges of Combining Open and Commercial Data Sources in Visitor Mobility Estimations	935
J. Gronman, P. Rantanen, P. Sillberg, T. Pohjola, T. Jonkkari	
An Overview of Diffusion Models for Text Generation	941
H. Ceovic, M. Silic, G. Delac, K. Vladimir	

An Overview of State-of-the-Art Solutions for Scene Text Detection M. Dzida, D. Vukadin, M. Silic, G. Delac, K. Vladimir	947
A Transfer Learning Method for Hate Speech Detection E. Smuc, G. Delac, M. Silic, K. Vladimir	953
Detection of Shilling Attacks on Collaborative Filtering Recommender Systems by Combining Multiple Random Forest Models V. Grozdanic, K. Vladimir, G. Delac, M. Silic	959
High-Performance Serverless Request Generator: Capable of Generating a Hundred Thousand Requests Per Second D. Mileski, M. Gusev	964
Future Dynamic Computing and User Profile Execution Considering User Migration in Social Media Contexts A. Abiola Periola, A.A. Alonge, K.A. Ogudo	970
Brief Introduction to Active Noise Control D. Miljkovic	977
Active Noise Control Using Waveform Synthesis with Improved Convergence and Tracking D. Miljkovic	983
Higher-Level Experimental Prototype of a Control Device for Dynamic Beverage-Cooling Process T. Spoljaric, B. Vuletic Komljen, L. Cvitas, G. Malcic, J. Matusko, M. Miletic	988
Artificial Intelligence-based Predictive Fuel Blending Control for Flare Gas Mitigation J. Kir Hromatko, S. Iles, R. Huljev, V. Vuckovic	994
Program Solution for Regulation and Monitoring of Evaporator Section in Individual Quick-Freezing Process T. Spoljaric, D. Gadze, I. Sulekic	1000
Electrical Profile of User with Photovoltaic System I. Petrovic, D. Koprivanac, E. Cirikovic	1006
Artificial Intelligence Systems	
Binary Dynamic Models of Structural Synthesis of Programs G.A. Oparin, V.G. Bogdanova, A.A. Pashinin	1010
The Concept of Cognition as Categorization in the Development of New Metaheuristics and Algorithms Inspired by Nature D. Tulicic, N. Ivkovic	1016

Speeding up the Solving of Logical Equivalence Checking Problems with Disjunctive Diagrams	1021
V. Kondratiev, I. Otpuschennikov, A. Semenov	
Empirical Analysis of the RC2 MaxSAT Algorithm	1027
S. Kochemazov, V. Kondratiev, I. Gribanova	
Challenges in Collective Intelligence: A Survey	1033
K. Poje, M. Brcic, M. Kovac, D. Krleza	
The Study of the Target Set Selection Problem under Deterministic Linear Threshold Model Using Evolutionary Algorithms	1039
M. Smirnov, S. Kochemazov, A. Semenov	
Neuroevolution for the Sustainable Evolution of Neural Networks	1045
E. Otovic, J. Lerga, D. Kalafatovic, G. Mause	
Influence of Quality of Pixel Level Annotations on Text Detection Performance in Natural Images	1052
I. Dorkic, M. Brisinello, R. Grbic, M. Herceg	
Effects of Applying Identified Road Lane Lines on Vehicle Autopilot Model Driving Performance	1057
V. Diklic, F. Matkovic, K. Pardon	
Estimating a Nonradial Vignetting Shape	1063
D. Potoc, D. Petrinovic	
The Impact of Image Processing on Perceptual Hash Values	1070
M. Ferencak, P. Grd, I. Tomicic	
The Role of Knowledge Management in Transition to Industry 5.0	1076
S. Lovrencic	
Learning Translation Model to Translate Croatian Dialects to Modern Croatian Language	1083
B. Penkova, M. Mitreska, K. Ristov, K. Mishev, M. Simjanoska	
Sentiment of the Tweets on Russo-Ukrainian War: The Social Network Analysis	1089
A. Poleksic, S. Martincic-Ipsic	
Compressing Sentence Representation with Maximum Coding Rate Reduction	1096
D. Severdija, T. Prusina, A. Jovanovic, L. Borozan	
DistilBERT and RoBERTa Models for Identification of Fake News	1102
A. Kitanovski, M. Toshevska, G. Mirceva	
Analysis of Pro-Russian Tweets during Russian Invasion of Ukraine	1107
J. Katalinic	

