

Institute of Radio and Information Systems (IRIS)
Institute of Electrical and Electronics Engineers (IEEE)
Media Publisher Ltd

International Scientific Conference

**«2023 SYSTEMS OF SIGNALS GENERATING
AND PROCESSING IN THE FIELD
OF ON BOARD COMMUNICATIONS»**

(IEEE Conference # 56737)

14-16 March 2023

CONFERENCE PROGRAM

**Moscow
2023**

CONFERENCE ORGANIZERS

INSTITUTE OF RADIO AND INFORMATION SYSTEMS (IRIS)
INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
MEDIA PUBLISHER LTD

CONFERENCE SECTIONS *

1. Antennas and Radio Waves Propagation.
2. Navigation and Mathematical Algorithms of an Object Space Orientation.
3. Radiofrequency Applications.
4. Wire and Optical Communication and Control Systems.
5. Intelligent Transport Systems
Sub-section I. “Peculiarities of data exchange in cooperative ITS”
Sub-section II. “Test methods of motor vehicles integrated into an intelligent transport environment”
Sub-section III. “Improving the power plants of intelligent vehicles”
Sub-section IV. “Theoretical Aspects of Artificial Intelligence Systems Development for Transportation Engineering”
6. Digital signal processing in on-board radio systems
7. Electrical and electronic engineering pedagogy

* The reports in the program inside the sections are listed in alphabetical order by the name of the first author. By agreement with the chairman of the section, the order of reports may be changed
(Доклады в программе внутри секций перечислены в алфавитном порядке по фамилии первого автора. По согласованию с председателем секции порядок следования докладов может быть изменен).

CONFERENCE SCHEDULE

CONGRESS CENTER AVIA-PLAZA
Moscow, Aviamotornaya st., 10, bldg. 2, 4th floor

14 March 2023 (Tuesday)

- 09-30 — 10-00 **Registration of participants** (*регистрация участников*) **Congress Center Hall**
- 10-00 — 12-00 **Plenary session** (*пленарное заседание*) **Conference hall**
- 12-00 — 13-00 **Dinner** (*перерыв на обед*)
- 13-00 — 14-00 **Conference section 1** (*работа секции 1*) **Room No. 9**
- 14-00 — 15-00 **Conference section 2** (*работа секции 2*) **Room No. 9**
- 15-00 — 17-00 **Conference section 3** (*работа секции 3*) **Room No. 9**
- 13-00 — 17-00 **Conference section 4** (*работа секции 4*) **Room No. 8**
- 13-00 — 17-00 **Conference section 5** (*работа секции 5*) **Rooms No. 3 and 4**
- 13-00 — 15-00 **Sub-section I.** “Peculiarities of data exchange in cooperative ITS”
Room No. 3
- 15-00 — 17-00 **Sub-section II.** “Test methods of motor vehicles integrated into an intelligent transport environment”
Room No. 3
- 13-00 — 14-15 **Sub-section III.** “Improving the power plants of intelligent vehicles”
Room No. 4
- 14-15 — 17-00 **Sub-section IV.** “Theoretical Aspects of Artificial Intelligence Systems Development for Transportation Engineering”
Room No. 4
- 13-00 — 17-00 **Conference section 6** (*работа секции 6*) **Rooms No. 5 and 10**
- 13-00 — 17-00 **Sub-section I.** “Radio systems” **Room No. 5**
- 13-00 — 15-00 **Sub-section II.** “TV systems” **Room No. 10**
- 15-00 — 17-00 **Conference section 7** (*работа секции 7*) **Room No. 10**
- 17-00 — 20-00 **Evening reception** (*фуршет*) **Congress Center Hall**

15 March 2023 (Wednesday)

11-00 — 17-00 Workshops (*Antennas and Radio Waves Propagation, Navigation and Mathematical Algorithms of an Object Space Orientation, Radiofrequency Applications*)

16 March 2023 (Thursday)

11-00 — 17-00 Workshops (*Intelligent Transport Systems, Digital signal processing in on-board radio systems, Electrical and electronic engineering pedagogy*)

Moscow, Aviamotornaya st., 10, bldg. 2, 4th floor
March 14, 2023 (Tuesday)
10-00 – 12-00

PLENARY SESSION

10-00 – 10-10

WELCOMING REMARKS

Svetlana S. Dymkova

*Chair of Russia Section TEM/GRS/ITSS Joint Chapter
Publication program coordinator of conference «Systems of signals generating and processing
in the field of on board communications», Member, IEEE
PhD, CIO of Media Publisher LLC*

10-15 – 10-30

Information message

«SPECIFIC REQUIREMENTS FOR IEEE SCIENTIFIC AND TECHNICAL PUBLICATIONS»

Oleg V. Varlamov

*Chair of Russian (Moscow) IEEE Circuits and Systems (CAS04) Chapter, Senior Member, IEEE
Doctor of Technical Sciences, Moscow Technical University of Communications and Informatics,
Moscow, Russia*

10-30 – 11-00

Report «CIRCULAR POLARIZATION ANTENNA»

Kaloshin Vadim Anatolyevich

*Doctor of Physical and Mathematical Sciences, IEEE Region 8, Chair of AP Moscow Chapter,
Vice-chair of MTT/ED/AES Moscow Chapter, Senior Member, IEEE,
Kotelnikov Institute of Radio Engineering and Electronics of RAS, Moscow, Russia*

11-00 – 11-30

Report «PROBLEMS OF ENSURING THE RELIABILITY OF THE TIME SCALE FORMED BY THE MASTER CLOCK»

Mikhail L. Schwartz

*Co-authors: Anatoliy V. Ryzhkov, Vladimir M. Aladin
PhD, Moscow Technical University of Communications and Informatics, Moscow, Russia*

11-30 – 11-55

Report «CLOUD DATA FORMATS TRANSFORMATION ALGORITHMS»

Vladimir A. Dokuchaev

*Co-author: Denis Petukhov
Doctor of Technical Sciences, Moscow Technical University of Communications and Informatics,
Moscow, Russia*

