

The 20th International Symposium on Symbolic and Numerical Algorithms for Scientific Computing

20th – 23rd September 2018
Timișoara, Romania

<http://synasc.ro/>

Organizers



**Department of
Computer Science**

*West University of Timișoara
(Timișoara, Romania)*



Institute e-Austria Timișoara

(Timișoara, Romania)



**Research Institute for
Symbolic Computation**

*Johannes Kepler University
(Linz, Austria)*

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Artificial Intelligence

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Distributed Computing

Karoly Bosa

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Advances in the Theory of Computing

Gabriel Istrate

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Workshops Chairs

Agents for Complex Systems

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Digital Image Processing for Medical and Automotive Industry

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Geoinformatics

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HPC for Science and Technology

Dana Petcu

West University of Timisoara (Romania)

Daniel Pop

West University of Timișoara (Romania)

Iterative Approximation of Fixed Points

Vasile Berinde

North University Center at Baia Mare (Romania)

Adrian Petrusel

Babeș-Bolyai University (Romania)

Ioan Rus

Babeș-Bolyai University (Romania)

Natural Computing and Applications

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University of Mumbai (India)

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Invited Speakers

Olivier Bournez

Ecole Polytechnique Paris (France)

Dorel Lucanu

Alexandru Ioan Cuza University (Romania)

Edwin Lughofer

Johannes Kepler University (Austria)

David Monniaux

University of Grenoble (France)

Andrei Voronkov

The University of Manchester (UK)

Tutorial Speakers

Alessandro Cimatti

Center for Information Technology (Italy)

Denis Enăchescu

Institute for Mathematical Statistics and Applied Mathematics (Romania)

Maria Prandini

Politecnico di Milano (Italy)

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Tracks

Thursday, 20th September

- Registration (08:00)
- Opening (09:00)
(chair: Erika Abraham, room: A11)
- **Invited Talk** (09:20–10:10)
(chair: Erika Abraham, room: A11)

Computing Over Convex Polyhedra Using VPL

David Monniaux

- Break (10:10)
- **Logic and Programming** (10:30–12:30)
(chair: Tudor Jebelean, room: A11)
 - (10:30) Towards Compiling Region Types Into RTSJ-Compliant Java Code
Florin Craciun and Gabriel Glodean
 - (10:50) SAT-Based Big-Step Local Search
Morad Muslimany and Michael Codish
 - (11:10) Acacia-K: A Tool for Synthesis of Reactive Systems from *KLTL*⁺ Specifications
Rodica Condurache
 - (11:30) Efficient Task Switching-Based Multiprocessor Scheduling for Nonpreemptive Independent Task Sets
Stefan Andrei, Vlad Radulescu, Albert Cheng and Gaurab Dahal
 - (11:50) Order Relations over Finitely Supported Structures
Andrei Alexandru and Gabriel Ciobanu
 - (12:10) Building Deobfuscated Applications from Polymorphic Binaries
Vlad Craciun
- Lunch (12:30)
- **Tutorial** (13:30–15:00)
(chair: Laura Kovacs, room: A11)

Invariant Checking of NRA Transition Systems via Incremental Reduction to LRA with EUF

Alessandro Cimatti

- Break (15:00)

■ **Distributed Computing** (15:20–17:00)

(chair: Marc Frincu, room: A11)

(15:20) On the Abstractness of Continuation Semantics

Gabriel Ciobanu and Eneia-Nicolae Todoran

(15:40) Scalable Task Deployment System Inspired from Virus Propagation Models
for Large Distributed Workflow Based Systems

Mihai Bica and Dorian Gorgan

(16:00) A Symmetric Nets Emulator for Adaptive P/T Nets

Lorenzo Capra and Matteo Camilli

(16:20) Parallel Acceleration of Subgraph Enumeration in the Process of Network
Motif Detection

Bogdan-Eduard-Madalin Mursa, Anca Andreica and Laura Diosan

(16:40) An Architecture for a Management Agency for Cloud Resources (position
paper)

Madalina Erascu, Gabriel Iuhasz and Flavia Micota

■ **Break** (17:00)

■ **Welcome Reception** (18:30)

Tracks

Friday, 21st September

■ Invited Talk (09:00–09:50)

(chair: Laura Kovacs, room: A11)

Reasoning with Quantifiers and Theories using Saturation-based Reasoning

Andrei Voronkov

■ Break (09:50)

■ Symbolic Computation (10:10–11:50)

