

**IEEE INTERNATIONAL CONFERENCE AUTOMATICS AND
INFORMATICS'2023 (ICAI'23),**

5 - 7 October 2023, VARNA (Technical University of Varna)

<http://icai-conf.org>

PRELIMINARY PROGRAM

THE GIVEN TIME IS ACCORDING TO THE BULGARIAN TIME ZONE - SOFIA UTC+3 HOURS

Thursday, October 5th

In the NUK gallery

08.00 - 09.00 REGISTRATION OF PARTICIPANTS

Stream 1 (Conference Hall NUK)

09.00 - 09.15 WELCOME AND OPENING CEREMONY

Stream 1 (Conference Hall NUK)

09.15 - 09:50 PLENARY SESSION (PS)

Chairman: Kosta Boshnakov

**Methods, Models and Algorithms of the Computational Intelligence Analyzed from a
Practical Point of View**



Gancho Vachkov
Baku Higher Oil School

09.50 - 10:00 DISCUSSION

Stream 1 (In attendance) (Room A – Hall 109TV)	Stream 2 (Online) (Room B)
<p>10:00 – 11:30 SESSION A1</p> <p>“MACHINE LEARNING”</p> <p>Chairman: Ivaylo Penev</p> <p>1. Simulating an Lack of Phase Fault on SynRM and Integrate Results with Machine Learning, Nikolay Djagarov, Hristo Milushev and Georgi Enchev (8915)</p> <p>2. Detection of Cyber Attacks in Self-Driving Vehicles By Machine Learning, Ivaylo Penev, Kristian Ivanov, Georgi Kostadinov and Zahari Stoyanov (4042)</p> <p>3. Comparative Analysis of the Bernoulli and Multinomial Naive Bayes Classifiers for Text Classification in Machine Learning, Neli Kalcheva, Ginka Marinova and Maya Todorova (3558)</p> <p>4. Detailed investigation of ML algorithms for diagnostics of IM on board vessel, Georgi Enchev (6257)</p>	<p>10:00 – 11:30 SESSION B1</p> <p>“CONTROL THEORY”</p> <p>Chairman: Aleksandra Grancharova</p> <p>1. Model-free non-singular fast terminal sliding mode controller using extended sliding mode observer for series elastic actuator-based robotic arm, Hongfei Sun, Haoping Wang and Yang Tian (7330)</p> <p>2. Synchronization of Chaotic Systems Using Novel Sliding Mode Neural Network Controller, Junhong Xie, Alexandra Grancharova and Liping Fan (8369)</p> <p>3. Fuzzy-logic Energy Management Strategy of Fuel Cell Hybrid Electric Vehicle Based on Whale Optimization Algorithm, Yuxuan Liu, Xuejun Zong, Kan He, Lian Lian and Yifei Sun (3830)</p> <p>4. A Compact and Secure Access Control Solution Based on a Deterministic Finite Automaton, Akbota Kulzhanova, Timur Bakibayev, Nurassyl Kerimbayev, Kalinka Kaloyanova and Diana Rakhimova (813)</p>
<p>11:30 – 13:00 SESSION A2</p> <p>“CLASSIFICATION AND VERIFICATION PROBLEMS”</p> <p>Chairman: Valentina Markova</p> <p>1. Study of the K-Nearest Neighbors Method with Various Features for Text Classification in Machine Learning, Neli Kalcheva, Maya Todorova and Ivaylo Penev (7117)</p> <p>2. Comparing Accuracy and Time of Support Vector Machine with Different Kernels for Handwritten Digits Classification, Neli Kalcheva, Maya Todorova, Ginka Marinova and Ivaylo Penev (4448)</p>	<p>11:30 – 13:00 SESSION B2</p> <p>“CONTROL APPLICATION”</p> <p>Chairman: Nencho Deliiski</p> <p>1. Development of a Microcontroller Based Automated Greenhouse Cultivation System for Mushrooms – Hardware, Hristo Kilifarev and Delyan Genkov (3709)</p> <p>2. Development of a Microcontroller Based Automated Greenhouse Cultivation System for Mushrooms – Software, Hristo Kilifarev and Delyan Genkov (6104)</p>