11-55 – 12-00

«PHOTO SESSION OF PARTICIPANTS»

March 14, 2023 (Tuesday)
13-00 – 14-00

SECTION 1
Antennas and Radio Waves Propagation

SECTION CHAIRMAN: Vadim A. Kaloshin, *Doctor of Physical and Mathematical Sciences,*
IEEE Region 8, Chair of AP Moscow Chapter,
Vice-chair of MTT/ED/AES Moscow Chapter,
Senior Member, IEEE

E. I. Glushankov

The Bonch-Bruевич Saint Petersburg State University of Telecommunications,
Saint Petersburg, Russia

V. I. Tsarik

LLC “Airtago”, Saint Petersburg, Russia

**SPACE-FREQUENCY BEAMFORMING ALGORITHMS COMPARISON
WITH A CIRCULAR ANTENNA ARRAY**

Nikita A. Konkin

Volga State University of Technology, Yoshkar-Ola, Russia

**DETERMINATION OF OPTIMAL MAXIMUM USABLE FREQUENCY
PREDICTION PERIODS FOR IONOSPHERIC RADIO CHANNELS USING
THE XGBOOST MACHINE LEARNING ALGORITHM**

Oleg Kuvshinov, Anton Ruzhitskii, Daniil Stafeev, Evgenii Baev, Ivan Malygin
Ural Federal University, Yekaterinburg, Russia

**DESIGN AND RESEARCH OF AN ANTENNA ARRAY FOR A SATELLITE
COMMUNICATION SYSTEM IN THE 435 MHZ BAND**

Vladimir I. Volovach (*Member, IEEE*)

Volga Region State University of Service, Togliatty city, Russia

Vladimir M. Artyushenko

Technological University, Korolev city, Russia

**ANALYSIS OF THE EFFECT OF MULTIPLICATIVE NOISE
ON THE PATTERNS OF PHASED AND SYNTHESIZED ANTENNA ARRAYS**

March 14, 2023 (Tuesday)
14-00 – 15-00

SECTION 2
Navigation and Mathematical Algorithms
of an Object Space Orientation

SECTION CHAIRMAN: Grigoriy A. Fokin, *Doctor of Sciences (Engineering),
The Bonch-Bruевич Saint Petersburg State University
of Telecommunications, Member, IEEE*

Denis V. Braslavskiy, Elena A. Skorodumova

Moscow Technical University of Communications and Informatics, Moscow, Russia

**DEVELOPING AN AI-SYSTEM FOR ANALYZING GAMES OF TEAM SPORTS
USING VR/AR TECHNOLOGY**

Andrei G. Erokhin, Margarita F. Vanina, Elena A. Frolova

Moscow Technical University of Communications and Informatics, Moscow, Russia

**ANALYTICAL QUEUEING MODEL OF FUNCTIONING OF THE ON-BOARD
NAVIGATION COMPLEX DATABASE**

Grigoriy Fokin (*Member, IEEE*), **Dmitriy Volgushev**

The Bonch-Bruевич SPbSUT, Saint Petersburg, Russia

**SOFTWARE-DEFINED RADIO NETWORK POSITIONING TECHNOLOGY DE-
SIGN. RECEIVER PROCESSING PROCEDURES**

D. V. Ivanov, N. V. Ryabova, V. A. Ivanov, A.A. Kislitsin

Volga State University of Technology, Yoshkar-Ola, Russia

**METHOD FOR DIAGNOSING THE ULTIMATE BANDWIDTH OF VARIABLE
TRANSIONOSPHERIC RADIO COMMUNICATION CHANNEL**

Zoya V. Ilyichenkova, Svetlana M. Ivanova, Alla Yu. Ermakova

MIREA – Russian Technological University, Moscow, Russia

Andrey I. Volkov

Moscow Technical University of Communications and Informatics, Moscow, Russia

**ENSURING THE SAFETY OF AN AUTONOMOUS OBJECT, TAKING INTO AC-
COUNT THE MOVEMENT OF OTHER ROAD USERS**

Sergey N. Stepanov, Victoria I. Korotkova, Margarita G. Kanischeva,

Anatoliy P. Pshenichnikov

Moscow Technical University of Communications and Informatics, Moscow, Russia

**CONSTRUCTION AND ANALYSIS OF A MODEL OF GROUP RECEIPT
OF IOT ELASTIC DATA IN A WIRELESS ACCESS NODE**

March 14, 2023 (Tuesday)
15-00 – 17-00

SECTION 3.
Radiofrequency Applications

SECTION CHAIRMEN: **Oleg V. Varlamov**, *Doctor of Sciences (Engineering), IEEE Region 8, Chair of Russia Section CAS Chapter, Professor of Moscow Technical University of Communications and Informatics, Senior Member, IEEE*

Grigoriy M. Aristarkhov, Oleg V. Arinin, Igor N. Kirillov, Andrey V. Markovskiy, Anzhela D. Doronina

Moscow Technical University of Communications and Informatics, Moscow, Russia

MULTI-BAND BANDPASS MICROSTRIP FILTERS BASED ON TWO CODIRECTIONAL HAIRPIN RESONATORS

A.V. Dolgopyatova, O.V. Varlamov (*Senior Member, IEEE*)

