	10.09 (Friday)	11.09 (Saturday)	12.09 (Sunday)	13.09 (Monday)
14:00	Opening Session	Regular Papers Session 2A	Plenary Session 3A	Plenary Session 4A
14:15	Plenary Session 1A			
15:00	Regular Papers Session 1A			Regular Papers Session 4A
15:30		Regular Papers Session 2B	Regular Papers Session 3A	
16:00				
16:30				Regular Papers Session 4B
17:00				
17:30			Regular Papers Session 3B	
18:00	Regular Papers Session 1B			
18:15		Plenary Session 2A		
19:00				Closing Session
20:00				

Local Time, Batumi GMT+4

FROM THE ORGANIZING COMMITTEE

We have great pleasure to invite you to 19-th 2021 IEEE EAST-WEST DESIGN & TEST SYMPOSIUM (EWDTS-2021)!

The purpose of the symposium is to coordinate and exchange experiences between leading scientific organizations and experts of the Eastern and Western Europe, as well as North America and other parts of the world, in the field of design, design automation and test of electronic circuits and systems.

From the one side, an overview of the state-of-the-art and of the most important progress trends of the industrial design and test will be presented by leading researchers and practitioners.

On the other side, an overview of recent achievements obtained by the scientists and technologists will be presented by the researchers and practitioners from countries in the region.

We are happy that IEEE EWDTS is becoming a world-renown event, as we have seen the interest of Eastern and Western scientists in mutual collaboration. As a result of this collaboration we can see the penetration of new technologies in the Eastern Europe market and educational system.

We would like to thank: Yervant Zorian, Victor Djigan, Dmitry Efanov, Nikolay Prokopenko for taking an active role in organizing the conference technical program, international activity in the field of higher education and support the preparation and operation of the symposium. The greatest appreciation to the official IEEE EWDTS – 2021 sponsors: IEEE, Computer Society, Test Technology Technical Council – TTTC.

We welcome all the participants of the symposium and wish you successful discussions in cyberspace!

SYMPOSIUM PROGRAM

First Day: September 10th, 2021 (Friday)

14:00 — 14:15 **Opening Session, Conference Hall**

Dr. Yervant Zorian — *General Chair, Chief Architect and Fellow at Synopsys, USA*

Vladimir Hahanov — *General Chair*

14:15 — 15:00 **Plenary Session 1A**

Moderator: Vladimir Hahanov

14:15 — 15:00 **Keynote Address**

On the Road from Classical to Quantum Communications...

Prof. Lajos Hanzo — *FREng, FIEEE, FIET, RS Wolfson Fellow, University of Southampton, United Kingdom*

Lajos Hanzo FREng, FIEEE, FIET, RS Wolfson Fellow, received his 5-year Master degree in electronics from the Technical University of Budapest in 1976, his doctorate in 1983 and his Doctor of Sciences (DSc) degree in 2004. During his career in telecommunications he has held various research and academic posts in Hungary, Germany and the UK. Since 1986 he has been

First Day: September 10th, 2021 (Friday)	
with the School of ECS, University of Southampton, UK, where he holds the Chair in Telecommunications. **Abstract:** The marriage of ever-more sophisticated signal processing and wireless communications has led to compelling 'telepresence' solutions - at the touch of a dialling key... However, the 'quantum' leaps both in digital signal processing theory and in its nano-scale based implementation is set to depart from classical physics obeying the well-understood laws revealed by science. We embark on a journey into the weird & wonderful world of quantum-physics, where the traveller has to obey the sometimes strange new rules of the quantum-world. Hence we ask the judicious question: can the marriage of applied signal processing and communications extented beyond the classical world into the quantum world?	
15:00 — 18:00	**Regular Papers Session 1A** **"Signal and Information Processing"** Moderators: Victor Djigan
	#81. Analysis of Pathologies on Endoscopic Images of the Stomach Using SSD and RetinaNet Neural Network Architecture *Vladimir Khryashchev, Anton Lebedev, Olga Stepanova and Anastasia Srednyakova*
	#82. Agricultural Fields Segmentation on Satellite Images Using Convolutional Neural Networks *Roman Larionov, Nikita Kotov, Andrey Priorov and Alexander Semenov*
	#31. Improvement of the Daugman method for non-reference assessment of image quality in iris biometric technology *Shavkat Fazilov and Ozod Yusupov*
	#68. Reception of QAM Signals with Pilots in Fast Fading Channels Using Partial GLRT *Alexander Sergienko*

