GLOBAL SMART INDUSTRY CONFERENCE (GloSIC'2020)

South Ural State University
November 17–19, 2020, Chelyabinsk
(Chelyabinsk time, GMT+5)

The conference is supported by:
South Ural State University, Chelyabinsk, Russia
Emerson Electric Company
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November 17, 2020

8:30-9:00 **REGISTRATION OF THE CONFERENCE PARTICIPANTS**
("Sigma", hall of the 2nd floor)

PLENARY SESSION
("Sigma", conference hall)
Chair: Radchenko G.I.

9:00-9:15 **OPENING CEREMONY**

9:15-10:00 **New Horizons of Digital Transformation**
Michael Train, Emerson Electric, USA

10:00-10:45 **Real Digitalization in Practice**
Peter Zornio, Emerson Automation Solutions, USA

10:45-11:30 **Digital Twin and Its Industry Applications**
Fei Tao, Beihang University, China

11:30-12:15 **Research of South Ural State University in Digital Industry**
Aleksandr L. Shestakov, South Ural State University (national research university), Russia

12:15-13:30 **LUNCH BREAK**

13:30-14:00 **REGISTRATION OF THE CONFERENCE PARTICIPANTS**
("Sigma", hall of the 2nd floor)

PLENARY SESSION
("Sigma", conference hall)
Chair: Zymbler M.L.

14:00-14:45 **The Learning Steel Plant: Merging Domain Knowhow with Artificial Intelligence and Performance-Based Business Models**
Volker Bleischwitz, SMS digital GmbH, Germany

14:45-15:30 **Measurement for the Digital Industries: Challenges and Opportunities**
Manus Patrick Henry, University of Oxford, United Kingdom

15:30-16:15 **Prediction of Sports Performance Using Biomechanics**
Guillaume Laffaye, Université Paris-Sud, Université Paris-Saclay, France

16:15-17:00 **Cryptology in Pre- and Post-Quantum Times**
Franck Leprevost, University of Luxembourg, Luxembourg

November 18, 2020

8:30-9:00 **REGISTRATION OF THE CONFERENCE PARTICIPANTS**
("Sigma", hall of the 2nd floor)

PLENARY SESSION
("Sigma", conference hall)
Chair: Samodurova M.N.

9:00-9:45 **The 4. Industrial Revolution – Digital Solutions and Use Cases for the Metals Industry**
Pino Tese, SMS group Inc., Germany

9:45-10:30 **Digital Technologies as a Way to Transform the Scientific Competencies of Universities into an Understandable Technology for Solving Everyday Problems of Industrial Enterprises. Considering the Service Interaction Model**
Danila Tselikanov, Magnitogorsk Iron and Steel Works, Russia

10:30-11:15 **Predictive Maintenance for Small and Medium Enterprises in Industry 4.0**
Vrinda Rastogi, Sahima Srivastava, Indira Gandhi Delhi Technical University for Women, India

11:15-12:00 **A MEMS Density-Viscosity Sensor Based on Electrostatically Actuation of a Comb-Drive Structure**
Ghader Rezazadeh, South Ural State University, Russia

12:00-13:30 **LUNCH BREAK**

13:30-14:00 **REGISTRATION OF THE CONFERENCE PARTICIPANTS**
("Sigma", hall of the 2nd floor)

PLENARY SESSION
("Sigma", conference hall)
Chair: Shiryaev V.I.

14:00-14:45 **Digital Industry based on Digital Twins**
Andrei I. Rudskoy, Peter the Great St.-Petersburg Polytechnic University, Russia

14:45-15:30 **Technical diagnostics and self-checking: development trends**
Roald E. Taymanov, Ksenia V. Sapozhnikova, Mendeleev All-Russian Institute for Metrology, Russia

SECTION A
(Zoom)
Chair: Ivanov S.A.
Virtual and augmented realities for Industry 4.0

16:30-16:50 **The Tasks of Designing and Developing Virtual Test Stands**
V.L. Averbukh, P. Vasev, I. Starodubtsev, N.V. Averbukh, I. Gajniyarov

16:50-17:10 **Problems Arising in the Design of Workstations Based on Augmented Reality**
V.L. Averbukh, N.V. Averbukh, I. Gajniyarov

17:10-17:30 **Virtual Reality in Environmental Education for Manufacturing Sustainability in Industry 4.0**
T. Krupnova, E. Yudina, O. Rakova, E. Shefer, A. Lut, A. Bulanova