Moscow Technical University of Communications and Informatics, Moscow, Russia

REVERSE INTERMODULATION DISTORTION IN CURRENT MODE AND BRIDGE CLASS D RF POWER AMPLIFIERS

Timur Fatkhulin, Raffi Alshawi, Alena Kulikova, Alexander Mokin, Anna Timofeyeva

Moscow Technical University of Communications and Informatics, Moscow, Russia

ANALYSIS OF SOFTWARE TOOLS ALLOWING THE DEVELOPMENT OF CROSS-PLATFORM APPLICATIONS FOR MOBILE DEVICES

I. R. Lavrukhin, A. A. Yelizarov (*Member, IEEE*), **S. V. Bashkevich, I. V. Nazarov**

National Research University Higher School of Economics, Moscow, Russia

RESEARCH OF THE ELECTRODYNAMIC PARAMETERS OF UHF RFID TAGS

M. A. Mashkova, V. N. Karavashkina

Moscow Technical University of Communications and Informatics, Moscow, Russia

A. A. Yelizarov (*Member, IEEE*), **A. A. Skuridin, E. A. Zakirova**

National Research University “Higher School of Economics”, Moscow, Russia

MODELING OF PARTIALLY FILLED WAVEGUIDE STRUCTURES WITH MAGNETIC WALLS ON A MUSHROOM-SHAPED METAMATERIAL

E. P. Stroganova, S. E. Grychkin

Moscow Technical University of Communications and Informatics, Moscow, Russia

DYNAMIC MEASUREMENTS ACCURACY INCREASING OF DIGITAL MEASURING DEVICE FOR ON-BOARD RADIO ELECTRONIC EQUIPMENT

A. A. Yelizarov (*Member, IEEE*), **D. M. Ikonnikova, A. I. Katsnelson, P. I. Gromova, D. S. Ilyanova**

National Research University «Higher School of Economics», Moscow, Russia

MONITORING OF RF-FIELD STRENGTH IN THE ENVIRONMENT BY MOBILE TELECOMMUNICATIONS IN THE MOSCOW

March 14, 2023 Tuesday

13-00 – 17-00

SECTION 4

Wire and Optical Communication and Control Systems

SECTION CHAIRMAN: Sergey N. Stepanov, *Doctor of Sciences (Engineering),
Professor of Moscow Technical University of
Communications and Informatics. Moscow, Russia*

Ali M. Almufti, Oleg G. Morozov (*Senior Member, IEEE*), **Rustam Sh. Misbakhov**
*Kazan National Research Technical University named after A.N. Tupolev-KAI,
Kazan, Russia*

Yagmyrguly K. Garovov, Ajna M. Niyazgulyeva

Institute of Telecommunications and Informatics of Turkmenistan, Ashgabat, Turkmenistan

**EXPERIMENTAL INVESTIGATION AND COMPARISON OF MODULATION
TYPES FOR HIGH CAPACITY BROADBAND TRANSMISSION SYSTEM TO
SUPPORT 5G NETWORKS**

**Tammam Dawood, Mikhail S. Stepanov, Christian Naoussi, Benedito Joao,
Khalil Yahia**

Moscow Technical University of Communications and Informatics, Moscow, Russia

**THE MATHEMATICAL MODEL OF THE INTERNET OF THINGS TRAFFIC
SERVICING IN CASE OF ITS IMPULSE NATURE**

D. V. Gadasin, A. V. Shvedov, Y. D. Egorova, I. R. Shaidullina

Moscow Technical University of Communications and Informatics, Moscow, Russia

**APPLICATION OF THE METHOD OF MAJORITY CODING TO DETERMINE
THE OPTIMAL ROUTE FOR DATA TRANSMISSION IN THE NETWORK**

B. G. Ibrahimov (*Member, IEEE*), **Z. A. Ismaylov** (*Member, IEEE*)

Azerbaijan Technical University, Baku, Azerbaijan

Z. N. Huseynov (*Member, IEEE*), **I. M. Mammadov** (*Member, IEEE*),

T. A. Ismaylov (*Member, IEEE*)

Azerbaijan Technological University, Ganja, Azerbaijan

**RESEARCH OF RESOURCES FIBER-OPTIC COMMUNICATION LINES BASED
ON WAVELENGTH MULTIPLEXING TECHNOLOGY**

Vladimir N. Korshunov, Nikolay I. Likhachev, Nadezhda A. Shishova

Moscow Technical University of Communications and Informatics, Moscow, Russia

Irina A. Ovchinnikova, Peter A. Semenov

JSC VNIKP, Moscow, Russia

FIBER – OPTICAL LINES RELIABILITY: THE ECONOMIC ASPECT

Artem A. Kuznetsov, Igor I. Vasil'ev, Shamil' R. Valiullin, Konstantin A. Lipatnikov
Kazan National Research Technical University named after A. N. Tupolev–KAI, Kazan, Russia
**FIBER-OPTICAL SYSTEM FOR MEASURING THE TEMPERATURE OF THE
KAI-1 CUBESAT**

Yuri Leokhin, Timur Fatkhulin
Moscow Technical University of Communications and Informatics, Moscow, Russia
**DEVELOPMENT OF A MATHEMATICAL MODEL FOR ANALYSIS
OF THE INFORMATION STRUCTURE OF A SOFTWARE-DEFINED
OPTICAL NETWORK**

**Oleg G. Morozov (Senior Member, IEEE), Ayrat Zh. Sakhabutdinov (Member, IEEE),
Vladislav S. Sokolov, Rustam Sh. Misbakhov**
Kazan National Research Technical University named after A.N. Tupolev-KAI, Kazan, Russia
Yagmyrguly Garovov
Institute of Telecommunications and Informatics of Turkmenistan, Ashgabat, Turkmenistan
**TWO-FREQUENCY DSB-SC MODULATION FOR RELATIVE FREQUENCY
RESPONSE MEASUREMENT OF MACH-ZEHNDER AMPLITUDE
MODULATORS**

Victor Netes
Moscow Technical University of Communications and Informatics, Moscow, Russia
**ULTRA-RELIABLE COMMUNICATIONS: BASIC CONCEPTS, CHALLENGES
AND OPEN ISSUES**

I. A. Ovchinnikova, E. B. Vasiliev, P. A. Semenov, A. S. Khahichev, A. G. Koriakin
JSC «VNIKP», Moscow, Russia
**INVESTIGATION OF THE POSSIBILITY OF USING OPTICAL CABLES
IN REMOTE CONTROL SYSTEMS OPERATING IN UNDERWATER
CONDITIONS**

