

**21th
INTERNATIONAL CONFERENCE
ON COMPUTER SYSTEMS
AND TECHNOLOGIES**

CompSysTech'20

**19-20 June 2020
University of Ruse
BULGARIA**

P R O G R A M M E



**"WORK,
FINISH,
PUBLISH"**

Michael Faraday

◆ CONFERENCE OBJECTIVE

The CompSysTech'20 International Conference is organized by the Bulgarian Academic Society of Computing and its OBJECTIVE is to intensify the information exchange of results in theoretical research and practical developments in the field. Since 2007 all papers presented at the conference and published in the conference proceedings have been published in the ACM Digital Library, registered in the US Congress Library and indexed in SCOPUS, dblp, etc.

CompSysTech'20 is organized under the patronage of the:

- Bulgarian Ministry of Education and Science;
- John Atanasoff Union of Automation and Informatics;
- University of Ruse

◆ INTERNATIONAL PROGRAMME COMMITTEE

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Danail Dochev	Bulgaria	Mirjana Ivanovic	Serbia

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Davide Taibi	Italy	Nikola Kasabov	New Zealand
Diana Kalibatiene	Lithuania	Nikolay Mehandjiev	United Kingdom
Domenico Tegolo	Italy	Peter Stanchev	United States
Douglas Harms	United States	Rebecca Bartlett	United Kingdom
Erika Nazaruka	Latvia	Roumen Nikolov	Bulgaria
Eugenijus Macikenas	Lithuania	Sebastiano Battiato	Italy
Francesco Rundo	Italy	Stavros Nikolopoulos	Greece
Georgi Georgiev	Bulgaria	Stoicho Stoichev	Bulgaria
Georgi Todorov	Buglaria	Svetlana Stefanova	Bulgaria
Georgi Tsochev	Bulgaria	Tsvetozar Georgiev	Bulgaria
Grisha Spasov	Bulgaria	Ville Leppänen	Finland
Heinz-Dietrich Wuttke	Germany	Vladimir Lazarov	Bulgaria
Isaac Agudo	Spain	Yasar Guneri Sahin	Turkey
Ivan Jelinek	Czech Republic	Zoltan Geler	Serbia

◆ NATIONAL ORGANIZING COMMITTEE

• Co-Chairs:

Galina Ivanova (Bulgaria)
Aneliya Ivanova (Bulgaria)

•Secretary:

Eugenia Dimitrova (Bulgaria)

• Members:

Tsvetozar Georgiev (Bulgaria)	Rumen Rusev (Bulgaria)
Stoyanka Smrikarova (Bulgaria)	Desislava Baeva (Bulgaria)
Angel Smrikarov (Bulgaria)	Yuksel Aliev (Bulgaria)

◆ TOPICS

1. Computer Hardware.
2. Computer Software.
3. Application Aspects of Computer Systems and Technologies.
4. Educational Aspects of Computer Systems and Technologies (ICT-based educational technologies).

Friday, 19th June 2020

15:00

OPENING

WELCOME

Chair: Galina Ivanova



PLENARY SESSION

Chair: Tzvetomir Vassilev

Room: <https://meet.uni-ruse.bg/b/kqw-jjh-haa>



Dr. Veselin Raychev
ETH Zurich

Keynote on:
**Beyond Neural Networks for Programming:
How to Learn from Programs**



Prof. Valeri Mladenov
Technical University of Sofia, Bulgaria

Keynote on:
**IT impact on the labor market –
professions to disappear and new ones to
emerge**



Assoc. Prof. Dr. Plamen Vatchkov
National Center for Supercomputer
Applications, Sofia, Bulgaria (NCSA)

Keynote on:
European and Bulgarian Supercomputers

DISCUSSIONS

PROGRAMME SUMMARY

Saturday, 20th June 2020

9:00 – 11:30	Session A Number of papers: 5	Session C Number of papers: 7	Session E Number of papers: 7	Session G Number of papers: 6
11:30 – 12:00	COFFEE BREAK			
12:00 – 14:30	Session B Number of papers: 7	Session D Number of papers: 6	Session F Number of papers: 3	Session H Number of papers: 6
12:00 – 14:30	Session I Number of papers: 6 THE YOUTH AND THE ICT (School students)			
14:30	https://meet.uni-ruse.bg/b/kgw-jjh-haa THE BEST PAPERS AWARDS			

Session A

Chair: **Daniela Chuda**
Co-Chair: **Svetozar Ilchev**
Scientific Secretary: **Galina Ivanova**