Syllable and Morpheme Segmentation of Macedonian Language M. Mitreska, K. Zdravkova	1113
Multilingual Named Entity Recognition Solution for Optimizing Parcel Delivery in Online Commerce: Identifying Person and Organization Names M. Pajas, A. Radovan, I. Ogrizek Biskupic	1119
Using Generated LIBS Data as a Base for Neural Network Architecture Development J. Lehtonen, T. Aaltonen	1125
Imitation Learning for Financial Applications S. Goluz, T. Bauman, T. Kovacevic, Z. Kostanjcar	1130
The Comparison of Different Feature Extraction Methods in Musical Instrument Classification N. Rodin, D. Pincic, K. Lenac, D. Susanj	1136
Driven by Artificial Intelligence (AI) – Improving Operational Efficiency and Competitiveness in Business K. Siber Makar	1142
A Survey on Usage of Multimedia Databases for Emotion Elicitation: A Quantitative Report on How Content Diversity Can Improve Performance M. Horvat, P. Jercic	1148
AI Chatbot For Job Interview N. Boudjani, V. Colas, C. Joubert, D. Ben Amor	1155
Consumer Class Side Scanning Sonar Dataset for Human Detection T. Aaltonen	1161
Network Model of Multiagent Communication of Traffic Inspection for Supervision and Control of Passenger Transportation in Road and City Traffic A. Djukic, R. Bjelosevic, M. Stojcic, M.K. Banjanin	1167
Closed-loop Artificial Pancreas Development: A Review S. Glumcevic, Z. Masetic, B. Viteskic	1173
Information Systems Security	
The Forensic Significance of Indexing Applications on the Windows Operating System I. Spoljaric, D. Delija, G. Sirovatka	1179
Implementation of Biometric Verification of a Fingerprint Whose Image is Taken from a Glass Surface M. Knezovic, M. Zagar, D. Delija, G. Sirovatka, D. Moznik	1183

The Latest Developments and Future Perspectives of Artificial Intelligence Systems for In-Vehicle Communication Intrusion Detection G. Marvin	1189
Deep Learning within the Web Application Security Scope – Literature Review M. Kaniski, J. Dobsa, D. Kermek	1195
Social Engineering Aspects of Email Phishing: An Overview and Taxonomy I. Tomicic	1201
Data Leaks to Third Parties in Web Services for Vulnerable Groups R. Carlsson, S. Rauti, T. Heino	1208
Privacy in Popular Children’s Mobile Applications: A Network Traffic Analysis R. Carlsson, S. Rauti, S. Laato, T. Heino, V. Leppanen	1213
Analysis of DMARC Implementation in Republic of Croatia D. Pranic	1219
Towards Improving Online Security Awareness Skills with Phishing and Spoofing Labs A. Kerr, T. Hynninen	1225
Secure, Accessible, Virtual Voting Infrastructure (SAVVI): Reducing Barriers for Disabled and Overseas Voters T. Selker, J.M. Pelletier	1230
JavaScript Library Version Detection V. Pagon, B. Skendrovic, I. Kovacevic, S. Gros	1240
Detecting JavaScript Libraries Using Identifiers and Hashes S. Loncarevic, B. Skendrovic, I. Kovacevic, S. Gros	1246
Detection and Analysis of Obfuscated and Minified JavaScript in the Croatian Web Space T. Dujmovic, B. Skendrovic, I. Kovacevic, S. Gros	1252
Forensic Implication of a Cyber-Enabled Fraud Taking Advantage of an Offline Adversary-in-the-Middle (AiTM) Attack D.O. Lawal, D.W. Gresty, D.E. Gan, T.C. Durojaiye	1258
 Business Intelligence Systems	
Metrics for Estimating Accuracy, Reliability, and Bias in Peer Assessment M. Fertilj, L. Brkic, I. Mekterovic	1264
Exploring the Relationship between Indoor Playrooms and Population in Skopje A. Naumoski, G. Mirceva, K. Mitreski	1270