17:30-17:50 **Development of the Software for Examination of the Crime Scene by Using Virtual Reality, Based on Spherical Panoramic Shot and 3D-Scanning**
G. Rusman, E. Popova

17:50-18:10 **The Use of AR Elements in the Teaching of Mathematics at a Technical University**
S.V. Akmanova, G.A. Kameneva, Y.A. Maznina, T.A. Bondarenko, L.V. Kurzaeva

18:10-18:30 **Repairability Assessment of Vehicle New Model Line-Up Using Modeling and Virtual Reality**
I. Makarova, P. Buyvol, E. Mukhametdinov, V. Shepelev, A. Gritsenko, N. Kostyuchenkov

SECTION B
(Zoom)
Chair: Sokolov A.N.
Cybersecurity in digital industry

16:30-16:50 **Conceptual comparison of Port Commmunity System and Blockchain Scenario for Maritime Document Handling**
S. Tsiulin, K.H. Reinau, N. Goryaev

16:50-17:10 **Malicious Qr-Code Threats and Vulnerability of Blockchain**
A. Averin, N. Zyulyarkina

17:10-17:30 **The Software Application for Increasing the Awareness of Industrial Enterprise Workers on Information Security of Significant Objects of Critical Information Infrastructure**
L. Astakhova, I. Medvedev

17:30-17:50 **Model for Providing Information Security of APCS Based on Predictive Maintenance Technology**
G.D. Asyaev, I.S. Antyasov

17:50-18:10 **Security Analysis of Wireless Sensor Networks Using SIEM and Multi-agent Approach**
V. Vasilyev, R. Shamsutdinov

18:10-18:30 **Virtual Environment for Researching Information Security of a Distributed ICS**
A. Barinov, S. Beschastnov, A. Boger, A. Kolpakov, M. Ufimtcev

SECTION C
(Zoom)
Chair: Suhov M.V.
Sensors and their components

16:30-16:50 **A Discrete Model of Acoustic Sensor**
S. Nekrasov

16:50-17:10 **Digital Processing of the Ultrasonic Signal for Mobile Devices in the Transmission of Information**
B. Saidov, V. Telezhkin

17:10-17:30 **Prototype of a Li-Fi Communication System for Data Exchange Between Mobile Devices**
I.L. Kaftannikov, A.V. Kozlova, A.D. Khlyzov

17:30-17:50 **Development of a Wireless Pressure Transmitter with Diagnostics**
E. Tugova, M.P. Henry, O. Bushuev, M. Motorina

17:50-18:10 **Modelling Fluid Loss Faults in an Industrial Pressure Sensor**
K. Soltani, E. Tugova, M. P. Henry, O. Bushuev, M. Ghanbari, G. Rezazadeh

18:10-18:30 **Functional Measuring Generator with Pulse Current Stabilization**
A.L. Galiev, N.I. Yumagulov, D.V. Topolsky

SECTION D

(Zoom)

Chair: Yaparova N.M.

Cloud and high-performance computing for smart factory

16:30-16:50 **Development of Supercomputer Model of Needle-Punched Felt**
N.Yu. Dolganina, E.A. Teleshova, P.N. Semenikhina

16:50-17:10 **Development and Integration of a Mesh-Modifying Program Module into User's Interface of the Openfoam Software for High Performance Computing in the CM Field**
D. Chitalov

17:10-17:30 **Research and Analysis of Unsteady-State Processes in Cloud Systems**
A.I. Martyshkin, D.V. Pashchenko, D.A. Trokoz

17:30-17:50 **Simulation Modelling of Data Locking in a Distributed System**
A.I. Martyshkin, D.V. Pashchenko, D.A. Trokoz

17:50-18:10 **Improving Parallel Computing Efficiency**
V.N. Aleeva

18:10-18:30 **Matrix-Matrix Multiplication Using Multiple GPUs Connected by NVLink**
Y.R. Choi, V. Nikolskiy, V. Stegailov

November 19, 2020

SECTION A

(Zoom)

Chair: Sidorov A.I.