Saturday, 20 June 2020

9:00 – 11:30

<https://meet.uni-ruse.bg/b/zat-cpy-4je>

COMPUTER HARDWARE

1. **Display of Computer-Generated Vector Data by a Laser Projector**
Svetozar Ilchev, Rumen Andreev and Zlatoliliya Ilcheva
2. **Body Sensors System for Physiological Data Long-term Monitoring**
Galya Georgieva-Tsaneva

NETWORK AND INFORMATION SECURITY

3. **Governance Model of a Cybersecurity Network: Best Practices in the Academic Literature**
Yantsislav Yanakiev and Todor Tagarev
4. **SGFA: A Two-Factor Smartphone Authentication Mechanism Using Touch Behavioral Biometrics**
Daniela Chuda, Lukas Janik and Kamil Burda
5. **An Algorithmic Framework for Malicious Software Detection Exploring Structural Characteristics of Behavioral Graphs**
Alvaro Chysi, Stavros Nikolopoulos and Iosif Polenakis

DISCUSSIONS

11:30 – 12:00
Coffee Break

Session B

Chair: **Roumen Trifonov**
Co-Chair: **Aleksejs Zorins**
Scientific Secretary: **Galina Ivanova**

Saturday, 20 June 2020

12:00 – 14:30

<https://meet.uni-ruse.bg/b/zat-cpy-4je>

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

- 1. Recommendations Concerning the Selection of Artificial Intelligence Methods for Increasing of Cyber-Security**
Roumen Trifonov, Slavcho Manolov, Georgi Tsochev and Galya Pavlova
- 2. Understanding the Essence of Artificial Intelligence: Towards Ecological Safety of AI in Human Society**
Aleksejs Zorins
- 3. Software Platform for Retinal Disease Diagnosis Through Deep Convolutional Neural Networks**
Venci Mihalov, Desislav Andreev and Milena Lazarova
- 4. Quantum Entanglement-based Deep Convolutional Neural Networks**
Desislav Andreev and Milena Lazarova
- 5. Theoretical Justification of a Neural Network Approach to Combinatorial Optimization**
Vladislav Haralampiev
- 6. AI Governor for the Quality and the Strength of Bridges**
Radostina Petrova and Snezhana Sulova
- 7. Spatial Context Identification for an Autonomous Mobile Robot**
Azeddine Hamadi, Manolo Dulva Hina, Nadia Saadia and Galina Ivanova

DISCUSSIONS

14:30

<https://meet.uni-ruse.bg/b/kqw-jjh-haa>

THE BEST PAPERS AWARDS

Session C

Chair: **Leon Rothkrantz**
Co-Chair: **Emilia Golemanova**
Scientific Secretary: **Pavel Zlatarov**

Saturday, 20 June 2020

9:00 – 11:30

<https://meet.uni-ruse.bg/b/4hu-2qx-y9x>

COMPUTER SOFTWARE

1. **Declarative and Imperative Approaches for Proving Turing Completeness of SPIDER**
Emilia Golemanova and Tzanko Golemanov
2. **Software Improved State Control of an Autonomous Platform**
Alexander Kolev and Alexander Ranov
3. **Developing and Implementing a Labyrinth Game for Self-Assessment**
Elitsa Ibryamova and Georgi Stefanov
4. **Distributed Ring-based Mutual Exclusion with Failure Recovery**
Milen Loukantchevsky

IMAGE, TIME SERIES AND SIGNAL PROCESSING

5. **Automated Surveillance Systems of Smart Cameras in Trains**
Leon Rothkrantz
6. **Wavelet Based Method for Non-Stationary Time Series Processing**
Galya Georgieva-Tsaneva
7. **Telemetry information restoring in satellite communications**
Kiril Alexiev, Ivan Tkachenko, Maksim Ivanushkin and Sergei Volgin

DISCUSSIONS

11:30 – 12:00
Coffee Break

Session D

Chair: **Bojan Cestnik**
Co-Chair: **Valentin Bakoev**
Scientific Secretary: **Pavel Zlatarov**