Predicting Customer Behavior in Support Channels Using Machine Learning M. Begovic, E. Avdagic-Golub, B. Memic, A. Kosovac	1275
Modeling Tennis Matches Using Monte Carlo Simulations Incorporating Dynamic Parameters J. Krcadinac, E.M. Marusevec, L. Jerkovic, I. Kovac, J. Zloic, A. Sarcevic, M. Vranic	1281
Data Warehouse-Based Analytical System in Private Higher Education Institution M. Fabijanic, D. Ruzak, A. Novosel, T. Hlupic	1287
Opinion Mining on E-commerce Live Broadcast of Agricultural Products Based on WLDA-Apriori Model B. Wang, Y. Wang, Z. Wang	1293
CroStats — Visualization of Population in Croatia V. Perkovic, F. Belac, K. Boros, M. Kos, L. Humski, D. Pintar	1299
A New Approach to Semantic Parsing of Metonymic Phrases by a Business Intelligence System V.A. Fomichov	1305
A Common Pentest Output Schema for Business Intelligence System Ingestion S. Sharma, J.M. Pelletier, B. Stackpole	1311
Partial SQL Query Assessment M. Fabijanic, I. Mekterovic	1317
 Digital Economy and Digital Society	
Risk Management in Development of Croatian Maritime Cargo Single Window System S. Aksentijevic, E. Tijan, K. Nikolozo, A. Peric Hadzic	1323
E-Accounting System as a Service (E-ASaaS): A Conceptual Overview N. Vlahovic	1328
A Preliminary Survey into the Use of Business Process Tools in Croatian Companies L. Milanovic Glavan	1334
The Importance of ITIL4 Adoption for IT Service Management in Insurance Companies A. Cerimagic Hasibovic, A. Tanovic, A. Granulo	1341
Classifying Relevant Causes of Employee Absenteeism Using Machine Learning I. Fosic, A. Zivkovic, I. Fosic	1347

Application of Blockchain Technology and NFTs in a Museum Environment M. Bilogrivic, H. Stublic	1353
Digital Strategies of Service Sector Enterprises: Promising B2B Decisions O. Omelianenko, V. Omelyanenko, O. Kudrina, I. Zihunova, D. Kostyrko, S. Lytvynenko	1359
Factoring Economic Biases Out of Tokenomics T. Baldo, M. Migliardi	1364
Adaptation of European Enterprises to COVID-19 Pandemic: Cluster Analysis Findings M. Pejic Bach, B. Jakovic, I. Jajic	1370
The 5G-supported Unmanned Aerial Vehicles for Emergency Cases Response Z. Paladin, Z. Luksic, N. Kapidani, M. Montagud, M. Fernandez-Dasi, S. Srinidhi, T. Wollert, G. Boustras	1376
Implementation and Cost-Effectiveness of Blockchain Technology within the IP Ecosystems P. Karanikic	1382
Factors Affecting the Use of Online Recommendation Systems in E-Commerce in Croatia V. Sebek, S. Antolovic, C. Kramaric	1387
Co-creating Community-level Indicators: Involving Communities in the Digitalization of Energy for Empowering Energy Citizenship A. Kumar, A. Wolff, B. Naqvi	1392
Exploring Regional Innovation Dynamics Using Directed Acyclic Graphs F. Molinari, D. Cisic, B. Kovacic	1398
Methodological Framework for the Comparative Evaluation of the Emission Footprint of Virtual Remote Work and Travel by Autonomous Electric Vehicle to the Workplace M. Berkovic, A. Omerhodzic, A. Džananovic	1405
Internet of Behavior – The Transformation of Customer Relationship Management in Logistics A. Agatic, E. Tijan, S. Aksentijevic, A. Pucihar	1411
Auto-generated Plans and Decisions as an Instrument of Crisis Management D. Labas, M. Galic, M. Pejic Bach	1416
The Legal Status of Digital Nomads H. Arbutina, Z. Sinkovic, L. Pribisalic	1422

