

Volume 60 of PROCEEDINGS includes the papers presented at the scientific conference RU & SU'21, organized and conducted by University of Ruse "Angel Kanchev" and the Union of Scientists - Ruse. Series 4.2. contains papers reported in the Sustainable and Intelligent Transport Systems, Technologies and Logistics.

Book	Code	Faculty and Section
Agrarian and Industrial Faculty		
1.1.	FRI-ONLINE-1-AMT&ASVM	Agricultural Machinery and Technologies, Agrarian Science and Veterinary Medicine
	FRI-ONLINE-1-MR	Maintenance and Reliability
	FRI-ONLINE-1-THPE	Thermal, Hydro- and Pneumatic Equipment
	FRI-ONLINE-1-EC	Ecology and Conservation
	FRI-ONLINE-1-ID	Industrial Design
1.2.	WED-ONLINE-SSS-AMT&ASVM	Agricultural Machinery and Technologies, Agrarian Science and Veterinary Medicine
	WED-ONLINE-SSS- MR	Maintenance and Reliability
	WED-ONLINE-SSS-THPE	Thermal, Hydro- and Pneumatic Equipment
	WED-ONLINE-SSS-EC	Ecology and Conservation
	WED-ONLINE-SSS-ID	Industrial Design
Faculty of Mechanical and Manufacturing Engineering		
2.1.	FRI-ONLINE-1-MEMBT	Mechanical Engineering and Machine-Building Technologies
2.2.	WED-ONLINE-SSS-MEMBT	Mechanical Engineering and Machine-Building Technologies
Faculty of Electrical Engineering Electronics and Automation		
3.1.	FRI-ONLINE-1-EEEE	Electrical Engineering, Electronics and Automation
3.2.	FRI-ONLINE-1-CCT	Communication and Computer Technologies
3.3.	THU-ONLINE-SSS-EEEE	Electrical Engineering, Electronics and Automation
	THU-ONLINE-SSS-CCT	Communication and Computer Technologies
Faculty of Transport		
4.1.	FRI-2.209-1-TMS	Transport and Machine Science
4.2.	FRI-2.204-SITSTL	Sustainable and Intelligent Transport Systems, Technologies and Logistics
4.3.	WED-ONLINE-SSS-TMS	Transport and Machine Science
Faculty of Business and Management		
5.1.	FRI-ONLINE-1-EM	Economics and Management
5.2.	FRI-ONLINE-1-LIPC	Linguoculturology, Intercultural and Political Communication
5.3.	THU-ONLINE-SSS-EM	Economics and Management
5.4.	FRI-ONLINE-1-ESIS	European Studies and International Security
8.2.	FRI-ONLINE-1-SW	Social Work
Faculty of Natural Sciences and Education		
6.1.	FRI-ONLINE-1-MIP	Mathematics, Informatics and Physics
6.2.	FRI-ONLINE-1-PP	Pedagogy and Psychology
6.3.	FRI-ONLINE-1-LL	Linguistics and Literature
	FRI-ONLINE-1-AS	Art Studies
6.4.	FRI-ONLINE-1-ERI	Education - Research and Innovations

6.5.	THU-ONLINE-SSS-FM	Financial Mathematics
	THU-ONLINE-SSS-PP	Pedagogy and Psychology
Faculty of Law		
7.1.	FRI-ONLINE-1-LS	Law Studies
7.2.	FRI-ONLINE-1-NS	National Security
7.3.	MON-ONLINE-SSS-L	Law Studies
Faculty of Public Health and Health Care		
8.1.	FRI-ONLINE-1-HP	Health Promotion
8.3.	FRI-ONLINE-1-HC	Health Care
8.4.	FRI-ONLINE-1-MCDA	Medical and Clinical Diagnostic Activities
8.5.	THU-ONLINE-SSS-HP	Health Promotion
	FRI-ONLINE-SSS-HC	Health Care
	THU-ONLINE-SSS-MCDA	Medical and Clinical Diagnostic Activities
Quality of Education Directorate		
9.1.	FRI-ONLINE-QHE	Quality of Higher Education
Razgrad Branch of the University of Ruse		
10.1.	FRI-LCR-1-CT(R)	Chemical Technologies
10.2.	FRI-LCR-1-BFT(R)	Biotechnologies and Food Technologies
10.3.	TUE-ONLINE-SSS-BFT(R)	Biotechnologies and Food Technologies
	TUE-ONLINE-SSS-CT(R)	Chemical Technologies
Silistra Branch of the University of Ruse		
11.1.	FRI-ONLINE-DPM(S)	Didactics, Pedagogy and Methodology of training in...
	FRI-ONLINE-LTLHF(S)	Linguistics; Theory of Literature and History; Philosophy
	FRI-ONLINE-ELENSTS(S)	E-Learning; Electrical; Technical Sciences
11.2.	FRI-ONLINE-SSH(S)	Humanities
	FRI-ONLINE-SSS-PPTM(S)	Pedagogy, Psychology, and Teaching Methodology
	FRI-ONLINE-SSS-TS(S)	Technical Sciences