Saturday, 20 June 2020

12:00 – 14:30

<https://meet.uni-ruse.bg/b/4hu-2qx-y9x>

MODELING AND MATHEMATICAL SOFTWARE

1. **Network Risks In Markov Decision Processes**
Vassil Sgurev and Stanislav Drangajov
2. **Manipulability Analysis of Redundant Robotic Manipulator**
Lyubomira Miteva, Galya Pavlova, Roumen Trifonov and Kaloyan Yovchev
3. **A Method for Fast Computing the Algebraic Degree of Boolean Functions**
Valentin Bakoev
4. **Comparative Analysis of Statistical Methods for Estimating Hurst Exponent**
Mitko Gospodinov, Evgeniya Gospodinova and Ekaterina Popovska
5. **The introduction of an Oracle in a simple finance inspired dynamic system leads to instability**
Giuseppe Giacomelli
6. **On finding the optimal parameters for probability estimation with m-estimate**
Bojan Cestnik

DISCUSSIONS

14:30

<https://meet.uni-ruse.bg/b/kqw-jjh-haa>
THE BEST PAPERS AWARDS

Session E

Chair: **Virginio Cantoni**
Co-Chair: **Krasimira Stoilova**
Scientific Secretary: **Tzvetomir Vassilev**

Saturday, 20 June 2020

9:00 – 11:30

<https://meet.uni-ruse.bg/b/kqw-ijh-haa>

APPLICATION ASPECTS OF COMPUTER SYSTEMS AND TECHNOLOGIES

1. **Statistically Based Criteria for Complex ECG Signal Assessment at Preventive Cardio Control**
Aneliya Manukova, Ivan Georgiev and Matey Marinov
2. **Split and Queue Optimization in Transport Network through Bi-level Optimization**
Yordanka Boneva
3. **Optimization of Urban Traffic in city network**
Krasimira Stoilova and Todor Stoilov
4. **Distribution of workforce in a public transport company**
Stanislav Dimitrov
5. **Nonlinear Dynamics Methods for Analysis of ECG Signals**
Evgeniya Gospodinova, Mitko Gospodinov and Maria Negreva
6. **Traffic flow city index based on public transportation vehicles data**
Georgi Yosifov and Milen Petrov
7. **Javastylosis: a tool for computer-assisted chromatic and semantics based anastylosis of frescoes**
Virginio Cantoni, Mauro Mosconi and Alessandra Setti

DISCUSSIONS

11:30 – 12:00

Coffee Break

Session F

Chair: **Martin Djonov**
Co-Chair: **Tatyana Ivanova**
Scientific Secretary: **Tzvetomir Vassilev**

Saturday, 20 June 2020

12:00 – 14:30

<https://meet.uni-ruse.bg/b/kqw-jjh-haa>

DATA MANAGEMENT AND INFORMATION RETRIEVAL

1. **Ontology evaluation and multilingualism**
Tatyana Ivanova and Miroslav Popov
2. **Real-time data integration AWS Infrastructure for Digital Twin**
Martin Djonov and Miroslav Galabov
3. **Automatic Assignment of Reviewers to Papers Based on Vector Space Text Analysis Model**
Yordan Kalmukov

DISCUSSIONS

14:30

<https://meet.uni-ruse.bg/b/kqw-jjh-haa>

THE BEST PAPERS AWARDS

Session G

Chair: **Emiliyan Petkov**
Co-Chair: **Tzanko Golemanov**
Scientific Secretary: **Anelia Ivanova**

Saturday, 20 June 2020

09:00 – 11:30

<https://meet.uni-ruse.bg/b/yjq-w6g-wme>

**EDUCATIONAL ASPECTS
OF COMPUTER SYSTEMS AND TECHNOLOGIES
(ICT-based Educational Technologies)**

1. **Multifunctional Module Laboratory System for Training in the Subject Measurements in Electronics**
Jordan Stoev, Snezhinka Zaharieva and Adriana Borodzhieva
2. **A Set of Tools to Teach Language Processors Constriction**
Tzanko Golemanov and Emiliya Golemanova
3. **A Conceptual Framework for Mobile Learning Development in Higher Education**
Latinka Todoranova and Bonimir Penchev
4. **Knowledge model for developing, searching and using personalized learning content for learners, having dyslexia disability**
Tatyana Ivanova and Miroslav Popov
5. **Virtual Reality Training System for Specialists Who Operate on High-Voltage Switchgears in an Oil Plant in Russia**
Emiliyan Petkov and Vladislav Angelov
6. **21st century skills of ICT professionals - the requirements of business and readiness of Higher Education in Bulgaria**
Albena Antonova, Eliza Stefanova, Nikolina Nikolova, Pencho Mihnev and Boyan Bontchev