<p>3. Development of a Java Syntax Analyzer for C/C++ code recognition, Gergana Spasova and Iliyan Boychev (8569)</p> <p>4. Automated Verification of the Program Code in The Development Process According to Team Defined Rules, Velislav Kolesnichenko, Hristo Nenov and Donika Stoyanova, (9807)</p>	<p>3. Computing the Heat Balance of Boiling Pits during Defrosting of Frozed Logs in them, Mincho Hadjiski, Nencho Deliiski, Pavlin Vitchev and Dimitar Angelski (121)</p> <p>4. Reversing BLE Remote Control Protocols of Dual Channel LED Lamps with CCT and Illumination Control, Rostislav Kandilarov and Yordan Yordanov (8303)</p>
<p>13:00 – 14:00 LUNCH in the UNIVERSITY CANTEEN</p>	
<p>14:00 – 15:30 SESSION A3</p> <p>“INTELLIGENT CONTROL SYSTEMS”</p> <p>Chairman: Nikola Nikolov</p>	<p>14:00 – 15:30 SESSION B3</p> <p>“INTELLIGENT COMPUTER SYSTEMS”</p> <p>Chairman: Ventsislav Nikolov</p>
<p>1. Control of ROV Thrusters via Discrete Modal State Controller, Nikola Nikolov, Ivan Grigorov and Konstantin Chterev (7970)</p> <p>2. Development of a Recipe Analysis System for Technological Processes Controlled by PLCs, Iliyan Boychev and Gergana Spasova (1455)</p> <p>3. ICPGF: An Industrial Control Protocol Format-Aware and Feedback-Guided Fuzzing, Xuejun Zong, Bowei Ning, Guogang Wang, Kan He, Lian Lian and Yifei Sun (3220)</p> <p>4. Integrated Environment for Monitoring Data from Wireless Sensor Technologies for IoT, Aydan Haka, Diyan Dinev, Veneta Aleksieva and Hristo Valchanov (4359)</p>	<p>1. Improving the process of training staff in software companies through specialized software, Slavka Stamenova (5744)</p> <p>2. Towards blockchain wallets classification and implementation, Ivan Popchev, Irina Radeva and Miroslava Dimitrova (8327)</p> <p>3. Semantic interoperability as a tool for the management of an e-Governance project, Lyubo Blagoev, Rumen Trifonov and Kamen Spassov (6743)</p> <p>4. Hamming Code: An Analysis of its Reliability and Efficiency in Computer Networks, Alla Levina and Nawras H. Sabbry (109)</p>
<p>15:30 – 17:00 SESSION A4</p> <p>“ADVANCED INDUSTRIAL CONTROL”</p> <p>Chairman: Mariela Alexandrova</p>	<p>15:30 – 17:00 SESSION B4</p> <p>“ADVANCED COMPUTING 1”</p> <p>Chairman: Georgi Tsochev</p>
<p>1. Software system for determining and visualizing locations and routes of underwater robots, Milena Karova and Ivaylo Penev (2201)</p>	<p>1. Accessible UX/UI design, Todor Todorov and Juliana Dochkova-Todorova (9496)</p> <p>2. Android Agile Test-Driven Development, Mohammed Alimam, Rand Kouatly and Manish Kaushik (8395)</p>

