IEEE INTERNATIONAL CONFERENCE AUTOMATICS AND INFORMATICS'2021 (ICAI'21), 30 September – 3 October 2021 (ONLINE)

http://icai-conf.org

CONFERENCE PROGRAM

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

Thursday, September 30th

09.00 - 09.15 WELCOME AND OPENING CEREMONY
Stream 1

09.15 - 09:50 PLENARY SESSION (PS)
Stream 1
Chairman: Kosta Boshnakov

How to Become an Effective Data Scientist?
Arthur Kordon
Kordon Consulting LLC

09.50 - 10:00 DISCUSSION IN THE PLENARY SESSION

Stream 1 (Track A)		Stream 2 (Track B)
10.00 - 12.00 SESSION A1 **"CONTROL THEORY"** **Chairman: Alexandra Grancharova**		**10.00 - 12.00 SESSION B1** **"COMPUTER SCIENCE"** **Chairman: Peter Dragnev**
1. Multi-output identification and LQG control of a two-wheeled robot (49) Tsonyo Slavov, Petko Petkov, Sherif Sherif and Jordan Kralev **2. Nonlinear Controller Design via Transformation into Reduced Generalized Observer Canonical Form** (4) Valentin S. Petrov		**1. Blockchains in Enterprise global risk management** (156) Irina Radeva, Ivan Popchev and Veneta Velichkova **2. Optimizations in computing the algebraic normal form transform of Boolean functions** (29) Maria Pashinska-Gadzheva, Valentin Bakoev, Iliya Bouyukliev and Dusan Bikov

3. Transformation of Nonlinear Systems into Output-Feedback Canonical Form (5)
Valentin S. Petrov

4. Gramians computation for hyperbolic distributed parameter systems (117)
Kamen Perev

5. Adaptive state controller with suspension of the recurrent estimation process (157)
Nikola Nikolov and Mariela Alexandrova

6. Nonlinear Model Predictive Control of the Depth of Hypnosis during Anesthesia in the Presence of Uncertainty (101)
Alexandra Grancharova and Ivana Valkova

7. Approach for Performance Assessment of a Control Systems with Uncertain Parameters (81)
Vesela Karlova-Sergieva, Nina Nikolova and Desislava Stoitseva-Delicheva

8. Study of fractal regulators (26)

Boris Grasiani

3. Effectiveness of Using Codes With a Sparse Check Matrix for Protection against Algebraic Manipulations (18)
Alla Levina, Gleb Ryaskin, Sergey Taranov and Anna Polubaryeva

4. On the Study of the n-dimensional Boolean Cube in the Undergraduate Programs in Computer Science (13)
Valentin Bakoev

5. Codes in Star and Bubble-sort graphs (14)
Ivan Mogilnykh

6. New direction in Cryptography: Homomorphic Encryption (47)
Alla Levina, Victor Kadykov and Dmitrii Kaplun

7. On intersection property of Reed - Muller like codes (17)
Faina Solov'Eva

8. Shader Injection for Instanced 3D Models (46)
Pavel Boytchev and Svetla Boytcheva

12.00 - 12.15 BREAK

12.15 - 13.45 SESSION A2

"CONTROL SYSTEMS"
Chairman: Idilia Batchkova

1. Information Modeling of Cyber-Physical Systems using OPC-UA (163)
Tsvetelina Ivanova, Idilia Batchkova and Daniela Gocheva

2. Comparative analysis of control quality between PI and FUZZY controller of experimental electrohydraulic servosystem (112)
Stanimir Yordanov, Krasimir Ormandzhiev and Georgi Mihalev

3. A Self-Tuning Fuzzy PID Controller for SEPIC Based on Takagi-Sugeno Inference System (78)
Elvin Yusubov and Lala Bakirova

4. Impulse Control of DC Motor with Addition of Energy (134)

12.15 - 13.45 SESSION B2

"SYSTEM SCIENCE"
Chairman: Valeri Mladenov

1. Expert information, economic rumors, and market self-organization: A lab study (126)
Ilia Atanasov, George Mengov and Anton Gerunov

2. Algorithmic method to solve three-state systems (123)
Jia Jing Choy, Kiril Tenekedjiev, Boyan Mednikarov and Natalia Nikolova