(chair: James Davenport and Tetsuo Ida, room: A11)

(10:10) Rational Householder Transformations

Ana-Carolina Camargos-Couto and David Jeffrey

(10:30) Compositional Taylor Model Based Validated Integration

Kristjan Liiva, Paul Jackson, Grant Passmore and Christoph Wintersteiger

(10:50) Computing the Lowest-order Element of a Multivariate Elimination Ideal by
Using Remainder Sequences

Tateaki Sasaki and Daiju Inaba

(11:10) GPaR: A Parallel Graph Rewriting Tool

Stéphane Desprésaux and Aude Maignan

(11:30) The Role of Benchmarking in Symbolic Computation (position paper)

James Davenport

■ Lunch (12:00)

■ Invited Talk (13:00–13:50)

(chair: Tudor Jebelean, room: A11)

Proving Reachability Properties by Coinduction

Dorel Lucanu

■ Break (13:50)

■ **Numerical Computing** (14:10–15:50)

(chair: Eva Kaslik, room: A11)

(14:10) Real-Time Computation of Legendre-Sobolev Approximations

Parisa Alvandi and Stephen Watt

(14:30) Computation Results of the Riemann Zeta Search Project

Norbert Tihanyi and Attila Kovács

(14:50) An Axis Symmetric 2D Description of the Dynamics of a Single Crystal Micro Fiber Growth from the Melt by Micro-Pulling-Down Method

Agneta Balint and Stefan Balint

(15:10) An Axis Symmetric 2D Description of the Growth Process of a Single Crystal Hollow Tube Grown from the Melt by Pulling Down Method

Agneta Balint, Stefan Balint and Loredana Tanasie

(15:30) An Image Inpainting Technique Based on Parallel Projection Methods

Irina-Maria Artinescu and Costin-Radu Boldea

■ **Break** (15:50)

■ **Position Papers** (16:10–17:30)

(chair: Erika Abraham, room: A11)

(16:10) Lax-Like Stability for the Discretization of Pseudodifferential Operators Through Gabor Multipliers and Spline-Type Spaces

Darian Onchis and Simone Zappala

(16:30) Towards Performance Evaluation Programming

Eneia-Nicolae Todoran

(16:50) An Overview of Obfuscation Techniques Used by Malware in Visual Basic for Application Scripts

Marilena Lupascu, Dragos-Teodor Gavrilut and Dorel Lucanu

(17:10) A Different Approach to Maximum Clique Search

Sandor Szabo and Bogdan Zavalnij

■ **Artificial Intelligence (1)** (18:00–19:00)

(chair: Daniel Pop, room: A11)

(18:00) Optimizing the Trade-off between Single-Stage and Two-Stage Deep Object Detectors using Image Difficulty Prediction

Petru Soviany and Radu-Tudor Ionescu

(18:20) Adjusting SVMs for Large Data Sets using Balanced Decision Trees

Cristina Vatamanu, Dragos-Teodor Gavrilut and George Popoiu

(18:40) Integrating Deep Learning for NLP in Romanian Psychology

Ioan-Cristian Schuszter

Tracks

Saturday, 22nd September

- **Tutorial** (08:30–10:00)
(chair: Erica Abraham, room: A11)

A Set-Based Approach to Model Checking of Nonlinear Systems

Maria Prandini

- Break (10:00)

- **Invited Talk** (10:20–11:10)
(chair: Gabriel Istrate, room: A11)

On the Computational Complexity of Solving Ordinary Differential Equations

Olivier Bournez

- Break (11:10)

- **Advances in the Theory of Computing** (11:30–12:50)
(chair: Mircea Marin, room: A11)

(11:30) The Polylog-Time Hierarchy Captured by Restricted Second-Order Logic
Flavio Ferrarotti, Senén González, Klaus-Dieter Schewe and Jose-Maria Turull-Torres

(11:50) Extremal Graphs with Respect to the Modified First Zagreb Connection Index
Guillaume Ducoffe, Ruxandra Marinescu-Ghemeci, Camelia Obreja, Alexandru Popa and Rozica-Maria Tache

(12:10) Cheap Non-Standard Analysis and Computability: Some Applications
Olivier Bournez and Sabrina Ouazzani

(12:30) A Terminating and Confluent Term Rewriting System for the Pure Equational Theory of Quandles
Robert McGrail, Thuy Trang-Nguyen, Thanh-Thuy Trang-Tran, Arti Tripathi and Hannah Quay-DeLaVallee

