

CONTENTS

ARTIFICIAL INTELLIGENCE 1

Novel Model for Hospitalization Tracking based on Smart Contracts and IoT H. Valchanov and V. Aleksieva	14
Resilient Architecture Framework for Robotic Systems A. Hristozov, E. Matson, J. Gallagher, M. Rogers and E. Dietz.....	18
Comparative study of two on-line learnable neural approximators of a robot inverse kinematics Z. Zhekov	24
A Methodology for Estimation of Software Architectural Complexity in Publish-Subscribe Systems A. Hristozov and E. Matson	29

CONTROL SYSTEMS 1

State Controller with Improved Response Speed for Linear Discrete SISO Systems N. Nikolov, M. Alexandrova, R. Gaziyeva and S. Ubaydullayeva.....	35
A model - free method based on Laguerre series expansion for dynamic measurement improvement T. Slavov, M. Baraharska and I. Markovsky	39
Application of a modulus and symmetrical optimum tuning methods for a cascade control system of a 2-joint planar robot Z. Zhekov	45
Combined local system for joint purification of drinking water from iron and arsenic with limitation of the harmful substances level in rinse water G. Ganchev and N. Nikolov	50

COMPUTER TECHNOLOGIES 1

Comparison of compiler efficiency with SSE and AVX instructions M. Pashinska-Gadzheva	56
Performance Study of MySQL and MongoDB for IoT Data Processing and Storage T. Mladenova and I. Valova.....	60
Android Application Prototype to Study Text Reading Speed and Comprehension T. Georgiev.....	64

Bitcoin Price Prediction using Long Short Term Memory Neural Networks	
S. Javadimasoudian, P. M. Kathuria, N. Gowda and T. Ali Khan	69

Measuring the effectiveness of blockchain smart contracts	
A. Panayotov and P. Ruskov	73

ARTIFICIAL INTELLIGENCE 3

Using Machine Learning Algorithms to Improve Education Process	
V. Jotsov, Z. Abdiakhmetova, N. Kerimbayev, A. Berdaly and L. Zhumakhan	78

Using the innovative I-learning platform in the education system	
N. Kerimbayev, G. Madyarova, M. Bolyskhanova, G. Tkach, I. Garvanov and Z. Umirzakova.....	83

Evaluation of cost-sensitive machine learning methods for default credit prediction	
Y. Aleksandrova and M. Armyanova.....	89

State Of Charge Estimation in Lithium-Ion Batteries via Machine Learning	
V. Mashkov, M. Karova and I. Penev	95

SYGNAL PROCESSING

List of Selected Number of Optimal Solutions of the Assignment Problem by Time Criterion	
L. Laskov and M. Marinov.....	100

SONG Adaptive Delta Modulation Processing of PPG Signals with Motion Artifacts	
N. Kostov, H. Zhivomirov, B. Nikolov and S. Kostadinova	107

Quadcopter’s telemetry parameters and their recursive estimates	
I. Grigorov, N. Atanasov and D. Dzhubarov	111

Investigating the possibility of monitoring the drying in the upper soil layer by means of a drone in the Dobruja region	
A. Atanasov, R. Mihaylov and G. Mihova.....	115

ADVANCED ELECTRICAL DRIVE

Synchronous Reference Frame Theory Control for Current Harmonics Suppression in Ship Power System Using Shunt Active Power Filter	
D. Tsvetanov, N. Djagarov, Z. Grozdev and J. Djagarova	120

Comparative Analysis of Conventional Methods for Braking a Three-phase Induction Motor and Research on Efficient Combinations of Methods for Efficient Braking Process	
P. Bahov and M. Alexandrova	129

ARTIFICIAL INTELLIGENCE 2

Intelligent Logistics at Harvest Time in Grain Production V. Sgurev, L. Doukovska and S. Drangajov	135
Using ontologies to support development of adaptive learning content T. Ivanova.....	140
Compositional Machine Learning Method for Computer Security Incidents Response Taxonomy Classification V. Yosifova	146
Digital Twin Software Overview with Text Mining Techniques G. Kolev, V. Lozeva and E. Koleva.....	153

ARTIFICIAL INTELLIGENCE BASED TECHNOLOGIES 1

Bimodal System for Facial Emotion Recognition Based on Deep Learning Neural Networks D. Pilev, A. Atanassov and F. Tomova.....	159
Intelligent Real-Time Face Mask and Temperature Recognition Using Deep Learning on Raspberry Pi O. Simonoski, I. Mitreska and I. Dimitrievski	164
Validation and evaluation of models in the study of characteristic descriptors based on patients' gender G. Marinova and M. Todorova.....	169
An Overview of some popular devices and technologies designed for blind and visually impaired people T. Stefanov, S. Varbanova and M. Stefanova	173

ARTIFICIAL INTELLIGENCE BASED TECHNOLOGIES 2

Recycling Rate in Europe: Econometric Modeling and dART Clustering Analysis R. Pantcheva and G. Mengov.....	179
Bot Development for Intelligent Automation in ERP Systems S. Stoykova and R. Hrishev.....	183
Personal Assistant Supporting Diagnosis of Livestock Poisoning V. Komsalova, S. Stoyanov, L. Doukovska, I. Stoyanov and S. Cherecharov	189
Automated Music Generation using Deep Learning S. Bhardwaj, S. M. Salim, T. Ali Khan and S. J. Masoudian	193

CONTROL THEORY

Distributed Model Predictive Control of Time-Delay Systems: Application to a Series of Chemical Reactors

A. Grancharova, S. Olaru and I. Valkova 199

Adaptive Metaheuristic Moth-Flame Optimized Droop Control Method for DC Microgrids