Condition monitoring and control for intelligent manufacturing

10:00-10:20 **Development of Artificial Neural Network for Predicting Drill Pipe Sticking in Real-Time Well Drilling Process**
S. Qodirov, A. Shestakov

10:20-10:40 **Effective Diagnostics of Metallurgical Equipment**
S. Rednikov, E. Akhmedyanova, K. Akhmedyanova, D. Toymurzin

10:40-11:00 **Methodology of Development for the Resource Prognostic System of Sheet Mill Machinery**
V. Golodov

11:00-11:20 **Application of the Coherent Spectrum Method with a Reference Signal in Problems of Diagnostics the State of Technical Equipment**
A.N. Ragozin, A.D. Pletenkova

11:20-11:40 **Digital Program For Diagnosing The Status of a Power Transformer**
I.E. Kolesnikov, A.V. Korzhov, K.E. Gorshkov

11:40-12:00 **Monitoring of Railway Infrastructure Objects with PHS-1 Photogrammetry System**
E. Grigorova , E. Sartasov, B. Sukhovilov, S. Tushev

12:00-14:00 **LUNCH BREAK**

SECTION B

(Zoom)

Chair: Plotnikova N.V.

Big data, machine learning and artificial intelligence for Industry 4.0 management

10:00-10:20 **Modern Information Technologies and the Need for Improving the Quality of Organizational and Corporate Structures' Management**
A.L. Shestakov, A.A. Maksimov, O.V. Loginovskiy, A.V. Hollay

10:20-10:40 **The Use of the YOLO Neural Network in the Task of Separating Vehicles and Pedestrians at a Signal-Controlled Intersection**
O. Ibriaeva, V. Shepelev, A. Zhulev, M. Chizhova, G. Yakupova, L. Fatikhova

10:40-11:00 **Automated System-Adviser Based on a Model for Control of the Technological Process of Concentrate Production**
D.A. Shnayder, E.A. Kalinina

11:00-11:20 **Cleansing Sensor Data in Smart Heating Control System**
M. Zymbler, Y. Kraeva, E. Latypova, S. Kumar, D. Shnayder, A. Basalaev

11:20-11:40 **Separation of Target Signal from Background Interference Using Convolutional Neural Network**
M. Gubin

11:40-12:00 **Two-Dimensional Model of Compound Eye Imaging System**
R. Fedyanina

12:00-14:00 **LUNCH BREAK**

SECTION C

(Zoom)

Chair: Spicyn V.V.

Sensors and their components

10:00-10:20 **Application of Genetic Algorithms for Construction of a Model of PLC in ICS Network Based on Observation**
D. Komarov, N. Domukhovsky

10:20-10:40 **Numerical Method Processing Data Related with Dynamic Measurements**
D. Yaparov, A. Shestakov

10:40-11:00 **Implementation of the Genetic Algorithm for Correcting the Dynamic Error of the Measuring Systems**
E.V. Yurasova, A.C. Rusanova

11:00-11:20 **On the Question of Comparing the Forms Output Signals in Magnetostrictive Displacement Transducers Formed under the Influence Input Current Pulses Rectangular and Triangular Shapes**
A.A. Vorontsov, Yu.N. Slesarev

11:20-11:40 **Model-Oriented Design of a Wireless Sensor Network**
A.N. Kazimirov

11:40-14:00 **LUNCH BREAK**

SECTION A

(Zoom)

Taranenko P.A.

Condition monitoring and control for intelligent manufacturing

14:00-14:20 **The Algorithm of Electricity Consumption Control by Household Consumers Based on Smart Electricity Meters in the Republic of Tajikistan**
A.I. Sidorov, S.S. Tavarov, O.A. Khanzhina

14:20-14:40 **Information Parameters Used in Protection when a 6-10 Kv Overhead Line Wire Breaks**
A.M. Ershov, A.V. Khlopova, A.I. Sidorov

14:40-15:00 **Diagnostics of Drying Units with Microwave Emitter Units**
S. Rednikov, E. Akhmedyanova

15:00-15:20 **Determination of the Parameters of an Induction Motor in Transient Modes to Improve the Quality of its Operation**
V.S. Goun, A.A.Bakin, A.S. Anikin, N.Yu. Sidorenko

15:20-15:40 **Software and Hardware on the Platform of Standard Schneider Electric Devices that Implement Digital Correction of Frequency-Controlled Asynchronous Electric Drives**
A. Baldenkov, V. Kodkin, N. Loginova

15:40-16:00 **A Digital Model for Evaluating the Thermal Behavior of Power Cable Couplings**
I. E. Kolesnikov, A. V. Korzhov, K. E. Gorshkov

SECTION B

(Zoom)

Chair: Zyulyarkina N.D.