J. Rabenandrasana, A. V. Bachus, N. S. Trofimov
Moscow Technical University of Communications and Informatics, Moscow, Russia
T. V. Kazieva
*Moscow Technical University of Communications and Informatics, Moscow, Russia;
National research nuclear university MEPhI, Moscow, Russia*
M. V. Boltanskii
Peoples Friendship University of Russia (RUDN University), Moscow, Russia
**DEVELOPMENT OF A METROLOGICAL SYSTEM FOR MEASURING
THE CHARACTERISTICS OF SINGLE PHOTON DETECTORS BASED
ON AN EDUCATIONAL PLATFORM EMQOS 1.0**

Sergey Rozhkov, Vyacheslav Voronov

Moscow Technical University of Communications and Informatics, Moscow, Russia

INFORMATION THEORY PATTERN RECOGNITION

Sergei A. Sidnev, Liudmila Y. Krasikova, Galina S. Artemeva, Vladimir A. Tsarenko

Moscow Technical University of Communications and Informatics, Moscow, Russia

**APPROACH TO SUBSTANTIATING THE EFFECTIVENESS OF THE
TRANSITION TO SLA FOR OPERATORS OF TRANSPORT AND ON-BOARD
SYSTEMS PROVIDING SERVICES OVER IP NETWORKS**

N. D. Smirnov, K. A. Lipatnikov, A. A. Ivanov (*Member, IEEE*)

Kazan National Research Technical University named after A.N. Tupolev-KAI, Kazan, Russia

FIBER-OPTIC TEMPERATURE SENSOR BASED ON A PHASE SHIFT

Mikhail S. Stepanov, Valentin G. Popov, Nadezhda K. Fedorova, Fedor S. Kroshin

Moscow Technical University of Communications and Informatics, Moscow, Russia

Artwell R. Muzata

University of Johannesburg, Johannesburg, South Africa

**THE AUTOMATION OF CLIENT SERVICING IN UNIVERSITY
AND COLLEGE ADMISSION OFFICE**

Alexey N. Terekhov, Alla S. Korchagina

Moscow Technical University of Communications and Informatics, Moscow, Russia

**MODELING AN EFFICIENT STORAGE METHOD INFORMATION BASED
ON UNARY CODING**

Pavel A. Titovets, Mikhail O. Fedyuk, Alexey A. Smolskii, Nataliia E. Miroshnikova

Moscow Technical University of Communications and Informatics, Moscow, Russia

**ATTENUATION OF LASER RADIATION IN WIRELESS UNDERWATER LASER
COMMUNICATION CHANNEL CONSIDERING TRANSITION BETWEEN
MEDIA**

March 14, 2023 (Tuesday)
13-00 – 17-00

SECTION 5.
INTELLIGENT TRANSPORT SYSTEMS

SECTION CHAIRMANS: *S.V. Zhankaziev, Doctor of Technical Sciences, Professor
Moscow automobile and road construction state technical University*
*A.M. Ivanov, Doctor of Technical Sciences, Professor
Moscow automobile and road construction state technical University*

SECTION 5. SUB-SECTION 1
Peculiarities of data exchange in cooperative ITS
13-00 – 15-00

CHAIRMAN: *S.V. Zhankaziev, Doctor of Technical Sciences, Professor
Moscow automobile and road construction state technical University*

Ivan A. Asmanov, Violetta V. Zavyazkina, Dmitry G. Moroz, Artem I. Zhukov
*Moscow Automobile and Road Construction State Technical University (MADI), Moscow,
Russia*

**DEVELOPMENT OF A HARDWARE AND SOFTWARE COMPLEX
FOR OPTIMIZING LOGISTICS ACTIVITIES IN THE FIELD
OF CONSUMER WASTE MANAGEMENT**

V. N. Bogumil, V. M. Vlasov, I. V. Konin, H. M. Eldiba
*Moscow automobile and road construction state technical university (MADI), Moscow,
Russia*

M. J. Duque Sarango
Escuela Superior Politécnica del Chimborazo, Riobamba, Ecuador

**DEVELOPMENT OF THE SPATIAL MODEL OF AN URBAN PASSENGER
TRANSPORT ROUTE FOR THE SAFE MOVEMENT OF PASSENGER
VEHICLES WITH A PARTIALLY AUTONOMOUS (ROBOTIC) CONTROL SYS-
TEM**

Igor F. Mikhalevich
*Russian University of Transport (Moscow Institute of Transport Engineers), Moscow, Rus-
sia*

**INTELLIGENT TRANSPORT SYSTEMS SOFTWARE AS A SOURCE OF
TRANSPORT SECURITY THREATS**

K. N. Pankov, M. M. Glukhov

Moscow Technical University of Communications and Informatics, Moscow, Russia

**ESTIMATION OF THE POWER OF ALGEBRAIC GEOMETRIC CODES
DESIGNED TO CONSTRUCT A POST-QUANTUM ALGORITHM
FOR ENSURING INFORMATION SECURITY OF ON-BOARD SYSTEMS**

Alexey A. Tsesar, Sergey V. Varshavskiy

SIE "MADiDT", Moscow, Russia

Yuri E. Vasiliev, Maria A. Fineeva

Moscow automobile and road construction state technical university (MADI), Moscow, Russia

**TECHNOLOGY FOR COLLECTING AND DATA PROCESSING
OF STREET-ROAD NETWORK MONITORING OBJECTS**

Sergey Vladimirovich Varshavskiy, Alexey Alexandrovich Tsesar

SIE "MADiDT", Moscow, Russia

Yuri Emmanuelovich Vasiliev, Maria Andreyevna Fineeva

Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

ANALYSIS OF MONITORING DATA OF THE STREET-ROAD NETWORK

E. A. Voronin, S. V. Kozlov

Federal Research Center "Computer Science and Control" of the Russian Academy of Sciences, Moscow, Russia

A. N. Kubankov

Moscow Technical University of Communications and Informatics, Moscow, Russia

**IDENTIFICATION OF THE NATURE OF THREATS TO THE ECONOMIC
AND FUNCTIONAL SECURITY OF INTELLIGENT ONBOARD SYSTEMS
AND THE SELECTION OF PROTECTION BY MACHINE LEARNING***