First Day: September 10th, 2021 (Friday)	
	#69. Capacity Analysis of the Bordered Semicorrelated Multiuser Massive MIMO System with Complex Nakagami-m Fading Channel Coefficients *Aleksey Gvozdarev, Yury Bryukhanov, Aleksandra Alischyuk and Marina Kazakova*
	#50. Alamouti Scheme And Spatial Diversity MIMO Algorithms *Anton Strelnikov, Alexey Volkov, Alexander Bakhtin, Aleksandr Gorelik and Valeriy Kobzev*
	#30. A simple model of MESH routing protocols *Dmitriy Prozorov and Ekaterina Prokasheva*
	#43. Comparative Analysis of the Time and Frequency Domain Sampling Theorems *Gamlet S. Khanyan*
	#55. Sensitivity Analysis of the Square Frequency Response of IIR Digital Filters in Equivalent Direct Form *Vladislav Lesnikov, Tatiana Naumovich and Alexander Chastikov*
	#66. Simulation and generation of navigation signals with normalized distortions *Mikhail A. Zenchenko, Anton M. Kaverin and Andrey V. Kleopin*
	#48. Circular Adaptive Antenna Array *Victor Djigan*
18:00 — 20:00	**Regular Papers Session 1B** **"SoC Design & Test"** Moderator: Garegin Sargsyan
	#8. Data Compression in Diagnostics of Digital Devices *Dmitriy Speranskiy*
	#13. FSM-based Sequential Circuits Optimization by Changing Initial State of

First Day: September 10th, 2021 (Friday)	
	Specification *Aleksandr Tvardovskii, Natalia Shabaldina, Maxim Gromov and Svetlana Prokopenko*
	#19. UVM Verification IP for AXI *Vazgen Melikyan, Stepan Harutyunyan, Taron Kaplanyan and Artak Kirakosyan*
	#20. Design and Verification of Novel Sync Cell *Vazgen Melikyan, Taron Kaplanyan, Stepan Harutyunyan, Artak Kirakosyan, Arsen Momjyan and Vardan Amiryan*
	#1. Polynomial Codes Properties Application in Concurrent Error-Detection Systems of Combinational Logic Devices *Dmitry Efanov and Ruslan Abdullaev*
	#35. The Reliability Improvement Method of Modern Analog Integrated Circuits *Gegham Petrosyan*
	#36. Optimizing Components of Finite State Machines Composition Based on Don't Care Input Sequences in Hardware Implementation *Ekaterina Shirokova, Larisa Evtushenko and Andrey Laputenko*
	#2. Specifics of Error Detection with Modular Sum Codes in Concurrent Error-Detection Circuits Based on Boolean Complement Method *Dmitry Efanov, German Osadchy and Marina Zueva*

Second Day: September 11th, 2021 (Saturday)	
14:00 — 15:30	**Regular Papers Session 2A** **"Hardware Security and Design for Security",**

Second Day: September 11th, 2021 (Saturday)	
	"SoC Design & Test" Moderator: Dmitry Efanov
	#46. Simulation of Electromagnetic Emanation of Cryptographic ICs: Tools, Methods, Problems *Omar Alejandro Sosa, Zoya Dyka, Ievgen Kabin and Peter Langendörfer*
	#56. An In-Pandemic View on the Global Trends in Microelectronic Design and Market *Sergey Mosin and Maxim Kislyakov*
	#73. Control-Flow Integrity for Real-Time Operating Systems: Open Issues and Challenges *Vahid Eftekhari Moghadam, Marco Meloni and Paolo Prinetto*
	#84. Combined Use of Equivalent and Non-Equivalent Transformations of FPGA Program Code to Embedding Additional Security Data *Olena Ivanova, Oleksandr Drozd, Kostiantyn Zashcholkin and Yulian Sulima*
	#58. Federated Machine Learning Architecture for Searching Malware *Vladimir Hahanov and Alexandr Saprykin*
	#61. Malware Searching Methods at FML-Architecture *Vladimir Hahanov and Alexander Saprykin*
15:30 — 18:10	**Regular Papers Session 2B** **"SoC Design & Test"** Moderator: Eugenia Litvinova
	#76. Resilient Development of Models and Methods in Computing Space *Oleksandr Drozd, Andrzej Rucinski, Kostiantyn Zashcholkin, Oleksandr Martynyuk and Julia Drozd*