DISCUSSIONS

11:30 – 12:00
Coffee Break

Session H

Chair: **Yavor Dankov**
Co-Chair: **Radka Nacheva**
Scientific Secretary: **Anelia Ivanova**

Saturday, 20 June 2020

12:00 – 14:30

<https://meet.uni-ruse.bg/b/yjq-w6g-wme>

**EDUCATIONAL ASPECTS
OF COMPUTER SYSTEMS AND TECHNOLOGIES
(ICT-based Educational Technologies)**

- 1. Internationalization in Context of Education 4.0: AHP Ranking of Bulgarian Universities**
Radka Nacheva and Snezhana Sulova
- 2. Towards a Taxonomy of Instruments for Facilitated Design and Evaluation of Video Games for Education**
Yavor Dankov and Boyan Bontchev
- 3. Robotic Technology for Inclusive Education: A Cyber-Physical System Approach to Pedagogical Rehabilitation**
Maya Dimitrova, Eleni Vrochidou, Roman Zahariev, Aleksandar Krastev, Tsvete Yaneva, Christos Bazinas and Elena Blagoeva - Hazarbassanova
- 4. Service Robots for Special Education of Children with Disabilities**
Roman Zahariev and Nina Valchkova
- 5. A Vision of the University of the Future**
Hristo Beloev, Angel Smrikarov, Tsvetomir Vassilev, Tsvetozar Georgiev, Stoyanka Smrikarova, Aneliya Ivanova, Galina Ivanova, Vanya Stoykova, Elitsa Arsova, Yuksel Aliev and Pavel Zlatarov
- 6. Blending Technology-based Teacher-led and Student-centered Approaches in STEM Education**
Valentina Terzieva, Katia Todorova, Yuri Pavlov and Petia Kademova-Katzarova

DISCUSSIONS

Session I

Chair: **Petar Kenderov**

Co-Chair: **Desislava Baeva**

Scientific Secretary: **Yuksel Aliev**

Saturday, 20 June 2020

12:00 – 14:00

<https://meet.uni-ruse.bg/b/vha-exk-fa4>

THE YOUTH AND THE ICT (School students)

1. **Innovative Educational Geometry**
Maria Kirilova, Syuzan Feimova
2. **Mathematics in Photography**
Nikol Georgieva, Syuzan Feimova
3. **Enchat – Encryption Protected Text-based Messaging**
Anton Georgiev, Syuzan Feimova
4. **Budget Tracker**
Ivan Petrov, Syuzan Feimova
5. **Numbers and Arithmetic Operations**
Arzu Teykova, Esra Teykova, Simeon Nedelkov, Syuzan Feimova
6. **Mathematical Manual**
Velislava Krumova, Raya Hristova, Niya Neykova, Syuzan Feimova