3. Influenceof the Individual Competence of the Experts on the Multicriteria Subjective Assessment (161)
Kalina Semova and Hristo Hristov

4. ZigBee Simulation Framework for Studying the Formation of a Hierarchical Tree Topology (57)

Svetoslav Ivanov, Yanka Ivanova and Kancho Peichev **5. An UKF-based Extremum Seeking Control of Two-Stage Anaerobic Digestion Process** (8) Dandan Xu, Haoping Wang, Yang Tian, Nicolai Christov, Lyudmila Kabaivanova and Ivan Simeonov **6. Implemented PLC System Controlling the Air Purification in a Hospital, Operating With Radioactive Isotopes** (68) Veselin Vasilev and Bohos Aprahamian	Aydan Haka, Veneta Aleksieva and Hristo Valchanov **5. Maximal covering of a point set by a system of circles via simulated annealing** (44) Stefan Filipov, Stefan Panov, Fani Tomova and Vanya Kuzmanova **6. Complex multivalued hierarchical logic with one real and two imaginary logical structures** (160) Vasil Sgurev
13.45 - 14.30 LUNCH	
14.30 - 16.30 SESSION A3 **"DATA PROCESSING"** **Chairman: Grisha Spasov**	**14.30 - 16.30 SESSION B3** **"COMPUTER NETWORKS SIMULATION"** **Chairman: Hristo Valchanov**
1. Content-Based Image Retrieval: Impact of image resolution on the search accuracy and results ordering (154) Miroslav Marinov, Yordan Kalmukov and Irena Valova **2. Reducing the Estimation Error of the Measure of Proximity Between Objects in Pattern Recognition** (76) Rahim Mammadov, Elena Rahimova and Gurban Mammadov **3. A Hybrid Model for Structuring, Storing and Processing Distributed Data on the Internet** (155) Velin Hadzhiev and Aldeniz Rashidov **4. Research of the optimization techniques applied to an integrating period meter** (82) Svilen Stoyanov and Desislava Mihaylova **5. Study of the specifics of the spectral reflections of different varieties of cereals harvest 2021, obtained from the visible and near infrared (NIR) frequency range** (80) Radko Mihajlov, Asparuh Atanasov, Hristo Stoyanov and Svetlana Paskaleva **6. PS-Dash - Analysis, Monitoring and Visualization of Network Measurements** (130)	**1. Designing a Client Tier for the IoT Platform EMULSION** (59) Ivan Ganchev, Zhanlin Ji and Máirtín O'droma **2. Designing a Modelling & Simulation Tier for the IoT Platform EMULSION** (53) Ivan Ganchev, Zhanlin Ji and Máirtín O'droma **3. Designing a Sensor Tier for the IoT Platform EMULSION** (73) Ivan Ganchev, Zhanlin Ji and Máirtín O'droma **4. Simulation Environment for Bluetooth Low Energy Network** (20) Aydan Haka, Yordan Yordanov, Veneta Aleksieva and Hristo Valchanov **5. Simulation Software For Finding Best Route in LoRaWan Network** (108) Diyan Dinev, Veneta Aleksieva, Hristo Valchanov and Kaloyan Genov **6. LoRaWan Network Mobility Software Simulation Tool** (128) Diyan Dinev, Veneta Aleksieva, Hristo Valchanov and Kaloyan Genov **7. Model and prototype of interactive assistant for compliant interface development – MayUI tool** (48) Maya Stoeva

Petya Vassileva, Alexander Penev, Shawn McKee and Ilija Vukotic

7. Removal of Ocular Artifacts from the Electroencephalogram Signal Flow using Median Filtering (135)

Pavel Lyakhov, Maria Kiladze, Alexander Voznesensky and Dmitrii Kaplun

16.30 - 16.45 BREAK

16.45 - 18.45 SESSION A4

"E-LEARNING"

Chairman: Angel Smrikarov

1. Conceptual Model to Evaluate the Learning Process Effectiveness, Extended with Artificial Intelligence Technologies (159)
Mincho Hadjiski and Rossitza Kaltenborn

2. Development of a Virtual Conference Online Platform for Adaptive Learning (144)
Vladimir Jotsov, Aliya Akramova, Galina Tkach, Nurassyl Kerimbayev, Gulnar Madyarova, Nurbol Besot and Madina Bolyskhanova