The papers have been reviewed.

ISSN 1311-3321 (print)

ISSN 2535-1028 (CD-ROM)

ISSN 2603-4123 (on-line) Copyright © authors

The issue was included in the international ISSN database, available at <https://portal.issn.org/>.

The online edition is registered in the portal ROAD scientific resources online open access



PROGRAMME COMMITTEE

- **Prof. Amar Ramdane-Cherif**
University of Versailles, France
- **Assoc. Prof. Manolo Dulva HINA**
ECE Paris School of Engineering, France
- **Prof. Leon Rothkrantz**
Delft University of Technology, Netherlands
- **Assoc. Prof. Antonio Jose Mendes**
University of Coimbra, Portugal
- **Prof. Ville Leppanen**
University of Turku, Finland
- **Assoc. Prof. Marco Porta**
University of Pavia, Italy
- **Prof. Douglas Harms**
DePauw University, USA
- **Prof. Zhanat Nurbekova**
L.N.Gumilyov Eurasian National University, Nur Sultan, Kazakhstan
- **Prof. Mirlan Chynybaev**
Kyrgyz State Technical University, Bishkek, Kyrgyzstan
- **Prof. Ismo Hakala, PhD**
University of Jyväskylä, Finland
- **Prof. Artur Jutman, PhD**
Tallinn University of Technology, Estonia
- **Prof. RNDr. Vladimir Tvarozek, PhD**
Slovak University of Technology in Bratislava, Bratislava, Slovakia
- **Assoc. Prof. Ing. Zuzana Palkova, PhD**
Slovak University of Agriculture in Nitra, Nitra, Slovakia
- **Andrzej Tutaj, PhD**
AGH University of Science and Technology, Krakow, Poland
- **Prof. Valentin NEDEFF Dr. eng. Dr.h.c.**
“Vasile Alecsandri” University of Bacău, Romania
- **Cătălin POPA, PhD**
“Mircea cel Bătrân” Naval Academy, Constantza, Romania
- **Prof. dr Larisa Jovanović**
Alfa University, Belgrade, Serbia
- **Prof. dr hab. Edmund LORENCOWICZ**
University of Life Sciences in Lublin, Poland
- **Assoc. Prof. Ion MIERLUS - MAZILU, PhD**
Technical University of Civil Engineering, Bucharest, Romania
- **Prof. Dojčil Vojvodić PhD**
Faculty of Philosophy, University of Novi Sad, Serbi
- **Assoc. Prof. Alexandrache Carmen, PhD**
Department of Teacher Training, “Dunarea de Jos”, Galati University, Romania
- **Prof. Alberto Cabada**
University of Santiago de Compostela, Faculty of Mathematics, Santiago de Compostela, Spain
- **Kamen Rikev, PhD**
Institute of Slavic Philology, Maria Curie-Skłodowska University in Lublin, Poland