DISCUSSIONS

14:30

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THE BEST PAPERS AWARDS

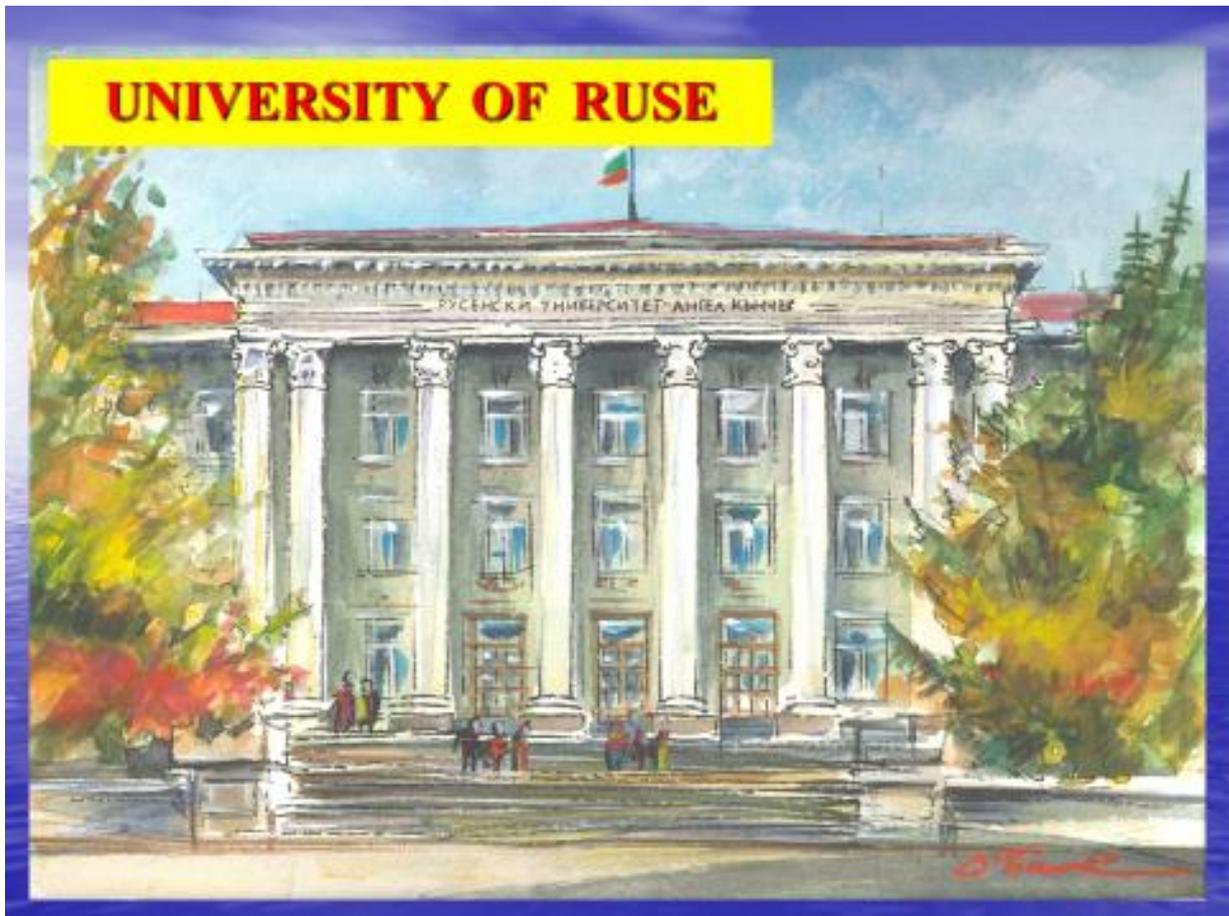
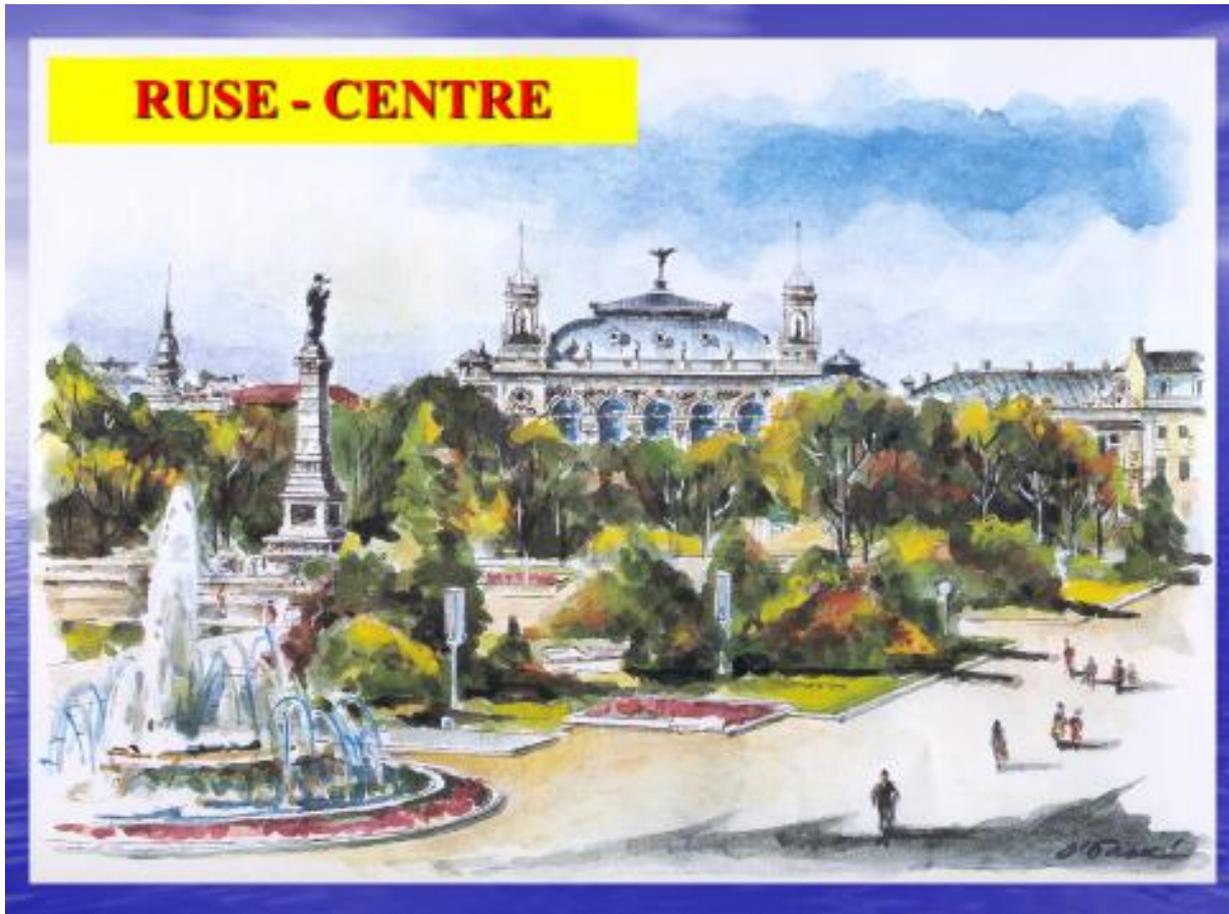
Saturday, 20th June 2020