A. I. Vorobyev, A. A. Koveshnikov, M. V. Gavriluk, T. V. Vorobyeva, D. Yu. Morozov

Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

**CLASSIFICATION OF INTEGRATION PLATFORMS OF INTELLIGENT
TRANSPORT SYSTEMS**

A. V. Zamytskih, A. I. Vorobyev, Yu. A. Korotkova, V. V. Dronseiko

Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

Yu. V. Fedyukin

Federal state institution "Roads of Russia", Moscow, Russia

SERVICE SPEED FOR SELF-DRIVING CARS

SECTION 5. SUB-SECTION 2

Test methods of motor vehicles integrated into an intelligent transport environment 15-00 – 17-00

CHAIRMAN: *A. M. Ivanov, Doctors of Technical Sciences, Professor
Moscow auto mobile and road construction state technical University*

Sergey B. Benevolensky, Vladimir S. Ershov
Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia
Alexander A. Sirotkin, Alexander A. Kiryanov, Vladimir Yu. Sirotkin
LLC "ErLab", Moscow, Russia

AGRICULTURAL ROBOT SOFTWARE WITH MACHINE VISION AND COGNITIVE ARTIFICIAL INTELLIGENCE MODULE

V. V. Gaevskiy, N. V. Popov, S. R. Kristalnyi, M. A. Toporkov, A. N. Andreev
Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

VIRTUAL ADVANCED DRIVER-ASSISTANCE SYSTEMS TESTS

Mikhail Gorodnichev, Grach Mkrtchian, Yury Furletov, Ksenia Polyantseva
Moscow Technical University of Communications and Informatics, Moscow, Russia

ON THE TASK OF CLASSIFYING SOUND PATTERNS IN TRANSPORT

Marina Moseva, Mikhail Gorodnichev, Ksenia Polyantseva, Artem Pavlikov
Moscow Technical University of Communications and Informatics, Moscow, Russia

ALGORITHM FOR PREDICTING PEDESTRIAN BEHAVIOR ON PUBLIC ROADS

Ksenia Polyantseva, Mikhail Gorodnichev, Marina Moseva
Moscow Technical University of Communications and Informatics, Moscow, Russia

ENSURING THE RELIABILITY OF A HIGHLY LOADED VEHICLE MONITORING AND TRAFFIC CONTROL PLATFORM

Sergey S. Shadrin, Andrey M. Ivanov, Daria A. Makarova, Yury M. Furletov
Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

AUTONOMOUS VEHICLES SAFETY PROVISION BEFORE AND DURING OPERATION ON PUBLIC ROADS

Boris S. Subbotin, Maria. Yu. Karelina, Andrey V. Ostroukh
Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

Petr I. Smirnov, Vologda State University, VOGU, Vologda, Russia **APPLICATION OF MULTIVARIATE STATE ESTIMATION TECHNIQUE FOR EARLY DETECTION OF POTENTIAL THREATS WHILE DRIVING A TRUCK**

Alexey A. Solntsev, Artur R. Asoyan, Alexander G. Tynyanyy
Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

Elena M. Tatarnikova, Moscow Aviation technical university (MAI), Moscow, Russia
Irina A. Panferova, Moscow State University, Moscow, Russia

OPTIMIZATION OF MULTI-CRITERIA DECISION-MAKING PROBLEMS IN SEARCHING AND ELIMINATION OF VEHICLE FAULTS

SECTION 5. SUB-SECTION 3
Improving the power plants of intelligent vehicles
13-00 – 14-15

CHAIRMAN: M. G. Shatrov, *Doctors of Technical Sciences, Professor*
Moscow automobile and road construction state technical University

Mikhail G. Shatrov, Andrey U. Dunin, Andrey L. Yakovenko,
Alexander S. Stryapunin, Leonid N. Golubkov
Moscow Automobile and Road Construction State Technical University (MADI), Moscow,
Russia

**APPLICATION OF THE AVL CRUISE M SOFTWARE PACKAGE FOR
MODELING THE OPERATION OF AN ENGINE AS PART OF A VEHICLE**

Vladimir V. Sinyavski, Mikhail G. Shatrov, Andrey Yu. Dunin, Igor V. Maksimov,
Evgenia M. Filippova
Moscow Automobile and Road Construction State Technical University (MADI), Moscow,
Russia

**SIMULATION OF THE WORKING PROCESS OF A DUAL-FUEL ENGINE
TO DETERMINE THE IMPACT OF THE PARAMETERS OF THE PILOT
PORTION OF DIESEL FUEL ON ITS PERFORMANCE**

Yu.V. Trofimenko, T.Yu. Grigoreva, A.Yu. Chekanov
Moscow Automobile and Road Construction State Technical University (MADI), Moscow,
Russia

**APPLICATION OF RISK MODELING TO ASSESS THE EFFECTIVENESS
OF MOTOR TRANSPORT DECARBONIZATION**

Andrey V. Vasiliev, Alexander V. Sukhodolya, Vladimir S. Ershov,
Alexey A. Akulov, Dmitriy S. Taldykin
Moscow Automobile and Road Construction State Technical University (MADI), Moscow,
Russia

**THE USE OF AN ALTERNATIVE FUEL IN AN INTERNAL COMBUSTION EN-
GINE WITH THE EFFECT OF AUTO-IGNITION**

Roman V. Yuschuk, Grigory S. Mazlumyan, Sergey A. Eruslankin, Aleksandr N. Sova
Moscow Automobile and Road Construction State Technical University (MADI), Moscow,
Russia

**METHODOLOGY FOR TESTING THE TRANSMISSION OF HEAVY-DUTY VE-
HICLES USING AUXILIARY DRIVES**

SUB-SECTION 4
Theoretical Aspects of Artificial Intelligence Systems Development
for Transportation Engineering
14-15 – 17-00

CHAIRMAN: *M.V. Yashina, Doctors of Sciences (Physical and mathematical),
automobile and road construction state technical University,
Member, IEEE*

Danis F. Amirov

*Moscow Technical University of Communications and Informatics, Moscow, Russia;
ITCOM Group of Companies, Moscow, Russia*