<p>2. Visual Servoing in Door Opening Task for Omnidirectional Mobile Manipulator, Tihomir Stoyanov, Vasil Popov, Andon Topalov, Sevil Ahmed-Shieva, Nikola Shakev and Bozhidara Nedelcheva (1909)</p> <p>3. Digitalization and Sustainable Development in the Creation and Operation of Automation and Control Systems, Alexander Georgiev, company presentation of Rittal EOOD - Bulgaria, part of FLG.</p> <p>4. Industrial Cybersecurity and how Regulation Support Industrial Manufacturing, Nikola Petkov, Anton Naumov, company presentation of Siemens EOOD, Digital Industries.</p>	<p>3. Analysis of source code based on changes in its state over time – using user behavior models, Mihail Petrov and Vladimir Valkanov (535)</p>
<p>17:00 – 17:30 COFFEE BREAK</p>	
<p>17:30 – 19:00 SESSION A5</p> <p>“ADVANCED ANALYSIS AND CONTROL OF ELECTRICAL DRIVES”</p> <p>Chairman: Nikolay Djararov</p> <p>1. Modeling and Analysis of Shipboard DC Grid System, Nikolay Djararov and Dimitar Tsvetanov (6507)</p> <p>2. Analysis of the induction motor load characteristics at different frequencies, Marin Todorov, (1011)</p> <p>3. Migration form PLC-5 to ControlLogix and Improvement of an Excavator Positioning System Using Frequency Converter and Induction Motors, Plamen Bahov (9905)</p> <p>4. Analysis of the induction motor losses and T-equivalent parameters at different frequencies, Marin Todorov, Marin Marinov and Maik Streblau (5426)</p> <p>5. Equipment and Methodology for EV Battery Testing, Viktor Mashkov and Milena Karova (9261)</p>	<p>17:30 – 19:00 SESSION B5</p> <p>“ADVANCED COMPUTING 2”</p> <p>Chairman: Idilia Batchkova</p> <p>1. Development of an Ontology for Bulgarian Wild, Cultivated and Protected Flora, Zornica Radeva, Asya Stoyanova-Doycheva, Ivan Popchev and Stanimir Stoyanov (6276)</p> <p>2. Development of an ontology for Bulgarian soil types, Asya Stoyanova-Doycheva, Sebiha Madanska and Sheban Bilyanov (2363)</p> <p>3. Pareto Optimal Solutions of the Biobjective Bottleneck Assignment Problem, Lasko Laskov and Marin Marinov (2082)</p> <p>4. Software for animation and graphic visualization of mechatronic elements and control process of FMS, Javanshir Mammadov, Gafar Atayev, Ulduz Agayev, Sabina Aliyeva, Tarana Safarova and Agil Huseynov (205)</p>
<p>19:00 COCKTAIL in the NUK gallery</p>	

Friday, October 6th

Stream 1 (Conference Hall HYK)

09.00 - 09:45 PLENARY SESSION (PS)

Chairman: Todor Ganchev

The Artificial Intelligence Perspective



Arthur Kordon

Kordon Consulting LLC

09.45 - 10:00 DISCUSSION

Stream 1 (In attendance) (Room A – Hall 109TB)	Stream 2 (Online) (Room B)
10:00 – 11:30 SESSION A6 “INTELLIGENT POWER CONTROL SYSTEMS” Chairman: Bohos Aprahamyan	10:00 – 11:30 SESSION B6 “ARTIFICIAL INTELLIGENCE 1” Chairman: Valeri Mladenov
1. Exogenous Disturbance Observer-based Distributed Bipartite Consensus of Nonlinear Multiagent Systems with Multiple Time-varying Delays , Zhen Tang, Ziyang Zhen, Zhengen Zhao and Geert Deconinck (8725) 2 Estimation of Power Consumption for an Electric Vehicle Through Variable Parameter Modelling , Viktor Mashkov and Milena Karova (2275)	1. Multivalued Network Logic with One Real and Two Imaginary Logic Structures , Vassil Sgurev and Lyubka Doukovska (692) 2. Unraveling the Elements of Effective Altruistic Appeals through Machine Learning and Natural Language Processing , Sourav Yadav, Sankalp Arora, Akash Kumar and Kaveri Verma (8061)