14:30

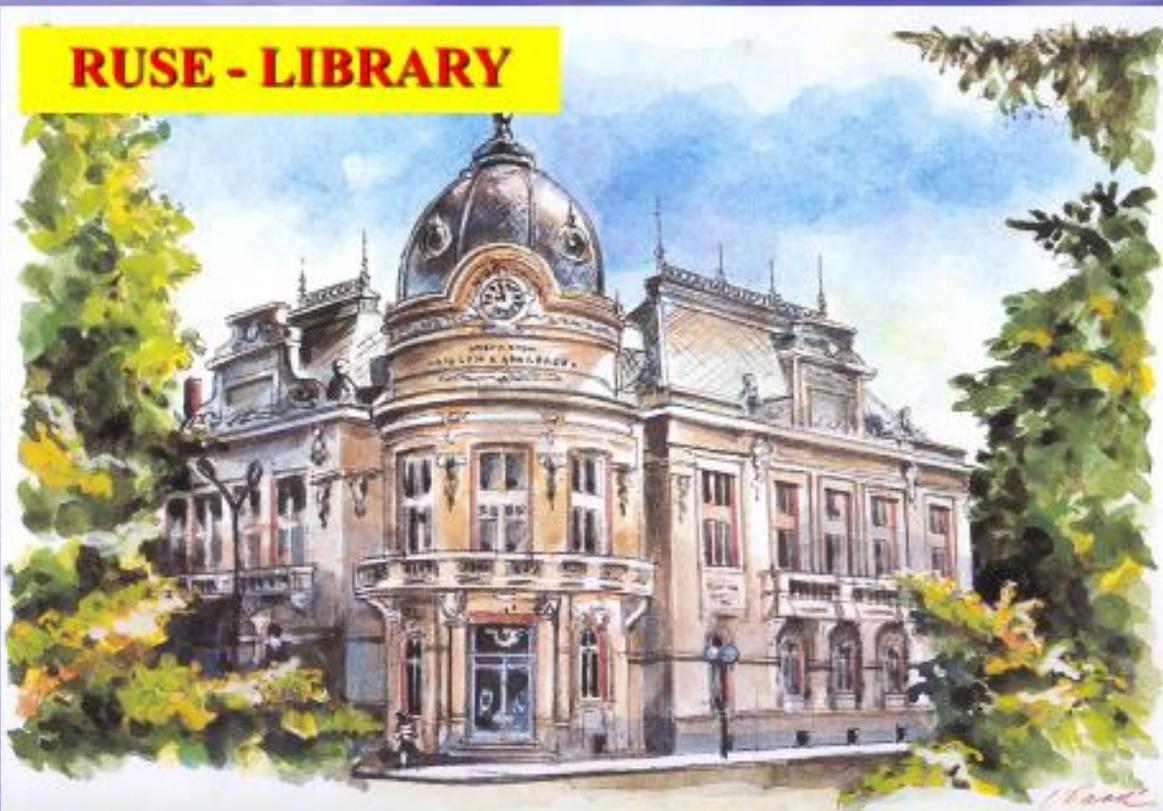
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**The CHAIRS
of the PROGRAMME COMMITTEE
and
the ORGANIZING COMMITTEE
will bestow
a CRYSTAL PRIZE
to the authors of the best papers.**

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REMARKS