Comparative Analysis of Machine Learning Algorithms on Data Sets of Different Characteristics for Digital Transformation D. Oreski, I. Pihir, D. Visnjic	1428
Clustering of Croatian Software Development Companies Based on Their Financial Indicators I. Konecki, D. Oreski, N. Kadoic	1434
Artificial Intelligence in Healthcare Services – Regulation, Implementation and Future Challenges M. Boban, M. Klaric	1440
 Information and Communication Technology Law	
Comparative Analysis of the AI Regulation of the EU, US and China from a Privacy Perspective V. Gabor Radi	1446
Algorithmic Contracts in European and United States Contract Law – A Comparative Legal Analysis K. Biczysko-Pudelko	1452
Medical Data in the Digital Era - Legal Challenges Related to Providing Information Security, Applying GDPR and Respecting the Professional Secrecy K. Switala	1457
Technical Solutions Supporting the Online RTBF in the CJEU and ECHR Jurisprudence N. Gumzej	1467
Legal Assessment of the National Cybersecurity System in Poland in the Light of the New Developments in the NIS2 Directive A. Besiekierska	1474
Online Audiovisual Content, Video Sharing Platforms and Regulation under DSA and AVMSD H. Lisicar, T. Katulic, M. Juric	1478
Interplay of Gatekeepers' Obligations and Consumer Rights under the Digital Markets Act I. Kanceljak	1484
Analysis of IoT Devices Security for Household Applications M. Milenkovic, R. Nikolic, S. Celan, P. Petrosanec	1490
Privacy Notice Informativeness: in a Search for Benchmark M. Alic	1496

DeShame Croatia: Student Reactions and Consequences of Online Sexual Harassment in High Schools	1501
L. Vejmelka, R. Matkovic, M. Rajter, T. Ramljak	
Capacities of Western Balkan Economies (and Their Public Sectors) to Respond to Ransomware Attacks	1508
D. Krivokapic, A. Nikolic, I. Zivkovic	
Status of Open Data (Sub)Ecosystem in Croatia: National Open Data Portal	1515
A. Musa, P. Djurman	
Information Security among SMEs in Hungary - An Overview	1521
N. Mike, E. Kren, T. Kecskemeti	
Anti-corruption Measures in the New Croatian Public Administration Office Management Regulation	1526
G. Vojkovic, T. Katulic	
Privacy Paradox and Generation Z	1532
M. Alic, L. Sopic	
 Engineering Education	
Development of Renewable Energy Course for Electrical Engineering Program	1538
F.R. Shahrouy, I. Abuishmais, H.H. Ahmad	
Hybrid Agile Approach in Software Engineering Education – A Case Study	1543
M. Kaluza, S. Candrljic, M. Asenbrener Katic	
Computer-supported Education of the Reserve Officers of the Armed Forces	1549
M. Colic	
Design, Development and Control of a Ball-on-Beam Control System Using Industrial Equipment	1555
N. Muskinja	
Using the Matlab Programming Environment in the Course of Student Training in the Electrical Machines Discipline	1561
V.S. Ruseva, A.H. Krasteva	
Exploring Pre-scoring Clustering for Short Answer Grading	1567
L. Petricioli, K. Skracic, J. Petrovic, P. Pale	
Identifying Higher Software Engineering Education’s Design-Reality Gaps in Rural India	1572
P. Spiesberger, L. Burstmayr, R. Vallon, T. Grechenig	
Understanding the Teamwork Challenges of Software Engineering Students	1578
L. Doric, N. Luburic, J. Slivka, A. Kovacevic	