<p>3. Improving Power Quality in Shipboard Power System using a Static Synchronous Compensator: A Simulation Study, Nikolay Djagarov and Dimitar Tsvetanov (7343)</p> <p>4. Investigation of Power Quality Using a Laboratory Experimental Setup of a Shipboard Power Plant, Nikolay Djagarov and Dimitar Tsvetanov (4341)</p>	<p>3. Comparative Analysis of Different Wavelet Transforms for Noise Reduction in CT Images, Miroslav Petrov (7505)</p>
<p>11:30 – 13:00 SESSION A7</p> <p>“AI-BASED PERSONALIZED EDUCATION”</p> <p>Chairman: Vladimir Jotsov</p>	<p>11:30 – 13:00 SESSION B7</p> <p>“ARTIFICIAL INTELLIGENCE 2”</p> <p>Chairman: Valeri Mladenov</p>
<p>1. The use of mobile technologies in education with an emphasis on a student-centered approach, Vladimir Jotsov, Gulnar Madyarova, Zhanat Umirzakova, Aliya Akramova, Galina Tkach, Nurassyl Kerimbayev and Nurbol Beisov (6586)</p> <p>2. Recursive Estimation Library For Education, Ivan Grigorov, Nasko Atanasov and Nikola Nikolov (5453)</p> <p>3. Compact EEG Features for Person Identification, Firgan Feradov and Todor Ganchev (553)</p>	<p>1. Memristor-Based Neural Network Implementation with Adjustable Synaptic Weights in LTSPICE, Valeri Mladenov, Georgi Tsenov and Stoyan Kirilov (9736)</p> <p>2. Network Intrusion Detection through Classification Methods and Machine Learning Techniques, Dimitrios Simeonidis, Pavel Petrov and Jordan Jordanov (8686)</p> <p>3. Predicting High-Resolution Maps of Atmospheric Formaldehyde Concentration Using Vision Transformers, Ryan Rad (5291)</p>
<p>13:00 – 14:00 LUNCH in the UNIVERSITY CANTEEN</p>	
<p>14:00 – 15:30 SESSION A8</p> <p>“ARTIFICIAL INTELLIGENCE 3”</p> <p>Chairman: George Mengov</p>	<p>14:00 – 15:30 SESSION B8</p> <p>“INTELLIGENT DIAGNOSIS IN HEALTH CARE”</p> <p>Chairman: Tania Pencheva</p>
<p>1. A Neural Model Forecasts Macroeconomic Indicators, Iliyan Nenov, Ralitsa Simeonova-Ganeva, Kaloyan Ganev and George Mengov (3023)</p> <p>2. Agent Irrationality in Socio-Economic Choices, Anton Gerunov, Iliya Atanasov and George Mengov (6934)</p>	<p>1. Diagnosing diseases for Prostate Cancer Prediction Using Hybrid Learning, Sathesh Abraham Leo Ebi (5066)</p> <p>2. Autism Spectrum Disorder Detection through Facial Analysis and Deep Learning: Leveraging Domain-Specific</p>

<p>3. Efficient Generative Adversarial DAG Learning with No-Curl, Hristo Petkov and Feng Dong (4638)</p> <p>4. An Algorithm for Random Tessellation using a Steppe Fire Model, Ognyan Zhelezov and Valentina Petrova (8835)</p>	<p>Variations, Anupam Agrawal and Krishna Sai Koppula (8527)</p> <p>3. A model of a two-stage classification system for glial tumors in magnetic resonance imaging, Miroslav Petrov (4801)</p> <p>4. Robust Intelligent System for COVID-19 Detection using CT-Scan, Ahmad Al Smadi, Ahed Abugabah and Ahmad Mohammad Al-Smadi (8814)</p>
<p>Stream 1 (Online) (Room A)</p>	<p>Stream 2 (Online) (Room B)</p>
<p>15:30 – 17:00 SESSION A9</p> <p>“INTELLIGENT ROBOTICS”</p> <p>Chairman: Andon Topalov</p>	<p>15:30 – 17:00 SESSION B9</p> <p>“ADVANCED MONITORING AND MODELING IN HEALTH”</p> <p>Chairman: Gancho Vachkov</p>
<p>1. Longitudinal Stability of Wheeled Mobile Robots - Permissible Forces and Accelerations, Stoyan Lilov, Vanya Markova, Nickolay Popov and Ventseslav Shopov (5819)</p> <p>2. Payload Stabilization in Multidirectional Robot Motion by Applying Trajectory Analysis Algorithm and Feedback Encoders, Tsvetelina Georgieva, Aleksandar Ivanov and Anton Anchev (7328)</p> <p>3. An application of artificial potential functions method in the robotic formation control, Vanya Markova and Ventseslav Shopov (2677)</p> <p>4. Intelligence in Human-Robot Collaboration – Overview, Challenges and Directions, Katya Madzharova-Atanasova and Nikola Shakev (3955)</p>	<p>1. Monitoring heart rate and udder surface temperature in dairy cows under heat stress conditions by infrared thermography, Hristo Hristov and Toncho Penev (415)</p> <p>2. Towards Enhanced Well-being: Monitoring Stress and Health with Smart Sensor Systems Muhammad Moazam Shahid, Georgina Enuwa Agada, Mohammed Kayyali, Isibor Kennedy Ihianle and Pedro Machado (1097)</p> <p>3. Model-free based neural network time delay estimation control for a 3-DOF ankle exoskeleton, Hao Gu, Yang Tian and Haoping Wang (3062)</p> <p>4. Intelligent Triage: Integrating Artificial Intelligence, Queuing Theory and Game Theory for Automated Patient Prioritization in Infectious Disease Wards, Angel Ivanov (7023)</p>
<p>17:00 – 17:30 COFFEE BREAK</p>	