- **Anna Klimentova, PhD**
Constantine the Philosopher University of Nitra, Slovakia
- **Prof. Ricardo Gobato, PhD**
Secretariat of State of Parana Education and Sport (SEED/PR), Laboratory of Biophysics and Molecular Modeling Genesis
- **Prof. Fatima Rahim Abdul Hussein, PhD**
University of Misan, College of Basic Education, English Department, Iraq
- **Prof. Emilija Gjorgjeva, PhD**
Goce Delchev University - Shtip, Nord Macedonia
- **Prof. Igor Kevorkovich Danilov, DSc**
Yuri Gagarin State Technical University of Saratov, Russia
- **Prof. Aleksander Valentinov Sladkowski, DSc**
Silesian University of Technology, Poland
- **Prof. Vera Karadjova, PhD**
“St. Kliment Ohridski” University – Bitola, Faculty of tourism and hospitality – Ohrid, Republic of North Macedonia
- **Prof. Aleksandar Trajkov, PhD**
“St. Kliment Ohridski” University - Bitola, Faculty of tourism and hospitality – Ohrid, Republic of North Macedonia
- **Prof. Petar Pepur, PhD**
University of Split, Croatia
- **Prof. Korhan Arun, PhD**
Namik Kemal University, Tekirdağ, Turkey
- **Prof. Yuliya Yorgova, PhD**
Burgas Free University, Bulgaria
- **Jelena Stankovic, PhD**
University of Nis, Serbia
- **Jovica Stankovic, PhD**
University of Nis, Serbia
- **Prof. Gerhard Fiolka, PhD**
University of Fribourg, Switzerland
- **Prof. Haluk Kabaalioglu, PhD**
Yeditepe University, Turkey
- **Prof. Silva Alves, PhD,**
University of Lisbon, Portugal
- **Hanneke van Brugge, DHC mult**
Appeldoorn, The Netherlands
- **Prof. Elena Torina**
Tula State Pedagogical University "L. N. Tolstoy", Tula, Russia
- **Prof. Violeta Jotova**
Direction Pediatrics at St. Marina University Hospital - Varna, Bulgaria, Chair ESPE Postgraduate Qualification Committee
- **Prof. Tanya Timeva, MD, PhD**
Obstetrics and Gynecology Hospital "Dr. Shterev", Sofia, Bulgaria
- **Prof. Kiril Stoychev, PhD,**
Institute of Metal Science, Equipment and Technologies “Acad. A. Balevsci” with Hydroaerodinamics centre – BAS, Bulgaria
- **Assoc. Prof. Mark Shamtsyan, PhD**
Technical University, Saint Petersburg, Russia

- **Assoc. Prof. Oleksii Gubenia, PhD**
National University of Food Technologie, Kiev, Ukraine
- **Prof. Olexandr Zaichuk, DSc**
Ukrainian State University of Chemical Technology, Dnepropetrovsk, Ukraine
- **Prof. Eugene Stefanski, DSc**
Samara University, Russia
- **Assoc. Prof. Tatiana Strokovskaya, PhD**
International University of Nature “Dubna”, Dubna, Russia
- **Prof. DSc. Petar Sotirow**
Maria Curie-Sklodowska University of Lublin, Poland
- **Prof. Papken Ehasar Hovsepian**
Sheffield Hallam University, Sheffield, UK
- **Accos. Prof. Krassimir Dochev Dochev, PhD**
University of Portsmouth School of Engineering, UK
- **Mariana Yordanova Docheva, PhD**
University of Portsmouth School of Engineering, UK
- **Assoc. Prof. Ivan Antonov Lukanov, PhD**
University of Botswana, Faculty of Engineering and Technology, Gaborone, Botswana
- **Assoc. Prof. Petko Vladov Petkov, PhD**
Research Associate Cardiff University, UK
- **Prof. Stepan Terzian DSc**
Bulgarian Academy of Science, Bulgaria
- **Prof. Gabriel Negreanu, PhD**
University Politehnica of Bucharest, Romania

ORGANISING COMMITTEE

◆ **ORGANIZED BY: UNIVERSITY OF RUSE (UR) AND UNION OF SCIENTISTS (US) - RUSE**

◆ **ORGANISING COMMITTEE:**

• **Chairperson:**

Prof. DTSc. Hristo Beloev, DHC mult., Academician of Bulgarian Academy of Sciences - Rector of UR, Chairperson of US - Ruse

• **Scientific Secretary:**

Prof. Diana Antonova PhD, Vice-Rector Research, dantonova@uni-ruse.bg, 082/888 249

