

# CRITICAL INFRASTRUCTURES IN THE DIGITAL WORLD - 2022 WORKSHOP PROGRAMME

March 16 Wednesday

Departure from Irkutsk at 10:00

Arrival in the Bolshoe Goloustnoe

March 16, 17:00 Wednesday

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Registration of participants

March 16, 20:00

OPENING CEREMONY

Welcome Party

March 17, 10:00 Thursday

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## SESSION 1

1. Main trends in the development of artificial intelligence on the example of their application in energy sector / **Massel Liudmila** (*Melentiev Energy System Institute SB RAS, Irkutsk, Russia*)
2. The digital platform for development of intelligent services for assessing risks of organism critical conditions / **Gribova Valeria, Petryaeva Margarita, Shalfeeva Elena** (*Institute of Automation and Control Processes FEB RAS, Vladivostok, Russia*) (*on line*)
3. Knowledge bases engineering for semi-automated formation of aviation task cards based on event trees transformations / **Dorodnykh Nikita, Nikolaychuk Olga, Yurin Aleksander** (*Matrosov Institute for System Dynamics and Control Theory SB RAS, Irkutsk, Russia*) (*on line*)
4. Technology of innovative energy development forecasting based on intelligent data analysis / **Kopaygorodsky Alex** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)
5. Ontological and cognitive modeling in the study of resilience of socio-ecological and energy systems / **Pesterev Dmitriy** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)

**Round table** "Artificial intelligence: prospects and directions of development"

Keynote Speakers: **Liudmila Massel, Valeria Gribova, Olga Gerget**

**March 17, 17:00**

**Thursday**

1. Research of interrelations of energy and socio-ecological systems using semantic technologies / **Vorozhtsova Tatyana, Ivanova Irina, Maysyuk Elena** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)

**Round table** "Ontological space of knowledge in the field of energy and ecology: the need for creation and approaches to implementation"

Keynote Speakers: **Liudmila Massel, Tatyana Vorozhtsova, Galina Zagorulko**

**March 18, 10:00**

**Friday**

**SESSION 2**

1. Mathematical modeling of plasma flow at low pressures in vacuum chamber with charge on body / **Shemakhin Aleksandr<sup>1</sup>, Zheltukhin Victor<sup>1,2</sup>, Shemakhin Evgeny<sup>1</sup>**  
*<sup>1</sup>Kazan Federal University, Kazan, Russia*  
*<sup>2</sup>Kazan National Research Technological University, Kazan, Russia*
2. Study of the operation of a self-tuning predictive speed controller of a synchronous generator on a cyber-physical model / **Bulatov Yury<sup>1</sup>, Kryukov Andrey<sup>2,3</sup>, Suslov Konstantin<sup>3</sup>**  
*<sup>1</sup>Bratsk State University, Bratsk, Russia*  
*<sup>2</sup>Irkutsk State Transport University, Irkutsk, Russia*  
*<sup>3</sup>Irkutsk National Research Technical University, Irkutsk, Russia*
3. The use of digital technology in buildings is a way to decarbonize the energy sector / **Galperova Elena** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)
4. Two-level technology for studying energy security threats using cognitive modeling methods and linear optimization models / **Pyatkova Natalia, Massel Aleksei** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)
5. Development of models for analyzing threats to the Industrial Internet of Things in the energy sector / **Gaskova Daria** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)
6. Analysis of approaches to medium-term forecasting of earthquakes based on fuzzy logic methods / **Kuklin Egor** (*Irkutsk National Research Technical University, Irkutsk, Russia*) (*on line*)

**March 18, 17:00**

**Friday**

1. Preventive analytics in safety tasks for critical infrastructures development / **Fridman Alexander** (*Institute for Informatics and Mathematical Modeling FRC KSC RAS (Apatity, Murmansk region, Russia)*) (*on line*)

**DICUSSION**

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**SESSION 3**

1. On the problems of route constructing and object locating in a dynamic environment / **Lempert Anna, Kazakov Alexander** (*Matrosov Institute for System Dynamics and Control Theory SB RAS, Irkutsk, Russia*)
2. A web-based software system for intelligent support in modeling and forecasting the water / **Stolbov Alexander, Lempert Anna, Pavlov Alexander** (*Matrosov Institute for System Dynamics and Control Theory SB RAS, Irkutsk, Russia*) (*on line*)
3. Mathematical modeling of different aspects of agricultural production under climatic and biological risks / **Ivanyo Yaroslav, Petrova Sofia, Kolokoltseva Irina** (*Irkutsk State Agrarian University named after A.A. Ezhevsky, Irkutsk, Russia*)
4. Models of management of agricultural production on lands with different fertility / **Ivanyo Yaroslav, Kovadlo Ilya** (*Irkutsk State Agrarian University named after A.A. Ezhevsky, Irkutsk, Russia*)
5. Data monitoring for information system for visualization forecasting and planning activities of agricultural producer / **Baymakov Aleksandr, Barsukova Margarita, Zamaraev Aleksei, Ivanyo Yaroslav** (*Irkutsk State Agrarian University named after A.A. Ezhevsky, Irkutsk, Russia*)
6. Comprehensive assessment of the mutual influence of energy and socio-ecological systems / **Maysyuk Elena** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)
7. Information and Computing System for Energy Objects Impact Assessment on Environment / **Kuzmin Vladimir** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)
8. Non-convex optimization problems: classification and applied statements / **Gornov Alexander, Zarodnyuk Tatiana, Anikin Anton, Sorokovikov Pavel** (*Matrosov Institute for System Dynamics and Control Theory SB RAS, Irkutsk, Russia*)

1. Elements of mathematical support in modelling situational awareness / **Tuchkova Natalia** (*Federal Research Center "Computer Science and Control" RAS, Moscow, Russia*) (*on line*)

**DICUSSION**

March 20, 10:00

Sunday

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**SESSION 4**

1. Information model of a residential Smart House / **Erzhenin Roman** (*SPC "Gosuchet", Moscow, Russia*)
2. Modeling and control in energy systems based on digital twin's technology / **Massel Aleksei** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)
3. The digital twin of the demand response aggregator / **Kolosok Irina, Korkina Elena** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)
4. Integration of cognitive and mathematical modeling based on ontologies in Software INTEC-A / **Mamedov Timur** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)
5. Development of the digital twin of wind power station: problem statement / **Massel Aleksei, Shchukin Nikita, Tsybikov Aleksei** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)
6. Weather forecast using LSTM model / **Tsybikov Aleksei, Shchukin Nikita** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)
7. Data imputation and time series forecasting for the digital twin of a solar power plant / **Losev Aleksei** (*Melentiev Energy Systems Institute SB RAS, Irkutsk, Russia*)
8. Digital Twin of socio-ecological system: formulation of the problem / **Gavrilovskii Dmitrii** (*Irkutsk National Research Technical University, Irkutsk, Russia*) (*on line*)

March 20, 17:00

Sunday

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**Round table** "Architecture of the IT-infrastructure for research in the energy sector using Digital Twins and Smart Digital Twins"

Keynote Speakers: **Aleksei Massel, Liudmila Massel**

**FINAL DISCUSSION**

**CLOSING CEREMONY**

March 21, 10:00

Monday

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**Departure of the participants to Irkutsk**