- Lunch (13:00)

- **Invited Talk** (14:00–14:50)
(chair: Daniela Zaharie, room: A11)

Self-Adaptive Forecast Models Inpredictive Maintenance Systems

Edwin Lughofer

- Break (14:50)

■ **Artificial Intelligence (2)** (15:10–16:10)

(chair: Edwin Lughofer, room: A11)

(15:10) Dual Criteria Determination of Natural Clustering Structures in Data

Dan Simovici and Kaixun Hua

(15:30) Modeling Real Estate Dynamics Using Survival Analysis

Diana Minzat, Mihaela Breaban and Henri Luchian

(15:50) A CiteSeerX-Based Dataset for Record Linkage and Metadata Extraction

Zalán Bodó

■ **Trip and Conference Dinner** (16:30)

Tracks

Sunday, 23rd September

- **Tutorial** (08:30–10:00)
(chair: Viorel Negru, room: A11)
Bayesian networks: Tutorial on Inference, Learning and Modelling Complex Systems
Denis Enachescu
- **Break** (10:00)
- **Artificial Intelligence (3)** (10:20–12:20)
(chair: Denis Enachescu, room: A11)
(10:20) Toward On-Line Predictive Models for Forecasting Workload in Clouds
Dong-Nguyen Doan
(10:40) Using Recommender Systems to Support Navigation in Concept Lattices
Flaviu-Florin Berbecariu, Christian Sacarea and Diana Sotropa
(11:00) Formal Concept Analysis Grounded Knowledge Discovery in Electronic Health Record Systems
Christian Sacarea, Diana Sotropa and Diana Troanca
(11:20) Genetic Operators in Evolutionary Music Composition
Csaba Sulyok
(11:40) MES Specific Data Analysis. Case Study with the Baxter Robot (position paper)
Delia Mitrea and Levente Tamas
- **Closing** (12:00)
(chair: Erika Abraham and Viorel Negru, room: A11)
- **Lunch** (12:30)

Workshops

Thursday, 20th September

■ NCA Workshop (1) (10:30–12:30)

(chair: Flavia Micota, room: 045c)

(10:30) A Tool for Fake News Detection

Bashar Al-Asaad and Madalina Erascu

(10:50) Deep Learning for Metal Corrosion Control: Can Convolutional Neural Networks Measure Inhibitor Efficiency?

Ruxandra Stoean, Catalin Stoean and Adriana Samide

(11:10) A Four-Phase Meta-Heuristic Algorithm for Solving Large Scale Instances of the Shift Minimization Personnel Task Scheduling Problem

Sebastian Nechita and Laura Diosan

(11:30) Unsupervised and Fully Autonomous 3D Medical Image Segmentation based on Grow Cut

Alexandru-Ion Marinescu, Zoltán Bálint, Laura Diosan and Anca Andreica

(11:50) Evolving Mathematical Formulas using LINQ Expression Trees and Direct Applications to Credit Scoring

Alexandru-Ion Marinescu and Anca Andreica

(12:10) Evolving Cellular Automata for Two-stage Edge Detection

Alina Enescu, Anca Andreica and Laura Diosan

■ Inno HPC Training (1) (10:30–12:30)

(chair: Viorel Negru, room: A01)

(10:30) HPC in Romania. Analysis of the current situation

Sebastian Stefaniga and Mihai Maghiar

(11:00) InnoHPC Technology Transfer Process, Intellectual Property Rights (IPR) and Digital transformation guidelines.

Sebastian Stefaniga and Mihai Maghiar

(11:30) WUT-HPC infrastructure presentation

Mihai Maghiar

■ Inno HPC Training (2) (13:30–15:00)

(chair: Dana Petcu, room: A01)

(13:30) Case study - Challenges for an HPC academic center in serving SMEs

Dana Petcu

(14:00) Hands on lab - Running simulations on BlueGeneP Supercomputer

Mihai Maghiar

■ **GeoInfo Workshop** (15:20–17:00)

(chair: Cosmin Bonchis, room: 045c)

(15:20) Use of Sentinel Constellation for Flood Monitoring. Study Case in Romania
Anisoara Irimescu, Denis Mihailescu, Gheorghe Stancalie, Vasile Craciunescu, Argentina Nertan, Simona Catana and Claudiu Angearu

(15:40) Satellite Based Geoportal for Drought Monitoring and Analysis
Anisoara Irimescu, Vasile Craciunescu, Claudiu Angearu, Alexandru Dumitrescu and Roxana Bojariu