ARTIFICIAL INTELLIGENCE FOR CYBER SECURITY GOALS

Yaroslavna S. Artamonova, Alexey A. Antipov

Moscow Technical University of Communications and Informatics, Moscow, Russia

Galina V. Brega

Financial University under the Government of the Russian Federation, Moscow, Russia

Ekaterina N. Vasilieva

Volgograd State University, Volgograd, Russia

**EMPIRICAL MODEL FOR STUDYING PREFERENCES IN THE FIELD
OF INTELLIGENT TRANSPORT SYSTEM OF EUROPE**

V. S. Artemyev

Russian Biotechnological University, Moscow, Russia

M. N. Makhboroda

Russian University of State for Social, Moscow, Russia

S. L. Yablochnikov, I. O. Yablochnikova

Moscow Technical University of Communications and Informatics, Moscow, Russia

F. K. Khutugova

North Ossetian State University named after Kosta Levanovich Khetagurov, Vladikavkaz, Russia

**SOME ASPECTS OF THE SYNTHESIS OF AUTOMATED SINGULARLY
PERTURBED CONTROL SYSTEMS**

N. G. Churbanova, M. A. Trapeznikova

*Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia;
Keldysh Institute of Applied Mathematics (KIAM), RAS, Moscow, Russia*

A. G. Churbanov

Keldysh Institute of Applied Mathematics (KIAM), RAS, Moscow, Russia

V. V. Emets

Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

PREDICTION OF FLOWS IN AN AUTOMOTIVE CATALYTIC CONVERTER

N. G. Kuftinova, A. V. Ostroukh, O. I. Maksimychev, C. B. Pronin, A. K. Yadav
Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

**IMPLEMENTATION OF THE DATA FABRIC ARCHITECTURE
AS A SUSTAINABLE DEVELOPMENT OF INDUSTRIAL PLATFORM
TECHNOLOGIES IN ROAD TRANSPORT SYSTEMS**

Nataliya V. Mokrova

RosBioTech, Russian Biotechnological University, Moscow, Russia

Sergey L. Yablochikov

Moscow Technical University of Communications and Informatics, Moscow, Russia

Andrey B. Semenov

National Research University, Moscow State University of Civil Engineering, Moscow, Russia

Irina K. Kuchieva

North-Ossetian State University named after K.L. Khetagurov, Vladikavkaz, Russia

INTENSIFICATION OF INTELLIGENT AUTOMATED CONTROL SYSTEMS

Dmitry G. Moroz, Artem I. Zhukov, Varvara M. Makurina, Philip V. Akopov

Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

Maxim A. Kudryshov

*Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia;
State Unitary Enterprise Mosgortrans, Moscow, Russia*

**METHODOLOGY FOR DETERMINING THE MINIMUM CAPACITY
OF TRACTION BATTERIES OF ELECTRIC BUSES BASED ON THE
OPERATIONAL CHARACTERISTICS OF ROUTES USING ARTIFICIAL
INTELLIGENCE TOOLS**

O. I. Sheluhin, D. I. Rakovskiy

Moscow Technical University of Communications and Informatics, Moscow, Russia

MULTI-LABEL LEARNING IN COMPUTER NETWORKS

Anastasia V. Tarasova, Maxim E. Yahimovich, Rinat A. Gematudinov,

Polina A. Selezneva

Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

Khizar A. Dzhabrailov

Moscow Technical University of Communications and Informatics, Moscow, Russia

**POSSIBILITIES OF USING THE ARCHITECTURE OF NEURAL NETWORKS
"TRANSFORMER" IN TRANSPORT ENGINEERING**

Ekaterina N. Vasilieva, Evginiy S. Vasiliev
Volgograd State University, Volgograd, Russia

Yaroslavna S. Artamonova
Moscow Technical University of Communications and Informatics, Moscow, Russia

Alexandr V. Brega
Moscow Technical University of Communications and Informatics, Moscow, Russia;
Financial University under the Government of the Russian Federation, Moscow, Russia

PARTICIPATORY DESIGN AS A TOOL FOR OPTIMIZING AN INTELLIGENT TRANSPORT SYSTEM

Marina V. Yashina (*Member, IEEE*)

Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia;
Moscow Technical University of Communications and Informatics, Moscow, Russia
Moscow Aviation Institute (National Research University MAI), Moscow, Russia

Alexander G. Tatashev

Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia;
Moscow Technical University of Communications and Informatics, Moscow, Russia

Ellina K. Shapranova, Margarita B. Yashina

Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia

MODEL OF MOBILE WEB SERVICE FOR BOOKING A PARKING SPACE BASED ON MULTI-CHANNEL QUEUE SYSTEM WITH DISCIPLINE OF PRIORITIZED CAPACITY

SECTION 6.
Digital signal processing in on-board radio systems
13-00 – 17-00

SUB-SECTION 1

CHAIRMAN: **Timofey Shevgunov**, *Moscow Aviation Institute*
(*National Research University*), *Moscow, Russia, Senior Member, IEEE*

Vladimir M. Artyushenko
Technological University, Korolev city, Russia

Vladimir I. Volovach (*Member, IEEE*)
Volga Region State University of Service, Togliatty city, Russia

**THE ENERGY SPECTRUM OF THE NOISE MODULATION FUNCTION
UNDER THE INFLUENCE OF SLOW MULTIPLICATIVE NOISE**

M. G. Bakulin, T.B.C. Ben Rejeb, V. B. Kreyndelin, D. Y. Pankratov, A. E. Smirnov
Moscow Technical University of Communications and Informatics, Moscow, Russia
CLASSIFICATION OF NOMA SCHEMES

V. V. Butenko, M. V. Ivankovich
FSUE NIIR, Moscow, Russia
E. M. Lobov, V. O. Varlamov, E. O. Lobova

Moscow Technical University of Communications and Informatics, Moscow, Russia
**SOFTWARE MODEL OF A 5G DATA TRANSMISSION SYSTEM WITH IN-
CREASED SPECTRAL EFFICIENCY**