Second Day: September 11th, 2021 (Saturday)	
	#37. Using architecture simulation tool for memory subsystem evaluation in multi-core systems *Peter Chibisov, Nikita Grevtsev, Aleksey Kuleshov and Pavel Zubkovsky*
	#44. Automatically-Designed Fault-Tolerant Systems: Failed Partitions Recovery *Jakub Lojda, Richard Panek and Zdenek Kotasek*
	#39. Applying incompletely specified Boolean functions for Patch Circuit Generation *Anzhela Matrovosa and Victor Provkin*
	#42. SAT Solvers Application of Deriving All Test Pairs Detecting Robust Testable PDFs *Anzhela Matrosova, Valentina Andreeva and Vyacheslav Tychinskiy*
	#3. Application of Constant-Weight Code '1-out-of-4' while Synthesis of Self-Checking Combinational Devices *Dmitry Efanov and German Osadchy*
	#6. The Structures of the Fault-Tolerant Automation and Computing Devices Based on the Boolean Complement *Valery Sapozhnikov, Vladimir Sapozhnikov and Dmitry Efanov*
	#32. The Weight-Based Sum Codes in the Residue Ring by Arbitrary Modulus for Synthesis of Self-Checking Digital Computing Systems *Dmitrii Efanov and Artem Pashukov*
	#40. Recovery of Parallel Dataflow Computing System From Faults and Failures *Nikolay Levchenko and Dmitry Zmejev*
	#4. Standard Cell Library Enhancement For Mixed Multi-Height Cell Design Implementation *Suren Abazyan*

Second Day: September 11th, 2021 (Saturday)

#5. Hamming Distance Based Data Correction Combined With Low Power XOR Circuit
Ruben Musayelyan

18:15 — 19:00 Plenary Session 2A

Moderator: Vladimir Hahanov

18:15 — 19:00 Keynote Address

Lifecycle Challenges and Opportunities of Mission Critical SOCs

Dr. Yervant Zorian — *Chief Architect and Fellow at Synopsys, USA*

Third Day: September 12th, 2021 (Sunday)

14:00 — 15:30 Plenary Session 3A

Moderator: Vladimir Hahanov

14:00 — 14:45 Invited Talk

FinFET Integrated Circuits: Thermal Issues

Doctor of Sciences, Professor

Vazgen Melikyan — *Corresponding Member of RA NAS, Armenia*

Vazgen Sh. Melikyan, Professor, Corresponding Member of National Academy of Science of Armenia, Doctor of Technical Sciences, Honorable Scientist of Armenia, Director of Educational Department of Synopsys Armenia CJSC, Head of "Microelectronic Circuits and Systems" (MCS) Chair of National Polytechnic University of Armenia (NPUA).

Born in 1956. He has received diploma in Computer Science in Yerevan Polytechnic Institute in 1978 graduating from Cybernetics

Third Day: September 12th, 2021 (Sunday)