(16:00) Reconstruction of Glaciated Landscape in the Southern Carpathians Using Semi-Automated Methods
Rafaela Tomuța, Alexandru Onaca and Florina Ardelean

(16:20) Mapping the Black Pines Forest Using High Resolution Satellite Images and Object Based Image Analysis. Case Study: Domogled Massif.
Ecaterina Mocioacă, Florina Ardelean and Marcel Török-Oance

(16:40) Satellite Image Segmentation with Deep Learning Techniques
Teodora Selea, Marian Neagul and Gabriel Iuhasz

■ **DIPMAI Workshop** (17:20–18:20)

(chair: Debora Gil and Mihail Gaianu, room: 045c)

(17:20) Back to Front Architecture for Diagnosis as a Service
Carles Sanchez, Miguel-Angel Vinas, Coen Atens, Agnes Borrás and Debora Gil

(17:40) Face Detection and Recognition Methods using Deep Learning in Autonomous Driving
Sebastian-Aurelian Stefaniga and Mihail Gaianu

(18:00) Face recognition in Automotive applications
Danut Rotar and Horia Popa-Andreescu

■ **ACSys Workshop** (17:20–18:20)

(chair: Costin Bădică and Gabriel Iuhasz, room: A11)

(17:20) An Adaptive Recommender System for Human Resource Allocation in Software Projects - Initial Results on an Agent-Based Simulation
Mihaela Ilie, Sorin Ilie and Ionut Muratetu

(17:40) Application of Meaningful Text Analytics to Online Product Reviews
Costin Badica and Georgian Vladutu

(18:00) A Self Developing System for Medical Data Analysis
Adriana Dinis, Todor Ivascu and Viorel Negru

Workshops

Friday, 21st September

■ PhD Colloquium (1) (10:10–11:50)

(chair: Gabriela Czibulla, room: 045c)

(10:10) Estimation of Prediction Intervals in Neural Network-based Regression Models

Kristian Miok

(10:30) Blockchain Technologies for a Decentralized Cloud

Adrian Spataru

(10:50) Ambient Assisted Living Sensors Failure Detection and Fault-Tolerance

Kristijan Cincar

(11:10) Test Suite Generation for Cyber Physical Systems at the Model in the Loop Level

Ana Turlea

(11:30) Small SNQ P Systems with Multiple Types of Spikes

Florin-Daniel Bilbie

■ PhD Colloquium (2) (14:20–16:00)

(chair: Dorel Lucanu, room: 045c)

(14:20) An Application of Graph Theory in Financial Netting

Lucian-Ionut Gavrilă and Alexandru Popa

(14:40) Formal Verification of Smart Contracts

Radu Ometita

(15:00) Heuristic Algorithms for the Longest Filled Common Subsequence Problem

Radu-Stefan Mincu and Alexandru Popa

(15:20) Improving ACSTL Iris Segmentation Method

Cristina-Madalina Noaica

(15:40) Modelling Operational Semantics in Many-Sorted Polyadic Modal Logic

Natalia Moanga

■ **PhD Colloquium (3)** (16:10–17:50)

(chair: Alexandru Popa, room: 045c)

(16:10) Static and Dynamic Script-Based Malicious Software Analysis

Marilena Lupascu

(16:30) Dynamic Analysis of Possible Malware Applications

Vlad Craciun

(16:50) An Improved Approach to Software Defect Prediction Using a Hybrid
Machine Learning Model

Diana-Lucia Miholca

(17:10) Measuring the Structural Similarity between Component-Based Software
Applications

Adriana Dinis and Alina Carunta

(17:30) Using Unsupervised Learning Models for Analyzing Students' Academic
Performance

Liana-Maria Crivei

■ **HPC-ST Workshop and InnoHPC Training (3)** (10:10–11:50)

(chair: Dana Petcu, room: A01)

(10:10) Parallelizations of an Inpainting Algorithm Based on Convex Feasibility

Liviu Maftciu-Scail, Irina-Maria Artinescu and Vlad Maftciu-Scail

(10:30) Survey on Feasibility of Pattern Matching Techniques In Heterogeneous
Architectures for Bioinformatics

Ciprian Pungila, Darius Galis and Viorel Negru

(10:50) Round Table

InnoHPC

■ **Industrial Presentations** (16:10–17:10)

(chair: Viorel Negru, room: A01)