<p>17:30 – 19:00 SESSION A10</p> <p>“ADVANCED ROBOTIC APPLICATION”</p> <p>Chairman: Nikola Shakev</p>	<p>17:30 – 19:00 SESSION B10</p> <p>“ADVANCED MEASUREMENT APPLICATION 1”</p> <p>Chairman: Kosta Boshnakov</p>
<p>1. Use of KUKA KR300 Industrial Robot in Electric Arc Furnace Operation, Georgi Georgiev, Nikolay Todorov and Alexandra Grancharova (8847)</p> <p>2. An Object Detection And Tracking Approach To Control Of a Mobile Agriculture Robot, Vladimir Kotev, Ivan Ivanov, Georgi Komitov, Georgi Stanchev and Kostadin Kostadinov (1059)</p> <p>3. Comparative analysis of algorithms for wheat weed recognition, Asya Toskova and Borislav Toskov (2636)</p> <p>4. Studying the influence of working fluid temperature on the performance of an electrohydraulic servo system in dynamic mode, Stanimir Yordanov, Krasimir Ormandzhiev, Georgi Mihalev, Krasen Kostov and Veselin Mitev (1102)</p>	<p>1. Impact Evaluation of the Optical Devices for Obtaining Soil Color Characteristics, Antonina Mihaylova, Tsvetelina Georgieva and Plamen Daskalov (3866)</p> <p>2. Cultivator-based soil density measurement sensor, Asparuh Atanasov, Svilen Stoyanov and Desislava Mihaylova (5700)</p> <p>3. An Expert System for the Diagnosis of Livestock Poisoning, Veneta Tabakova-Komsalova, Stanimir Stoyanov, Asya Stoyanova-Doycheva, Ivan Stoyanov, Lyubka Doukovska and Atanas Dukovski (5961)</p> <p>4. Simple conditioning interfaces for strain measurement, Desislava Mihaylova, Svilen Stoyanov, Asparuh Atanasov, Svetlozar Zahariev, Angel Marinov and Kaloyan Solenkov (9411)</p>
<p>19:00 GALA DINNER in the Old Chinar restaurant</p>	

Saturday, October 7th

Stream 1 (Online) (Room A)	Stream 2 (Online) (Room B)
<p>09:00 – 10:30 SESSION A11</p> <p>“INTELLIGENT COMMUNICATION”</p> <p>Chairman: Ivan Garvanov</p> <p>1. Investigation of Underwater Packet Radio Communication at 433 MHz, Nikolai Kolev, Darin Peev and Neli Stoycheva (8466)</p> <p>2. Mobile application for creating and exporting geofences, Victoria Velkova and Rosen Ivanov (2983)</p> <p>3. Geocodes in Geographic Information Systems, Pavel Petrov (5801)</p> <p>4. Drone Detection Approach Based on Radio Frequency Detector, Ivan Garvanov, Denislav Kanev, Magdalena Garvanova and Vladimir Ivanov (551)</p>	<p>09:00 – 10:30 SESSION B11</p> <p>“AI TECHNOLOGIES BASED LEARNING 1”</p> <p>Chairman: Margarita Todorova</p> <p>1. Using Big Data and Hadoop in the Student Learning Process - Enhancing the Educational Process through Real Experience, Irena Valova (3719)</p> <p>2. Implementing Gamified Learning in University Environment, Milen Sotirov, Valentina Petrova and Donika Nikolova-Sotirova (5502)</p> <p>3. Prolog Education in Selected High Schools in Bulgaria, Veneta Tabakova-Komsalova, Ivan Stoyanov, Laska Kostadinova-Tzankova, Atanas Dukovski and Tsvetomira Ivanova (7849)</p> <p>4. STEM educational kit for assistance of individuals with special needs, Todor Todorov and Pajtim Vela (2949)</p>
<p>10:30 – 12:00 SESSION A12</p> <p>“ADVANCED PROCESS CONTROL”</p> <p>Chairman: Mariela Alexandrova</p> <p>1. IEC/EN 62264 Energy-based Restriction Knapsack Optimization Scheduling for Wood Processing SME, Plamen Vasilev, Tsvetelina Ivanova and Yordan Belev (6105)</p> <p>2. Pareto Optimal Solutions of the Minimal Cost Minimal Time Assignment Problem, Lasko Laskov and Marin Marinov (2438)</p> <p>3. Steady State Optimization and Model</p>	<p>10:30 – 12:00 SESSION B12</p> <p>“AI-TECHNOLOGIES BASED LEARNING 2”</p> <p>Chairman: Margarita Todorova</p> <p>1. System Tempura - a modern approach for describing and managing temporal processes in a virtual educational space, Mihail Petrov and Vladimir Valkanov (8903)</p> <p>2. The Nine-Steps Gamification Process: Increasing Student Engagement in LMS, Milen Sotirov and Valentina Petrova (1540)</p>