Big data, machine learning and artificial intelligence for Industry 4.0 management

14:00-14:20 **Realization Algorithms of Major Types of Linguistic Processors Based on the Systems with Predefined Semantics**
A.N. Vanyulin, T.A. Lavina, N.R. Alekseeva, E.A. Zvereva, T.A. Mochalova

14:20-14:40 **Applying of Generative Adversarial Networks for Anomaly Detection in Industrial Control Systems**
S.K. Alabugin, A.N. Sokolov

14:40-15:00 **Assessment of the Applicability of Autoencoders in the Problem of Detecting Anomalies in the Work of Industrial Control Systems**
I.A. Pyatnisky, A.N. Sokolov

15:00-15:20 **The Detecting Cross-Site Scripting (XSS) Using Machine Learning Methods**
S. Kascheev, T. Olenchikova

15:20-15:40 **Application of the Cycles Merging Algorithm to the Shortest Common Superstring Problem**
Y.F. Leonova, A.V. Panyukov

15:40-16:00 **N-Dimensional Model for Visual Representation of Linear Programming Problem**
N. Olkhovsky

SECTION C

(Zoom)

Chair: Prokudina L.A.

Digital Twin technologies

14:00-14:20 **Numerical Simulation of Parameters of Ocsillatory Modes of an Oregonator Under External Influence**
L. Prokudina, S. Turlakova

14:20-14:40 **Scalable Method for Linear Optimization of Industrial Processes**
L.B. Sokolinsky, I.M. Sokolinskaya

14:40-15:00 **Digital Twin of City: Concept Overview**
S.A. Ivanov, K.Yu. Nikolskaya, G.I. Radchenko, L.B. Sokolinsky, M.L. Zymbler

15:00-15:20 **Modeling as the Foundation of Digital Twins**
O.G. Brylina, N.N. Kuzmina, K.V. Osintsev

15:20-15:40 **Interactive Visualization for Simulating the Movement of Liquids and Gases**
A.G. Kriushichev, N.S. Silkina, E.A. Nenakhova

15:40-16:00 **Digital Twin of Air Pollution**
A.A. Zamyshliaeva, D.A. Drozin, S.M. Elsakov, T.G. Krupnova, S.G. Nitskaya, T.Yu. Olenchikova

SECTION A

(Zoom)

Chair: Taranenko P.A.

Condition monitoring and control for intelligent manufacturing

16:00-16:20 **Learning and Control of Energy Consumption in Large Company**
V. Tsyganov

16:20-16:40 **Learning of Quartering in Digital Control of Refit**
V. Tsyganov

16:40-17:00 **Additive Noise Effect on the Error of Time Interval Forming**
O.V. Prokofiev, A.E. Savochkin

17:00-17:20 **IoT-Based Approach for Industrial Equipment Condition Monitoring: Wireless Technology and Use Cases**
V.V. Abdullin, D.A. Shnayder, A.R. Khasanov, D.F. Tselikanov

17:20-17:40 **Method for Determining the Thermal State of the Body During Complex Heat Treatment**
N. Yaparova, Yu. Koryagin

SECTION B
(Zoom)
Chair: Ivanova O.N.
Cybersecurity in digital industry

16:00-16:20 **Comprehensive Classification of Internet Background Noise**
M. Zolotykh

16:20-16:40 **Research of Behavior of the Search Engine 'Shodan.Io'**
M. Zolotykh

16:40-17:00 **Characteristics of a Random Vector Obtained Using Human-Computer Interaction**
A. Averin, N. Zyulyarkina

SECTION C
(Zoom)
Chair: Suhovilov B.M.
Industrial robotics

16:00-16:20 **Evaluation of Positioning Accuracy of Manipulation Mechanism**
N.V. Plotnikova

16:20-16:40 **A Distributed Algorithm of Control Software Processing for a Robotic Laser Welding Complex**
S. Sukhorukov, S. Cherniy, R. Bazhenov, S. Bogatenkov, I. Borodin, O. Chuyko

16:40-17:00 **Robot Manipulator Control Using Predictive Model Under Conditions of Incomplete Information**
V. Shcherbakov, A. Bragina, V. Shiryaev