Department. He received his PhD degree in Moscow Engineering-Physics Institute in 1984, was conferred Academic rank of Associate Professor in Computer Science Supreme Certification Board in Moscow, 1985. He was granted the degree of Doctor of Technical Sciences in SEUA, Yerevan, 2006 and Academic rank of Professor in Technical Sciences in SEUA, Yerevan, 2006. In 2010 he was selected as an Academician of Engineering Academy of RA. In 2014 he was selected as a Corresponding Member of National Academy of Sciences of RA. He has been the head of various international projects. On September 18, 2007 by decree of RA President he has been conferred the title of Honorable Scientist of the Republic of Armenia. On April 10, 2010 by decree of RA President he has been conferred "President of the Republic Prize" in "Technical Sciences and Information Technologies" area. He has received gold medal from National Polytechnic University of Armenia, Yerevan State University, Russian-Armenian Slavonic State University and European University. He is an Honorable Professor of Moscow Institute of Electronic Technology (Russia), Xidian University (China), European University, etc. He is the author of 12 monographs, more than 300 scientific and 135 methodical publications, had more than 150 reports in international conferences. 65 PhD dissertations have been realized and successfully defended under his supervision.

Abstract: It is known that in the result of transistor scaling, a number of challenges have occurred in case of MOS transistors: the electrostatic field no longer planar, worsened channel modulation effect, threshold-voltage shift, increased leakage current, etc. That's why, starting with 14nm and smaller technology nodes, FinFET technology has been used. However in this case a series of difficulties arise, too: fin formation, variation, Vth tuning, etc. Thermal issues are especially important among those issues. In particular, as a result of thermal issues, such problems are more emphasized like the change of all parameters of a transistor in the result of self-heating, and aging as a consequence.

Third Day: September 12th, 2021 (Sunday)

14:45 — 15:30 Invited Talk

Automated Synthesis of Vulnerable Architectures

Paolo PRINETTO – *Full professor of Computer Engineering at the Dip. di Automatica e Informatica of Politecnico di Torino (Turin, Italy).*

His research interests include: Hardware Security & Trust, Digital Systems Design & Test, System Dependability, Emerging Memories, Reconfigurable System Design.
He is serving as Director of the Cybersecurity National Laboratory. From 2010 to 2014 he served as appointed member of the Scientific Committee of the French "Centre National de la Recherche Scientifique" (C.N.R.S.) and from 2000 to 2003 as elected chair of the IEEE - Computer Society TTTC: Test Technology Technical Council.
He is a golden core member of the IEEE Computer Society. His work was followed with more than 150 publications on high quality international conference and journals.

Abstract: Training in hardware security more and more exploits gamification as a key asset to attract and increase students' attention. Typical gaming-based approaches include Capture-the-Flag (CtF) challenges.
As the number of required hardware-based challenges increases, the task of preparing new stimulating scenarios becomes harder and harder. To make it easier, the availability of tools and environments capable of easily synthesizing new challenges is needed.

15:30 — 17:30 Regular Papers Session 3A
"SoC Design & Test"
Moderator: Eugenia Litvinova

#26. Overview of the Electronics Redesign of the multi-Needle Langmuir Probe System

Third Day: September 12th, 2021 (Sunday)	
	Candice Quinn, Sondre Slettemoen, Philipp Hafliger and Ketil Røed
	#25. Energy Analyze Tool for Renewable Energy Assited Data Centers *Furkan Gökçül, Vladimir Hahanov, Gül Nihal Güğül, Burak Behlül Ölmez and Mustafa Kuru*
	#33. The Hybrid Structure of a Self-Dual Built-In Control Circuit for Combinational Devices with Pre-Compression of Signals and Checking of Calculations by Two Diagnostic Parameters *Dmitry Efanov and Dmitry Pivovarov*
	#91. Model of Multiagent Cooperation for Behavioral Testing *Oleksandr Martynyuk, Oleksandr Drozd, Hanna Stepova, Thuong Van Bui, Dmitry Martynyuk and Lyudmila Sugak*
	#38. Application of Template Models for Current-Voltage Characteristics Approximation of Complementary MOSFETs *Alexandr M. Pilipenko*
	#49. GSM-based control and data collection system *Sergei Kalabanov, Rinat Shagiev and Rashid Ishmuratov*
	#70. Adaptive homing sequences for partial weakly-initialized observable FSMs *Evgenii Vinarskii, Aleksandr Tvardovskii and Nina Yevtushenko*
	#89. New Metric for Evaluating the Effectiveness of Redundancy in Fault-Tolerant Logic Circuits *Dmitry Telpukhov and Tatiana D. Zhukova*
	#22. Verifying multiple virtual networks in Software Defined Networks