• **THEMATIC FIELDS:**

- **Agricultural Machinery and Technologies, Agrarian Sciences and Veterinary Medicine**
- **Maintenance and Reliability**
- **Thermal, Hydro- and Pneumatic Equipment**
- **Ecology and Conservation**
- **Industrial Design**
Assoc. Prof. Plamen Manev, pmanev@uni-ruse.bg, 082 888 485
- **Didactics, Pedagogy and Methodology of training in...; (16.10., Silistra)**
Assoc. Prof. Diana Zhelezova-Mindizova, PhD, dmindizova@uni-ruse.bg
- **Linguistics; Theory of Literature and History; Philosophy; (16.10., Silistra)**
Assoc. Prof. Todorka Georgieva, DcS, tgeorgieva@uni-ruse.bg
- **E-Learning; Technical Sciences; (16.10., Silistra)**
Assoc. Prof. Evgenia Goranova, PhD, egoranova@uni-ruse.bg
- **Chemical Technologies (05-06.11., Razgrad)**
- **Biotechnologies and Food Technologies (05-06.11., Razgrad)**
Assoc. Prof. Tsvetan Dimitrov, PhD, conf_rz@abv.bg, 0887 631 645
- **Mechanical Engineering and Machine-building Technologies**
Prof. Ivelin Ivanov, PhD, ivivanov@uni-ruse.bg, +359 82 888 472
- **Electrical Engineering, Electronics and Automation**
Assoc. Prof. Boris Evstatiev, PhD, bevstatiev@uni-ruse.bg, 082 888 371
- **Communication and Computer Systems**
Assoc. Prof. Galina Ivanova, PhD, giivanova@uni-ruse.bg, 082 888 855
Pr. Assist. Ivanka Tsvetkova, PhD, itsvetkova@uni-ruse.bg, 082 888 836
- **Transport and Machine Science**
Assoc. Prof. Simeon Iliev, PhD, spi@uni-ruse.bg, 082 888 331
- **Sustainable and intelligent transport systems, technologies and logistics**
Prof. Velizara Pencheva, PhD, vpencheva@uni-ruse.bg, 082 888 558, 082 888 608

- **Economics and Management**
Pr. Assist. Miroslava Boneva, PhD, mboneva@uni-ruse.bg, 082/888 776
Pr. Assist. Elizar Stanev, PhD, eastanev@uni-ruse.bg, 082/888 557
- **European studies and International Security**
Prof. Vladimir Chukov, DSc, vlachul@gmail.com, +359 82 825 667
Assoc. Prof. Mimi Kornazheva, PhD, mkornazheva@uni-ruse.bg, +359 82 825 667
- **Linguoculturology, Intercultural and Political Communication**
Prof. Juliana Popova, PhD, jppopova@uni-ruse.bg, +359 82 888 255
Pr. Assist. Hristina Sokolova, PhD, hsokolova@uni-ruse.bg, +359878537015
- **Mathematics, Informatics and Physics**
Prof. Tsvetomir Vasilev, PhD,
tvasilev@uni-ruse.bg, 082/888 475
- **Education – Research and Innovations**
Assoc. Prof. Emilia Velikova, PhD,
evelikova@uni-ruse.bg, 0885 635 874
- **Pedagogy and Psychology**
Assoc. Prof. Bagryana Ilieva, PhD,
bilieva@uni-ruse.bg 082 888 219
- **History, Ethnology and Folklore**
Pr. Assist. Reneta Zlateva, PhD
rzlateva@uni-ruse.bg, 082/888 752
- **Linguistics, Literature and Art Science**
Assoc. Prof. Velislava Doneva, PhD,
doneva_v@uni-ruse.bg, 0886 060 299
- **Health Promotion**
Assoc. Prof. Stefka Mindova, PhD,
smindova@uni-ruse.bg, 0882 895 149
- **Social Work**
Assoc. Prof. Silvia Krushkova, PhD, skrushkova@uni-ruse.bg, 0882517554
Pr. Assist. Ana Popova, PhD, apopova@uni-ruse.bg, 0889 874219
- **Medical and Clinical Diagnostic Activities**
Prof. Nikola Sabev, DSc,
nsabev@uni-ruse.bg, 0882 123 305
- **Health Care**
Pr. Assist. Tsveta Hristova, PhD,
tshristova@uni-ruse.bg, 0878 389 793
- **Law**
Assoc. Prof. Elitsa Kumanova, PhD,
ekumanova@uni-ruse.bg, 0884 980 050
- **National Security**
Assoc. Prof. Milen Ivanov, DSc,
poligon@abv.bg, 082 888 736
- **Quality of Higher Education**
Prof. Ivanichka Serbezova, PhD, iserbezova@uni-ruse.bg
Daniela Todorova, dtodorova@uni-ruse.bg, 082 888 378