Stimulating (Open) Data Literacy at the Basis of Society: Approaches for Active Learning and Teaching to Young Children	1584
I. Bosnic, A. Kuvezdic Divjak, B. van Loenen	
The Relationship between Extracurricular Activities and Student Achievement in the Affective Domain: The Case of a Vocational Electrical Engineering School	1590
D. Delac, D. Purkovic	
Academic Motivation of Sophomore and Junior Electrical Engineering Students	1595
A. Gero, B. Catz	
Teaching and Assessing Ethics in a Specialized Professional Skills Course	1599
B. Pejcinovic	
Levels and Differences in Professional Identity in Engineering Undergraduates	1604
V. Putarek, J. Petrovic	
Virtual and Augmented Reality in Mechanical Engineering Education	1612
G. Ivanova, A. Ivanov, L. Zdravkov	
Video Creation as a Catalyst of Value Change in Engineering Education	1618
R. Habash, N.M. Abdulkadir	
Ensuring Global Perspectives within Reading Lists to Increase Students' Engagement	1624
G.J. Collins	
Virtual Electric Machines Laboratory, Requirements and Practical Realization	1630
P.J. van Duijsen, D.C. Zuidervliet	
Hierarchical Approach in Modeling and Simulation of Power Electronics for Education	1636
P.J. van Duijsen, D.C. Zuidervliet	
Teaching Introductory Parallel Programming Using Two-Player Online Games	1642
S. Manoharan, X. Ye	
Curriculum Development for Socially Responsible and Sustainably Acting Engineers	1647
M. Derda, M. Wedel, M. Albrecht	
Income Prospects of Engineering Graduates in Croatia	1653
A. Tecilazic	

Software and Systems Engineering

Role, Importance and Significance of Software Quality	1658
F. Temole, D. Atanasova	

Identification of Code Properties that Support Code Smell Analysis S. Prokic, N. Luburic, J. Slivka, A. Kovacevic	1664
Migrating to a Microservice Architecture: Benefits and Challenges S. Salii, J. Ajdari, X. Zenuni	1670
Optimization and Parallelization of Object-Relational Mappers F. Jovanov, V. Zdraveski, M. Gusev, M. Kostoska	1678
A Survey of End-to-End Congestion Mechanisms in the Field of IoT D. Fonovic, S. Sovilj, N. Tankovic	1684
Security and Privacy Concerns Associated with the Internet of Things (IoT) and the Role of Adapting Blockchain and Machine Learning - A Systematic Literature Review E. Leka, E. Hoxha, G. Rexha	1690
Applying Balanced Scorecard in Software Process Improvement: A Case Study of Small Software Organization B. Karahodza, E. Avdagic-Golub, A. Colakovic	1697
Application of Hybrid Project Management Methodology in Development of Software Systems S. Urlic, Z. Car	1703
 MIPRO Junior - Student Papers	
Analyzing Sentiment of Reddit Posts for the Russia-Ukraine War A. Krivicic, S. Martincic-Ipsic	1709
Classification of Crimes Using Machine Learning Techniques for National Crime Data M. Trpchevska, A. Dedinec	1715
Optimizing Vision Transformer Performance with Customizable Parameters E. Ibrahimovic	1721
Cardano - What Is It and How to Start Working with It S. Barac, I. Boticki, G. Perkovic, V. Radosevic, I. Terzic	1727
Keeping Drivers Alert: A Solution for Monitoring Driver Attention in Assisted-Driving Vehicles R. Jutresa, P. Peer, Z. Emersic, J. Kim	1733
Teaching Programming and Microcontrollers with an Arduino Remote Laboratory Application A. Bukovac, E. Plese, U. Maravic, P. Petrovic, T. Jagust	1738

Awareness of Croatian Citizens about the Advantages and Disadvantages of IoT Devices and Their Safety	1742
P. Petrosanec, S. Celan, R. Nikolic, M. Milenkovic	
Device for Testing the Windings of Electrical Machines	1748
M. Lonc, V. Zuppa Baksa, G. Vujisic	
Electrical Scheme Digitization Using Deep Learning Methods	1754
M. Putak, V. Zuppa Baksa, A. Bednjanec	
Body Fat Percentage Calculation: A Linear Regression Model on Croatian Tennis Players Morphology	1760
M. Vasilj, V. Vucetic, M. Sukreski, D. Bojanjac	
Visualization of Three-Dimensional Ultrasound Data	1765
H. Hrzenjak, Z. Mihajlovic	