Third Day: September 12th, 2021 (Sunday)	
	Igor Burdonov, Nina Yevtushenko and Alexandr Kossachev
17:30 — 19:30	**Regular Papers Session 3B** **"SoC Design & Test", "System-in-Package and 3D Design & Test"** Moderator: Eugenia Litvinova
	#23. Self-Timed Storage Register Soft Error Tolerance Improvement *Yuri Stepchenkov, Yuri Diachenko, Yury Rogdestvenski, Yury Shikunov and Denis Diachenko*
	#7. Standard Cell Library Enhancement Using Neural Network Based Sleep Mode Control Integration For Low Leakage Designs *Suren Abazyan, Shavarsh Melikyan and Davit Musayelyan*
	#12. Power Supply Ramp-up And Ramp-down Detector For Dynamic Memory Refresh Using 16nm Technological Process *Vazgen Gevorgyan, Nune Grigoryan, Shavarsh Melikyan and Davit Musayelyan*
	#51. CJFet "Folded" Cascode of the Op-Amp with "Floating" Differential Input Stage optimization in Ltspice environment *Vladislav Chumakov, Nikolay Prokopenko, Alexey Titov and Ilya Pakhomov*
	#52. CJFET Op-Amp without Current Mirrors for Low Temperature Applications *Nikolay Prokopenko, Vladislav Chumakov, Anna Bugakova and Darya Denisenko*
	#53. Generalized Structure of Active RC Filters with Independent Tuning of Pole Frequency, Pole Q-Factor and Transfer Ratio *Daria Denisenko, Nikolay Prokopenko, Yuriy Ivanov and Ilya Pakhomov*

Third Day: September 12th, 2021 (Sunday)

#72. Current Mirrors on Complementary Field-Effect Transistors with a Control PN Junction for Low-Temperature and Radiation-Hardened Analog Ics
Nikolay Prokopenko, Anna Bugakova, Darya Denisenko, Vladislav Chumakov and Nikolay Butyrlagin

#27. Design validation of recurrent signal processor FPGA prototype
Yury Stepchenkov, Dmitry Khilko, Yury Shikunov and Georgy Orlov

Fourth Day: September 13th, 2021 (Monday)

14:00 — 14:45 Plenary Session 4A

Moderator: Vladimir Hahanov

14:00 — 14:45 Invited Talk

The state identification problem for Finite State Machines (FSM)

Doctor of Sciences, Professor
Nina Yevtushenko

Nina Yevtushenko received her PhD diploma in Computer Science from Saratov State University. From 2017 she joined Ivannikov Instutute for System Programming of RAS in Moscow as a leading researcher. She published five books and many research papers. Her research interests include formal methods, automata theory, distributed systems, protocol and software testing.

Abstract. The state identification problem for Finite State Machines (FSM) has a long history. State identification sequences such as distinguishing, homing and synchronizing sequences allow to identify an initial state or a final (current) of a discrete event system under investigation and are widely used for testing and verification

Fourth Day: September 13th, 2021 (Monday)	
of hardware and software systems. The knowledge of state identification sequences allows to set a system of interest into the known state or to determine such a state by observing external system responses; the latter permits to minimize testing efforts in both active and passive testing (monitoring). Nowadays, the state identification problem is efficiently studied for timed and hybrid systems. Respectively, classical FSMs have been extended with clock and continuous variables and methods for checking the existence and derivation of state identification sequences have been proposed for such systems. In this presentation, we consider the problem of distinguishing and homing sequences in the classical FSM theory and present the existing results for various FSM classes such as non-deterministic, partial, weakly-initialized FSMs. In the second part of our presentation, the existing methods for solving the state identification problem for timed FSMs and input/output automata are presented.	
14:45 — 16:30	**Regular Papers Session 4A** **"SoC Design & Test",** Moderator: Gül Nihal Güğül
	#71. Cyber Social FML – Computing I. Goal and Main Trends *Vladimir Hahanov, Svetlana Chumachenko, Eugenia Litvinova, Anna Hahanova and Olga Shevchenko*
	#78. Cyber Social FML – Computing II. Relations & Metrics *Vladimir Hahanov, Svetlana Chumachenko, Eugenia Litvinova, Hanna Khakhanova, Alexander Mishchenko and Daria Rakhlis*
	#86. Cyber Social FML – Computing III. Architectures *Vladimir Hahanov, Svetlana Chumachenko,*