3. Selecting a platform for distance learning in an electronic environment (113)
Monika Petrunova, Atanas Atanassov and Dimitar Pilev

4. Secondary effects converted to useful knoledge in e-Learning system (32)
Georgi Cholakov

5. The role of information systems in the activities of the State Examination Center (94)
Maleyka Abbaszade, Vugar Akbarov and Khatayi Mammadov

6. Comparative Analyses of Li-Fi Simulators for Purposes of the Education (109)
Diyan Dinev, Veneta Aleksieva and Hristo Valchanov

7. Problems of the E-learning on computer engineering courses in the context of Covid19 Pandemy (110)
Orlin Tomov

16.45 - 18.45 SESSION B4

"APPLICATION I"

Chairman: Kosta Boshnakov

1. Application of Method for Constructing a Complex Hierarchical Logic in Intelligent Agriculture Context (149)
Todorka Glushkova, Stanimir Stoyanov, Vassil Sgurev, Lyubka Doukovska and Atanas Dukovski

2. Architecture of a Knowledge Base in Smart Crop Production (150)
Asya Stoyanova-Doycheva, Vanya Ivanova, Lyubka Doukovska, Veneta Tabakova, Irina Radeva and Savanna Danailova

3. Ambient-oriented CCA Modeling in Agriculture (151)
Todorka Glushkova, Stanimir Stoyanov, Konstantin Rusev, Irina Krasteva and Nevena Moraliyska

4. An Event Model for Smart Agriculture (152)
Stanimir Stoyanov, Asya Stoyanova-Doycheva, Vanya Ivanova, Veneta Tabakova-Komsalova, Vladimir Monov and Zornica Radeva

5. Infrastructure Model of Intelligent Pasture (153)
Evgeni Valchev, Jordan Todorov, Vladimir Monov and Borislav Dimitrov

8. E-Learning - the practice in industrial enterprises (9)

Toni Mihova, Ivelina Ivanova and Valentina Nikolova Alexieva

Friday, October 1th

Stream 1 (Track C)		Stream 2 (Track D)
9.00 - 11.00 SESSION C1 **"ARTIFICIAL INTELLIGENCE"** **Chairman: Mincho Hadjiski**		**9.00 - 11.00 SESSION D1** **"ROBOTICS"** **Chairman: Gancho Vachkov**
1. Hybrid System for Emotion Recognition Based on Facial Expressions and Body Gesture Recognition (83) Atanas Atanassov, Dimitar Pilev, Fani Tomova and Vanya Kuzmanova **2. Application of Facial Recognition with PCA and Raspberry Pi for Access Control to Luggage Lockers** (30) Tsvetelina Mladenova, Irena Valova and Nikolay Valov **3. Vulnerability Type Prediction in Common Vulnerabilities and Exposures Database with Ensemble Machine Learning** (92) Veneta Yosifova **4. A Novel approach to identify Build Failure Causes involving Machine Learning Techniques** (146) Saravanakumar C Shanmugam and Sivakartik Sreedhara **5. Defect inspection for front opening unified pods using a convolutional neural network** (79) Hao Min Chang, Chin Han Chang and Yu Bin Chen **6. Controlling Adaptation in Affective Serious Games** (139) Boyan Bontchev, Ivan Naydenov and Ilko Adamov **7. Path Planning and Collision Avoidance with Artificial Intelligence for a Quadrotor UAV** (133) Mehmet Karahan and Cosku Kasnakoglu		**1. Kinematic model and analysis of an anthropomorphic robotic finger** (111) Georgi Mihalev and Stanimir Yordanov **2. Evaluation of Search Strategy for Autonomous Rescue Mobile Robot** (23) Aydın Güllü and Hilmi Kuşçu **3. Modelling and Control of 2-DOF Underwater Manipulator in Presence of Disturbances** (106) Zhivko Zhekov and Nasko Atanasov **4. Extended Research of Neural Control System for 2-DOF Underwater Manipulator** (107) Zhivko Zhekov **5. Review and Analysis of Robotized Feeding Systems** (115) Elena Blagoeva, Boiko Karkov and Nikolay Stoimenov **6. Automatic Beacon Selection for Indoor Localization** (1) Rosen Ivanov