E. Yusubov and L. Bekirova..... 204

Industrial Bound Design and Application of Fuzzy Logic PID Controller for Liquid level in Carbonisation Column

S. Yordanova, M. Slavov, G. Prokopiev and D. Delicheva..... 210

Robust Control of Electro-Hydraulic Servo System

G. Mihalev, S. Yordanov, K. Ormandzhiev, K. Kostov and V. Mitev 218

CONTROL SYSTEMS 2

Intelligent Robotic Process Automation for Small and Medium-sized Enterprises

S. Stoykova, R. Hrishev and N. Shakev.....223

Overview of Industrial Communication in Process Automation

N. Petkov and A. Naumov229

Use of Elements and Algorithms of Intelligent Support in the Automation of Technologies for Control and Quality Management of Bulk Materials

P. Kalandarov, S. Ubaydulayeva, R. Gaziyeva, N. Nikolov and M. Aleksandrova235

IEC/EN 62264 multi-dimensional scheduling approach using ISO 22400 Key Performance Indicators

P. Vasilev239

CONTROL SYSTEMS 3

Towards Achieving Thermal Comfort through Physiologically Cloud based controlled HVAC System

I. K. Ihianle, P. Machado, K. Owa and D. A. Adama245

Model for determining of optimal ultrasonic sensors measurement zone

H. Kilifarev and D. Genkov250

Energy management system based on wireless sensor networks and power line communications

A. Omar, R. Malekian and D. C. Bogatinoska.....255

Design, Manufacture and Control of the Prosthetic Hand with 3D Printer

A. Pajaziti, G. Rexha, X. Bajrami, E. Rustemi, J. Kola and M. Zeqiraj.....261

COMPUTER SCIENCE 1

A framework of blockchain/IPFS-based platform for smart crop production	
I. Popchev, L. Doukovska and I. Radeva.....	265
An Algorithm for Generating All Subsets in Lexicographic Order	
V. Bakoev	271
Auditing blockchain smart contracts	
I. Popchev, I. Radeva and V. Velichkova.....	276
Study of Received Signal Strength Indicator values of Bluetooth Low Energy in Test Environment and Simulation	
A. Haka, Y. Yordanov, V. Aleksieva and H. Valchanov	282

COMPUTER SCIENCE 2

An improved approach of using data storage services in ASP.NET Core	
D. Damyanov, Z. Varbanov and S. Varbanova	287
Repository Platform for RESTful Web Services	
A. Nikolov and D. Petrova-Antonova	292
Internet of Things–based pregnancy tracking and monitoring service	
R. Ivanov, S. Yordanov and D. Dinev	298
AutoCAD application for selecting the required materials for manufacturing machines and equipment from sheet material	
A. Bankova, S. Tenev, Z. Tsoneva, M. Tachev and I. M. Mehmedov	303

DATA PROCESSING 1

Increasing the Accuracy of Pulsar’s Period Measurement by Chinese Remainder Theorem	
V. Ivanov, I. Garvanov, N. Ivanov, M. Garvanova, G. Torres and N. Petrov	307
A Survey of Data Quality and Processing of Information in Innovative Smart Devices	
D. Denev and T. Tsankov	311
Statistical analysis of data using LabVIEW	
V. Ganchovska and I. Krasteva.....	316
Converting color to grayscale image using LabVIEW	
V. Ganchovska and I. Krasteva.....	320

DATA PROCESSING 2

Biosignal measurements for Neurophysiological tests aimed to determine new beverage responses	
S. Georgiev, S. Andonov, G. Tsenov and V. Mladenov	324
Complete Experimental Set with a Period Meter	
D. Mihaylova, S. Stoyanov and A. Atanasov.....	330
Network Design for Gathering Data in Manufacturing Process	
A. Petrov and A. Taneva	335
Process Inspection and Data Collection for Manufacturing	
A. Petrov and A. Taneva	339

OPTIMIZATION

Multi-Objective Optimisation of Urban Design Using a Genetic Algorithm	
S. Boyukliyski, D. Petrova-Antonova, E. Hristov and K. Hristov	345
An Efficiency of Third Party Genetic Algorithms Software Libraries in Mobile Distributed Computing for Financial Time Series Forecasting	
G. Mateeva, D. Parvanov, I. Dimitrov, I. Iliev and T. Balabanov	351
Metaheuristic Maximum Power Point Tracking for PV systems under Partial Shading Conditions	
E. Yusubov and L. Bekirova	355
Finding the minimum number of disks of fixed radius needed to cover a set of points in the plane by MaxiMinMax approach	
S. Panov, S. Panova and A. Garbev	361

COMPUTER TECHNOLOGIES 2

Possibilities for Visual Programming in Robotics via Node-RED	
A. Garbev	367
Video Lectures Management System	
D. Genkov, T. Raykov and H. Kilifarev	372
Educational technology integrating the project and problem-based approach in technical disciplines for the formation of creativity and creative thinking in engineering students	
M. Stoeva and P. Stoev	378

APPLICATIONS

An Approach for Computing the Average Moisture Content in Batches of Wood Materials Subjected to Thermal Treatment

M. Hadjiski, N. Deliiski, P. Vitchev and D. Angelski..... 383

Parallel Distributed Compensation for the Control of Processes in Anaerobic Organic Wastewater Treatment

S. Yordanova and D. Stoitseva-Delicheva.....388

LoRa Application for Food Monitoring – LYUTENITSA

K. Kolev, R. Maksimova and A. Kostadinov.....394

Positioning intermodal terminals optimally along a railway line using the train differential equation of motion

S. Todorov, V. Popov and M. Iliev399