<p>Predictive Control of a Tubular Reactor, Alexandra Grancharova, Junhong Xie and Jus Kocijan (5360)</p> <p>4. Technological Machines Diagnostics of Grain Processing Enterprises as the Object of Automation, Palvan Kalandarov, Shakhnoza Ubaydullayeva, Nikola Nikolov, Aziz Hayitov and Husen Sharifov (8996)</p>	
<p>12:00 – 13:00 LUNCH</p>	
<p>13:00 – 14:30 SESSION A13</p> <p>“MODELING AND CONTROL OF POWER SYSTEMS”</p> <p>Chairman: Kamen Perev</p> <p>1. Model Predictive Control for a Single Machine Infinite Bus Power System of Full and Reduced Order, Andrey Yonchev and Kamen Perev (3181)</p> <p>2. Modelling of grid-connected PV-systems using real meteorological data, Svetlozar Zahariev, Desislava Mihaylova, Angel Marinov and Kaloyan Solenkov (8181)</p> <p>3. Study of output mechanical energy, developed by a small permanent magnet direct current motor, using simulations of linear motor models, Nickolay Popov, Stoyan Lilov, Ventseslav Shopov and Vanya Markova (4458)</p> <p>4. Generation of Electricity Using Compression Piezoelectric Harvesters, Rummyana Stoyanova, Velimira Todorova and Dimo Kolev (5848)</p>	<p>13:00 – 14:30 SESSION B13</p> <p>“AI APPLICATION IN SOCIAL SYSTEMS”</p> <p>Chairman: Kamen Spasov</p> <p>1. A Deep Learning Wheat-Weed Dataset, Asya Toskova and Borislav Toskov (8692)</p> <p>2. Opportunities and Challenges of Using Artificial Intelligence in Energy Communities, Vitali Atias (9616)</p> <p>3. An Evaluation of Web3 Concepts and Technologies and Relation with Digital Forensics, Blerim Krasniqi and Eliza Stefanova (7407)</p>
<p>14:30 – 16:00 SESSION A14</p> <p>“ADVANCED MEASUREMENT APPLICATION 2”</p> <p>Chairman: Kosta Boshnakov</p>	

<p>1. Research and Analysis of the Method for Measuring the Moisture Content of Cottonmaterials at Ultrahigh Frequencies, Palvan Kalandarov, Khasan Turkmenov, Shakhnoza Ubaydullayeva, Nikola Nikolov and Mariela Alexandrova (134)</p> <p>2. Automation of Technological Processes for Controlling Grain Moisture in the Flow, Palvan Kalandarov, Shakhnoza Ubaydullayeva, Rano Gaziyeva, Nikola Nikolov and Mariela Alexandrova (2311)</p> <p>3. Compensation of the Temperature Impact on the Characteristics of a Titania-Silica Thin Film Humidity Sensor element, Stefan Ivanov, Nedyu Nedev and Zvezditsa Nenova (6509)</p> <p>4. Multisensor Sunflower Oil Quality Assessment System Based on "Electronic Nose", Stefan Ivanov, Todor Todorov, Toshko Nenov and Jacek Wilk-Jakubowski (120)</p>	
<p>16:00 – 16:15 CLOSING CEREMONY - Stream 1 (In attendance) (Room A – Hall 109TV)</p>	