8. Modeling of a System for Studying of Biological Tissues With the Use of Augmented Reality (19)
Plamen Vasilev, Veronika Ivanova, Rumen Andreev and Ani Boneva

11.00 - 11.15 BREAK

11.15 - 13.15 SESSION C2

"COMPUTER TECHNOLOGIES"
Chairman: Milena Lazarova

1. Design of a Virtual Machine for Training Compilers (84)
Ivaylo Penev and Dimitar Dimitrov

2. Exceeding Information Targets in Fixed-Form Test Assembly (63)
Ivan Gospodinov, Emirate Karaibrahimova and Stefan Filipov

3. A Hot Decomposition Procedure: Operational Monolith System to Microservices (105)
Nikolay Ivanov and Antoniya Tasheva

4. Simple routing algorithm with link discovery between source and destination hosts in SDN networks (90)
Dimitar Todorov, Hristo Valchanov and Veneta Aleksieva

5. Shortest path routing algorithm with dynamic composite weights in SDN networks (10)
Dimitar Todorov, Hristo Valchanov and Veneta Aleksieva

6. Android Password Managers and Vault Applications: Comparative Security Analysis (12)
Petar Sabev and Milen Petrov

7. Analysis of 3D technologies for stereo visualization (41)
Penio Lebamovski and Penio Lebamovski

8. A New Model of Logo Generator (85)
Milena Karova, Ivaylo Penev, Ivelin Ivanov and Kaloyan Mitev

11.15 - 12.15 SESSION D2

"COMMUNICATION"
Chairman: Ivan Kurtev

1. Analysis of swarm application layer protocols (SALP) used in event-driven communication (15)
Antouan Anguelov, Roumen Trifonov and Ognian Nakov

2. Intelligent Management of IoT Devices with Limited Connectivity (62)
Borislav Toskov, Asya Toskova, Stoyan Bogdanov and Nina Spasova

3. Efficiency of data exchange of IoT communication protocols (69)
Nikolai Kaskatiiski and Luben Boyanov

4. Characterization of the communication traffic generated by power electronic devices (6)
Ivan Nedyalkov

12.15 - 13.15 SESSION D3

"COMPUTER NETWORKS"
Chairman: Roumen Trifonov

1. Analysis of Threats to a University Network Using Open Source Technologies (102)
Georgi Tsochev, Roumen Trifonov, Slavcho Manolov, Ognian Nakov and Svetoslav Spasov

2. Architectural Approach to Design of a Corporative Computer Network (136)
Krassimir Kolev

3. Intelligent IoT Gateway (61)
Borislav Toskov, Asya Toskova, Stoyan Bogdanov and Nina Spasova

4. Input Arbiter for Router Allocator in MPP Computers with Double-loop Hypercube Network Topology (75)
Milen Angelov

13.15 - 14.00 LUNCH

14.00 - 15.00 SESSION C3

"SOFTWARE SYSTEMS FOR INDUSTRIAL AUTOMATION"
Chairman: Nikola Nikolov

1. Productivity Improvement in a Class of CNC Machine Tools (16)
Marin Zhilevski, Mikho Mikhov and Madlena Zhilevska

2. IEC/EN 62264 Augmented Reality Manufacturing Operations Research in the scope of Reference Architecture Model for Industry 4.0 (58)
Plamen Vasilev

3. Software Systems and Technologies in The Conditions of Industry 4.0 (140)
Valentina Nikolova-Alexieva, Katina Valeva and Tania Gigova

4. Designing 3D-printer Models for Students with Vision Impairment or Low Vision (119)
Pavel Boytchev and Svetla Boytcheva

15.00 - 16.00 SESSION C4

"DIGITALIZATION OF SOCIETY"

Chairman: Krasimira Stoilova

1. Decision Support in Real Estate Investment by Portfolio Theory (50)
Todor Stoilov, Krasimira Stoilova and Miroslav Vladimirov

2. Bringing the Electronic Government to the Youth (148)
Galia Novakova Nedeltcheva, Kamen Spassov and Radoslav Chobanov

3. First steps towards Open Science in Albania (36)
Silvester Hasani, Eliza Stefanova, Krassen Stefanov and Atanas Georgiev