D. S. Chirov (*Member, IEEE*), **E. O. Kandaurova**
Moscow Technical University of Communications and Informatics, Moscow, Russia
**SPECTRUM OCCUPANCY PREDICTION ALGORITHM USING ARTIFICIAL
NEURAL NETWORKS**

Oksana Guschina (*Member, IEEE*)
Moscow Aviation Institute (National Research University), Moscow, Russia
**A SIMULATION STUDY ON THE DETECTION OF A CYCLOSTATIONARY
SIGNAL BURIED IN A STATIONARY NOISE FOR UNKNOWN POWER
SCENARIO**

I. I. Ishmiev, S. S. Loginov
*Kazan National Research Technical University named after A.N. Tupolev-KAI, Kazan, Rus-
sia*
**M-SEQUENCE BASED PARTIAL TRANSMIT SEQUENCE PAPR REDUCTION
TECHNIQUE**

Kaib M. Kafarov, Sergey S. Loginov, Elena A. Bobina

Kazan National Research Technical University named after A.N. Tupolev-KAI, Kazan, Russia

**DIGITAL SIGNAL GENERATORS BASED ON THE LORENTZ SYSTEM
IMPLEMENTED USING FIXED-POINT NUMBERS**

N. A. Kandaurov, E. O. Lobova, V. O. Varlamov, K. E. Telengator

Moscow Technical University of Communications and Informatics, Moscow, Russia

**SIGNAL-CODE CONSTRUCTIONS FOR WIDEBAND SIGNALS BASED
ON M-CPFSK AND NON-BINARY ERROR-CORRECTING CODES**

Tatiana P. Kiseleva

Moscow Technical University of Communications and Informatics, Moscow, Russia

**THE TIME OF ENTERING INTO SYNCHRONISM DURING SYNCHRONIZATION
ACCORDING TO THE CYCLIC PREFIX OFDM SYMBOLS FORMED BY THE
SUM OF INFORMATION AND MULTIPHASE SEQUENCES**

German Leon, D. S. Koptev

Southwest State University, Kursk, Russia

**EVALUATION OF INFLUENCE OF THE RADIO RECEIVING DEVICES
HETERODYNES FUNCTIONING QUALITY ON THE QUADRATURE AMPLITUDE
MODULATION DIGITAL SIGNALS RECEPTION NOISE IMMUNITY**

Ilya M. Lerner (Member, IEEE), Anvar N. Khairullin, R. R. Fayzullin

Kazan National Research Technical University n.a. A.N. Tupoleva – KAI, Kazan, Russia

Dmitrii V. Shushpanov

The Bonch-Bruевич Saint Petersburg State University of Telecommunications, Saint Petersburg, Russia, Saint-Petersburg, Russia

V. I. Il'in

Kazan Federal University, Kazan, Russia

**RESOLUTION TIME THEORY BROADBAND COMMUNICATIONS
IN PROBLEM OF DATA DEPENDENT JITTER IN FREQUENCY
SELECTIVE CHANNELS WITH PAM-N-SIGNALS**

E. M. Lobov, E. O. Lobova, V. O. Varlamov

Moscow Technical University of Communications and Informatics, Moscow, Russia

**SYNTHESIS OF THE OPTIMAL DISPERSION SLOPE AND PHASE JOINT
FILTERING ALGORITHM FOR THE BROADBAND SIGNAL IN THE
IONOSPHERIC RADIO CHANNEL**

V. Y. Mikhaylov, R. B. Mazepa, A. A. Abramov, N. A. Yakush

Moscow Aviation Institute (National Research University), Moscow, Russia

DEVELOPMENT OF MODELS OF SECRETLY INFLUENCE ON THE WIRELESS NETWORKS INFRASTRUCTURE USING SIGNAL-LIKE INTERFERENCE AND EVALUATION OF THEIR RESISTANCE TO DETECTION

M. Y. Spodobaev, M. V. Ivankovich

FSUE NIIR, Moscow, Russia

A. A. Kuchumov, E. M. Lobov, V. O. Varlamov

Moscow Technical University of Communications and Informatics, Moscow, Russia

5G DATA TRANSMISSION SYSTEM RADIO LINK LAYOUT USING FBMC BASED MULTIPLEXING

Timofey Shevgunov (*Senior Member, IEEE*)

Moscow Aviation Institute (National Research University), Moscow, Russia

USING SHAPING FILTER FOR DERIVING ANALYTICAL MODELS OF SPECTRAL CORRELATION FUNCTIONS DESCRIBING PULSE-MODULATED CYCLOSTATIONARY RANDOM PROCESSES

D. I. Sukhoplyuev, A. N. Nazarov

MIREA, Russian Technology University, Moscow, Russia

ANALYSIS OF APPLICATION-LEVEL LOAD BALANCING ALGORITHMS

A.P. Zhuravlev, T.A. Chadov

Moscow Technical University of Communications and Informatics, Moscow, Russia

QAM SIGNAL DEMODULATOR WITH ONE AND A HALF SYMBOL PER SAMPLE

SECTION 6.
Digital signal processing in on-board radio systems
13-00 – 15-00

SUB-SECTION 2

CHAIRMAN: **Igor V. Vlasuyk**, *Moscow Technical University of Communications and Informatics, Moscow, Russia*

Dmitry Egorov, Anastasia Egorova, Aleksey Potashnikov

Moscow Technical University of Communications and Informatics, Moscow, Russia

EFFICIENCY EVALUATION OF NOISE BASED CAMERA MEASUREMENTS ALGORITHMS

Anastasia Egorova, Roman Baryshev

Moscow Technical University of Communications and Informatics, Moscow, Russia

Anastasia Mozhayeva

The University of Waikato, New Zealand;

Moscow Technical University of Communications and Informatics, Moscow, Russia

METHODOLOGY OF RESEARCHING PERCEPTION IDENTITY OF REGIONS OF USERS' INTERESTS WHILE VIEWING STREAMING VIDEO CONTAINING VARIOUS CONTENT AND COMPRESSION ARTEFACTS