REVIEWERS

- **Prof. Aleksander Sladkowski, DTSc**
Silesian University of Technology, Poland
- **Prof. Svetla Stoilova, Prof. DTSc**
Technical University of Sofia
- **Prof. Stanimir Karapetkov, Prof. DTSc**
Technical University of Sofia
- **Assoc. prof. Emil Madzharski, PhD**
Technical University of Sofia
- **Assoc. prof. Volodiya Kirov, PhD**
Technical University of Sofia
- **Assoc. prof. Nikolina Dragneva, PhD**
Burgas Free University
- **Assoc. prof. Simeon Iliev, PhD**
Univercity of Ruse “Angel Kanchev”
- **Assoc. prof. Svetlozar Nejkov, PhD**
Technical University of Sofia
- **Assoc. prof. Mitko Marinov, PhD**
Univercity of Ruse “Angel Kanchev”

**SUSTAINABLE AND INTELLIGENT TRANSPORT SYSTEMS,
TECHNOLOGIES AND LOGISTICS**

Content

1. SAT-ONLINE-1-SITST-1	13
DEVELOPMENT OF THE PHYSICAL INTERNET CONCEPT AND PERSPECTIVES FOR APPLICATION IN TRANSPORT AND LOGISTICS <i>Velizara Pencheva</i>	
2. SAT-ONLINE-1-SITST-2	24
RECENT CYCLING MOBILITY TRENDS OBSERVED IN THE CITY OF BOLOGNA <i>Federico Rupi, Antonio Danesi</i>	
3. SAT-ONLINE-1-SITST-3	30
ASSESSMENT OF SOME INDICATORS DETERMINING THE DISCIPLINE AND RESPONSIBILITY OF THE PARTICIPANTS IN THE ROAD TRAFFIC <i>Iliyan Damyanov, Georgi Mladenov, Vladimir Madjarski</i>	
4. SAT-ONLINE-1-SITST-4	37
TRAFFIC FLOWS PASSAGE OPTIMIZATION THROUGH A LIGHT REGULATED CROSSROADS IN THE TOWN OF PLOVDIV <i>Durhan Saliev, Georgi Mladenov, Dimityr Bechev</i>	
5. SAT-ONLINE-1-SITST-5	45
IMPROVING THE CONDITIONS FOR PASSING THROUGH A CROSSROADS IN THE CITY OF SOFIA WITH HIGH TRANSPORT LOADS <i>Durhan Saliev, Prof. Georgi Mladenov, Sandrina Babcheva</i>	
6. SAT-ONLINE-1-SITST-6	54
APPLICATION OF A DIFFERENT PEDESTRIAN IMPACT MODELS TO THE DETERMINATION OF IMPACT SPEED <i>Daniel Lyubenov</i>	
7. SAT-ONLINE-1-SITST-7	59
ALGORITHM, USED IN THE INVESTIGATION OF PREVENTION OF A TRAFFIC ACCIDENT WITH THE PARTICIPATION OF A PEDESTRIAN <i>Milena Mratsenkova</i>	
8. SAT-ONLINE-1-SITST-8	63
GRAPHO-ANALYSIS ANALYSIS OF THE MOVEMENT OF A VEHICLE, INCLUDING THE PROCESSES: ACCELERATION, MOTION AT A CONSTANT SPEED AND STOPPING <i>Svilen Kostadinov</i>	
9. SAT-ONLINE-1-SITST-9	68
STUDY OF FAKTORS RELATED TO THE RISK OF ACCIDENTS WITH PEDESTRIANS <i>Kalcho Petkov</i>	
10. SAT-ONLINE-1-SITST-10	74
ASSESSMENT OF THE IMPACT OF ROADS AND VEHICLES ON THE NUMBER OF PERSONS KILLED IN ROAD TRAFFIC ACCIDENTS IN BULGARIA <i>Vladimir Madjarski</i>	