(16:10) Breast cancer detection with IBM PowerAI Vision

Florin Mănăilă

(16:40) AI on Edge – A perspective

Valentin Mureșan

Workshops

Saturday, 22nd September

■ **NCA Workshop (2)** (11:30–12:30)

(chair: Ruxandra Stoean, room: 045c)

(11:30) Increasing Protection against Internet Attacks through Contextual Feature Pairing

Georgiana-Ingrid Stoleru, Adrian-Stefan Popescu and Dragos-Teodor Gavrilit

(11:50) Detecting Java Compiled Malware using Machine Learning Techniques

Gheorghe Balan and Adrian-Stefan Popescu

(12:10) Optimizing Cleanset Growth by Using Multi-Class Neural Networks

Adrian-Ioan Piri, Mihai Leonte, Nicolae Postolachi and Dragos-Teodor Gavrilit

Workshops

Sunday, 23rd September

■ **IAFP Workshop** (10:20–12:40)

(chair: Vasile Berinde and Dorel Mihet, room: 045c)

(10:20) Tripled Fixed Point Theorems in Metric Spaces Endowed With a Binary Relation

Melânia-Júlia Dobrican and Marin Borcut

(10:40) On Some Classes of Nonlinear Contractions in Fuzzy Metric Spaces

Dorel Mihet and Claudia Zaharia

(11:00) Solving Split Common Fixed Point Problem for Demicontractive Mappings

Vasile Berinde and Madalina Pacurar

(11:20) Fixed Point Theorems for Nonselb Bianchini Type Contractions in Banach Spaces Endowed With a Graph

Andrei Horvat and Laszlo Balog

(11:40) Fixed Point Theorems for Discontinuous Mappings of Kannan and Bianchini Type in Distance Spaces

Paula Homorodan

(12:00) A Global Perspective Over the Equations Systems Preconditioning

Liviu-Octavian Mafteiu-Scai and Emanuela Mafteiu-Scai

(12:20) Solving Some Integral Equations by using Tripled Fixed Point Theorems

Monica Lauran and Adina Pop

Live status on the web and mobile

The following QRCode contains the URL `http://m.synasc.ro/` for our web application with live status about the current and upcoming presentations and other events.



Internet access

Wireless access

Wireless access is available inside the premises of the university, by choosing the network named SYNASC-WiFi. The wireless network is encrypted using WPA/WPA2. The access passphrase is nifojuvaleda (that is nifo juva leda without spaces).



Alternatively **eduroam** is available — provided that it is already properly configured on your device — it should work by default without any further configuration. For additional details please consult the following links: <http://eduroam.uvt.ro/> or <https://www.eduroam.org/>.

Security information

Unsecured SMTP (port 25) is disabled. Instead SMTP over SSL (port 465) can be used. POP3, IMAP for email retrieval can be used. And of course HTTP/HTTPS, FTP and SSH are available.

For more informations and questions please contact the support staff.

City of Timișoara

Highlights

The first record of the city of Timișoara, built on the site of an ancient Roman fortress called Castrum Regium Themes, dates back to 1212. Over the years, Timișoara, the largest city in western Romania, has been influenced by many cultures. The Romans used it as an important crossroads fortress until the Tatars destroyed it in the 13th century. Conquered by Turkish armies in 1552, Timișoara remained under their protection until 1718 when the region of Banat came under Austrian rule for two centuries. Timișoara later became a vital medieval commercial and manufacturing town. Turks, Austrians, Germans and Serbs all left their mark and their influence can be seen in neighborhoods throughout the city even today.

The charm of this city, settled on the northern bank of the Bega River, lies in its distinct architectural character and vibrant cultural life. Frequently referred to as “Little Vienna”, Timișoara is home to year-round musical and theatrical performances, art galleries, museums and a buzzing nightlife. A progressive, cosmopolitan place, Timișoara was the first city in Europe and second in the world after New York, to use electricity to illuminate its public streets.

Thanks to a Mediterranean climate, life is best observed outdoors, in the many public squares and lush green retreats. Timișoara is easy to explore on foot. If you get tired, a tram will be along in a moment; the system is fast, frequent and efficient.

Timișoara abounds with churches of several denominations, a Jewish quarter, an elegant baroque square and a pedestrian-only downtown area. Some of the monuments in the heart of the city afford panoramic views, while the many parks in this “city of flowers” provide an idyllic spot to take a break from sightseeing.