Fourth Day: September 13th, 2021 (Monday)	
	Eugenia Litvinova, Vugar Hacimahmud Abdullayev and Ivan Hahanov
	#85. Quantum Digital–Analogue Computing *Vladimir Hahanov, Wajeb Gharibi, Mikhail Karavay, Ka Lok Man, Svetlana Chumachenko, Eugenia Litvinova, Tariq Hama Salih, David Devadze and Ivan Hahanov*
	#92. AFTAB: A RISC-V Implementation with Configurable Gateways for Security *Maryam Rajabalipanah, Mahboobe Sadeghipour Roodsari, Zahra Jahanpeima, Gianluca Roascio, Paolo Prinetto and Zainalabedin Navabi*
	#88. Novel Design and Simulation of HERIC Transformerless PV Inverter in MATLAB/Simulink *Musa Adam Shuaibu, Vladimir Hahanov, Ka Lok Man, Svetlana Chumachenko and Eugenia Litvinova*
	#83. About the Method of protecting information in financial portals based on neural networks *Zurab Meskhidze and Mikheil Donadze*
	#80. Implementation and Comparative Analysis of Symmetric Encryption Model Based on Substitution Cipher Techniques *Elza Jintcharadze, Tsitsino Sarajishvili, Anna Surmanidze and Davit Khojava*
	#62. Timed Finite State Machine Assertion Based Design *Shkil Olexandr, Anatolii Miroshnyk, Georgiy Kulak and Kyrylo Pshenychnyi*
16:30 — 19:00	**Regular Papers Session 4B “Internet of Things Design & Test”,**

Fourth Day: September 13th, 2021 (Monday)	
	"Automotive Reliability & Test" Moderator: Ivan Hahanov
	#15. Automated Complex for the Study of Digital Model of Titan *Alexey Andreev, Yury Nefedyev, Carlos De La Morena, Ekaterina Ahmedshina and Natalia Demina*
	#16. The Use of Deterministic Mathematical Modeling for the Prediction of Dynamic Geophysical Processes *Yury Nefedyev, Alexey Andreev, Regina Mubarakshina, Natalya Demina and Zoya Andreeva*
	#63. Development of Fast Exponentiation Algorithm «To Center and Back» *Ivan Smirnov, Larissa Cherckesova, Olga Safaryan, Denis Korochentsev, Vladislav Chumakov and Alexander Gavlicky*
	#87. Assessing Trustworthiness of IoT Applications Using Logic Circuits *Andrey Laputenko*
	#14. The Digital Fractal Model of the Earth Based on Space Measurements Data *Alexey Andreev, Yury Nefedyev, Regina Mubarakshina, Zoya Andreeva and Natalya Demina*
	#10. On Digital Twin for Metro System *Oleg Pokusaev, Alexander Chekmarev and Dmitry Namiot*
	#18. Automation of scheduling for drivers of the subway rolling stock *Agata Markevich and Valentina G. Sidorenko*

Fourth Day: September 13th, 2021 (Monday)	
	#47. Remotely controlled experiments on the basis of Raspberry Pi and openHAB *Zaza Davitadze, Gregory Kakhiani and Demid Fasieshvili*
	#74. Astatic Gyrocompass Based on a Hybrid Micromechanical Gyroscope *Lyalya Bakhtieva and Vladimir Bogolyubov*
	#79. Differential gas flow measurement device with software temperature compensation *Zh.A. Sukhinets, O.O. Valiamova and A.I. Gulin*
	#45. Smart shell structure designed to protect industrial robots from aggressive environments *Mikhail Mitsik, Marina Byrdina, Igor Maltsev and Olga Aleynikova*
19:00 — 20:00	**Closing Session**