11.	SAT-ONLINE-1-SITST-11 INVESTIGATION OF THE UNEVENNESS OF THE TRANSPORT FLOWS AT JUNCTION <i>Kremena Mineva, Asen Asenov, Velizara Pencheva</i>	79
12.	SATI-ONLINE-1-SITST-12 EXPERIMENTAL STUDY OF THE VEHICLE ACCELERATION WITH AN AUTOMATIC TRANSMISSION <i>Filip Kirilov, Daniel Lyubenov</i>	87
13.	SAT-ONLINE-1-SITST-13 STUDY OF TRANSPORT PROCESSES USING A SIMULATOR <i>Dimitar Grozev</i>	94
14.	SAT-ONLINE-1-SITST-14 IMPACT OF VEHICLES ON TRAFFIC SAFETY <i>Ivan Beloev, Teodor Gatev, Asen Asenov, Velizara Pencheva</i>	101
15.	SAT-ONLINE-2-SITST-1 STUDY OF DYNAMIC CHARACTERISTICS OF CARS USING DIFFERENT ENERGY SOURCES <i>Dimitar Grozev, Ivan Beloev</i>	107
16.	SAT-ONLINE-2-SITST-2 METHODOLOGY FOR DRY PORT EFFICIENCY ASSESSMENT IN CASE OF UNBALANCED IMPORT AND EXPORT CONTAINER FLOW <i>Boril Ivanov</i>	116
17.	SAT-ONLINE-2-SITST-3 PROCESS-ORIENTED DESIGN OF AN INTERMODAL TERMINAL <i>Svetoslav Martinov, Mario Ninov</i>	121
18.	SAT-ONLINE-2-SITST-4 ENVIRONMENTAL AND SOCIAL ASPECTS IN THE FORMATION OF URBAN PASSENGER SYSTEMS TRANSPORT <i>Aleksandar Georgiev, Asen Asenov, Velizara Pencheva</i>	128
19.	SAT-ONLINE-2-SITST-5 ANALYSIS OF THE TRANSPORT WORK IN A COMPANY FOR PUBLIC TRANSPORT OF PASSENGERS <i>Pavel Stoyanov</i>	135
20.	SAT-ONLINE-2-SITST-6 STUDY OF THE OPPORTUNITIES AND CHALLENGES FOR DECARBONIZATION OF TRANSPORT FOR URBAN LOGISTICS <i>Asen Asenov, Velizara Pencheva</i>	143
21.	SAT-ONLINE-2-SITST-7 RESEARCH OF SOME SECTIONS OF BICYCLE INFRASTRUCTURE IN THE CITY OF RUSE <i>Toncho Balbuzanov</i>	151
22.	SAT-ONLINE-2-SITST-8 RESEARCHING THE PREPARETNESS OF THE ROAD TRANSPORT COMPNIES FOR USUGE OF eTIR CARNET AND eCMR <i>Velizara Pencheva, Radoslav Kolev</i>	157

23.	SAT-ONLINE-2-SITST-9 USE OF THE ROLE-PLAY METHOD FOR TRAINING STUDENTS FROM TRANSPORT SPECIALTIES <i>Mihail Milchev, Dimitar Grozev</i>	167
24.	SAT-ONLINE-2-SITST-10 SURVEY OF CONSUMER OPINION ON THE SERVICES PROVIDED BY COURIER COMPANIES IN THE CITIES <i>Valeri Gamozov , Asen Asenov, Dimitar Eskidarov</i>	172
25.	SAT-ONLINE-2-SITST-11 OVERVIEW OF TRENDS IN URBAN MOBILITY DEVELOPMENT <i>Dimitar Georgiev</i>	179
26	SAT-ONLINE-2-SITST-12 COMPARATIVE ANALYSIS OF CURRICULUM TRAINING CURRICULA FOR CATEGORY "B" DRIVERS IN EUROPEAN UNION COUNTRIES <i>Nikolay Paunov, Asen Asenov, Velizara Pencheva</i>	185
27	SAT-ONLINE-2-SITST-13 ANALYSIS OF INNOVATIVE HYBRID SYSTEMS IN RIVER NAVIGATION <i>Valeri Georgiev Asen Asenov, Velizara Pencheva, Stoyan Nyagolov</i>	192
28	SAT-ONLINE-2-SITST-14 THE STATE OF TRAFFIC SAFETY TRAINING IN PRESCHOOL AND SCHOOL EDUCATION <i>Asen Asenov</i>	201