A. Komina, S. Votyakov, K. Nezhivleva, N. Stepanov, I. Vlasuyk

Moscow Technical University of Communications and Informatics, Moscow, Russia

ASSESSMENT OF INFORMATION CAPACITY OF COMPRESSED VIDEO SEQUENCES FOR INFORMATION SECURITY SYSTEMS

Vladislav Lesnikov (Member, IEEE), Tatiana Naumovich, Alexander Chastikov, Alexander Metelyov

Vyatka State University, Kirov, Russia

RESTORATION OF COMPLEX SIGNALS DISTORTED BY ALIASING AS A RESULT OF BANDPASS SUB-NYQUIST SAMPLING

O. A. Mukhametzyanov, D. V. Libina, T. F. Shcherbakova, S. S. Sedov

Kazan National Research Technical University named after A. N. Tupolev – KAI, Kazan, Russia

ANALYSIS OF ELECTROCARDIOSIGNALS BY Z LEAD ON PRESENCE OF LOW-AMPLITUDE HIGH-FREQUENCY COMPONENTS

K. A. Panteleeva, D. D. Gadasin, A. V. Shvedov, D. V. Gadasin

Moscow Technical University of Communications and Informatics, Moscow, Russia

DETERMINING THE AMOUNT OF INFORMATION IN ONE INFORMATION BIT OF TEXT DATA

O. B. Popov, T. V. Chernysheva, K. V. Orlov, P. S. Saprnov

Moscow Technical University of Communications and Informatics, Moscow, Russia

MINIMIZING DISTORTION WHEN COMPANDING AN AUDIO SIGNAL IN TRANSMISSION CHANNELS

D. Yu. Ryabov, O. A. Mukhametzyanov, S. S. Sedov, T. F. Shcherbakova

Kazan National Research Technical University named after A. N. Tupolev – KAI, Kazan, Russia

ANALYSIS OF POWER SPECTRUMS IN HEART SIGNALS TO DETECT THE PRESENCE OF LOW-AMPLITUDE HIGH-FREQUENCY COMPONENTS

A. V. Shvedov, D. V. Gadasin, O. G. Klygina, L. A. Tremasova

Moscow Technical University of Communications and Informatics, Moscow, Russia

OPTIMIZATION OF NETWORK ROUTING USING THE MARKOV DECISION PROCESS AND HAMILTONIAN CYCLE

March 14, 2023 (Tuesday)
15-00 – 17-00

SECTION 7.
Electrical and electronic engineering pedagogy

SECTION CHAIRMAN: **Sergei L. Yablochnikov**, *Doctor of Pedagogical Sciences, Professor of Moscow Technical University of Communications and Informatics, Moscow, Russia*

A. S. Adzhemov (*Member, IEEE*), **A. Y. Kudryashova**, **N. E. Poborchaya**
Moscow Technical University of Communications and Informatics, Moscow, Russia
**IMPLEMENTATION OF THE FORMAT OF VIDEO LECTURES
FOR DISCIPLINES OF THE DEPARTMENT OF GENERAL
COMMUNICATION THEORY**

Veronica M. Antonova, **Elena E. Malikova**, **Vladimir E. Bogomolov**,
Andrey Y. Malikov
Moscow Technical University of Communications and Informatics, Moscow, Russia
**SOME FEATURES OF ANYLOGIC INTEGRATION INTO THE UNIVERSITY'S
EDUCATION SYSTEM**

S. S. Dymkova (*Member, IEEE*)
Moscow Technical University of Communications and Informatics, Moscow, Russia;
Institute of Radio and Information Systems (IRIS), Vienna, Austria
**METHODOLOGY FOR ORGANIZING SCIENTIFIC WORK
IN TELECOMMUNICATIONS UNIVERSITY**

R. T. Govorova
Beijing Language and Culture University, Beijing, China;
Moscow Technical University of Communications and Informatics, Moscow, Russia
E. G. Kukharengo
Moscow Technical University of Communications and Informatics, Moscow, Russia
**THE SPECIAL ASPECTS OF CHINESE TEACHING METHODOLOGY
FOR RADIO ENGINEERING STUDENTS**

A. Y. Kudryashova, **A. S. Adzhemov** (*Member, IEEE*), **N. V. Toutova**
Moscow Technical University of Communications and Informatics, Moscow, Russia
**IMPLEMENTATION OF ELECTRONIC EDUCATIONAL AND METHODOLOGICAL
COMPLEXES FOR STUDENTS OF IT AREAS**

E. G. Kukhareno, V. V. Voskobovich, A. M. Kukhareno

Moscow Technical University of Communications and Informatics, Moscow, Russia

A. S. Novikova,

RANEPA, Moscow, Russia

**IMPROVING THE EFFICIENCY OF INFORMATION SYSTEMS MANAGEMENT
THROUGH THE INTRODUCTION OF THE AUTHORITY CRITICALITY
MATRIX**

E. V. Lopatina, S. N. Maltseva, A. Y. Pavlova

Moscow Technical University of Communications and Informatics, Moscow, Russia

**SELF-DIRECTED LEARNING OPTIMISATION TOOLKITS FOR ELECTRONICS
AND ELECTRICAL ENGINEERING STUDENTS**

A. E. Mikenin, G. A. Prokurat, A. V. Pestryakov

Moscow Technical University of Communications and Informatics, Moscow, Russia

**SOFTWARE DEMO VERSIONS OF MODERN MEASURING EQUIPMENT
USING FOR TELECOMMUNICATION DISCIPLINES STUDYING**

S. L. Yablochnikov, I. O. Yablochnikova

Moscow Technical University of Communications and Informatics, Moscow, Russia

V. B. Dzobelova

North Ossetian State University named after Kosta Levanovich Khetagurov, Moscow, Russia

A.V. Dobrovinskaya

Kutafin Moscow State Law University, Moscow, Russia

A. A. Bekoeva

North Ossetian State University named after Kosta Levanovich Khetagurov, Vladikavkaz, Russia

**MANAGEMENT OF THE PROCESSES OF IT BACHELORS' TRAINING
IN TECHNICAL UNIVERSITIES**