4. Technological space, the concept and capabilities (147)

Kiril Kirov and Kalin Proynov

14.00 - 16.00 SESSION D4

"APPLICATIONS II"
Chairman: Nencho Deliiski

1. Road traffic modelling and development of a specific traffic light control system (39)
Dian Dzhibarov and Ivan Grigorov

2. Cloud based architecture for Intelligent Transportation System (114)
Teodora Mecheva and Nikolay Kakanakov

3. Entropy and hierarchy of competition in the world semiconductor market (11)
Iliyan Petrov

4. Computing the Processing Medium Temperature and Heat Fluxes in the Beginning of Regimes for Autoclave Steaming of Frozen Wood Materials (27)
Mincho Hadjiski, Nencho Deliiski and Dimitar Angelski

5. Investigation of the Magnetic Forces in Drum Separator with Permanent Magnets (120)
Tatyana Dimova, Bohos Aprahamian, Maik Streblau and Marin T. Marinov

6. Determining the Magnetic Forces in a Suspention Type Separator with Permanent Magnets (145)
Tatyana Dimova, Bohos Aprahamian, Maik Streblau and Marin T. Marinov

7. Analysis of The Transient Process in a Direct Start-up of an Induction Motor, by Use of COMSOL Multiphysics (143)
Marin Todorov, Maik Streblau, Marin Marinov and Tatyana Dimova

8. Achieving Energy Efficient Household Equipment Through Application of Induction Hobs (118)

Yanita Slavova, Maik Streblau, Maria Marinova and Borislav Danov

16.00 - 16.15 BREAK

16.15 - 17.15 SESSION C5

"ANIMAL HUSBANDARY SMART AUTOMATION"
Chairman: Todor Stoilov

1. Intelligent Solutions for Risk Analysis in Animal Husbandry (21)
Stanislav Dimitrov, Todor Stoilov and Krasimira Stoilova

2. Integrated software solutions in animal husbandry (60)
Elisaveta Trichkova-Kashamova and Elena Paunova-Hubenova

3. Towards CPS/IoT System for Livestock Smart Farm Monitoring (137)
Kristina Dineva, Tatiana Atanasova, Plamen Petrov, Dimitar Parvanov, Gergana Mateeva and Georgi Kostadinov

4. Cost oriented software system for animal husbandry smart automation (99)
Stefan Chivarov, Nayden Chivarov, Denis Chikurtev and Matus Pleva

17.15 - 18.15 SESSION C6

"MODELING AND CONTROL OF DIESEL ENGINES"
Chairman: Kiril Tenekedjiev

1. Advanced mathematical model of slow speed diesel engine (70)
Hristo Milushev

2. Digital evaluation of the accuracy and sensitivity of a mathematical model of a slow speed marine diesel engine (71)
Hristo Milushev

3. Analysis of gas exchange of marine diesel engine by equilibration and minimization of deviations in the equilibrium states (88)
Georgi Enchev

4.Analysis the dynamics of a turbocharger using differential equations (89)
Georgi Enchev

16.15 - 18.00 SESSION D5

"SECURITY"
Chairman: Vladimir Jotsov

1. "Cyber-Security of Industrial Computer Systems" - Differentiation as a Separate Discipline (98)
Roumen Trifonov, Ognian Nakov, Slavcho Manolov, Georgi Tsochev and Galya Pavlova

2. Analysis of practical cyberattack scenarios for wind farm SCADA systems (97)
Evgeni Sabev, Roumen Trifonov, Georgi Tsochev, Galya Pavlova and Kamelia Raynova

3. Using Machine Learning Reacted with Honeypot Systems for Securing Network (103)
Georgi Tsochev, Maksim Sharabov and Aleksandar Georgiev

4. Machine Secret Key Recognition in a Homogeneous Environment (65)
Dimitar Todorov and Milena Karova

5. Vulnerabilities Space and the Superiority of Hackers (141)
Willian Dimitrov, Georgi Dimitrov, Kamen Spasov and Liliana Petkova

6. COVID-19 detection with X-Ray input data (142)
Miroslav Nikolov, Georgi Tsenov and Valeri Mladenov

18.15 - 18.30 CLOSING CEREMONY