Interesting facts: Timișoara was the first European city to introduce horse-drawn trams (in 1869) and electrical street lighting (in 1889); Timișoara was built on a swamp; the Metropolitan Cathedral has 5000 oaks supports underneath it; Johnny Weissmuller, Hollywood’s original Tarzan, was born here.

(Information from <http://www.romaniatourism.com/timisoara.html>)

Public transportation

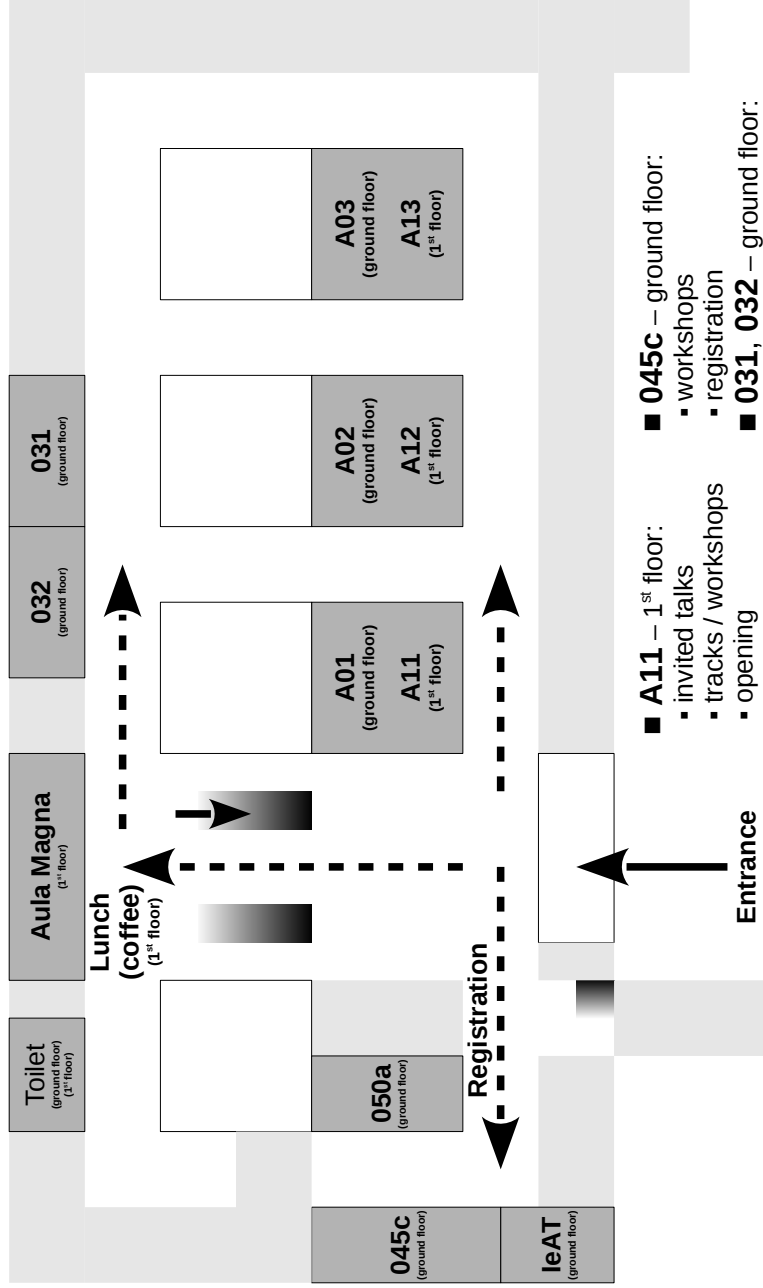
Several bus (“autobuz”), tram (“tramvai”) and trolleybus (“troilebuz”) routes connect Timișoara’s main areas and tourist attractions. The public transportation system runs between 4:45am and 11:15pm. Paper tickets must be purchased before boarding at kiosks near the station, and validated once boarded at the ticket-stamping machine in front of the vehicle. Tickets are interchangeable for all three forms of transport with the exception of express buses, which can be recognized by an **E** prefixing their number.

Taxi companies: City Taxi (+40 256) 949; Grup Taxi (+40 256) 946; Radio Taxi (+40 256) 940; Tudo Taxi (+40 256) 945.

Useful phone numbers

Organizers: Viorel Negru (+40) 755 240 164; Daniela Zaharie (+40) 729 639 576; Monica Sancira-Tirea (+40) 766 102 375.

Emergencies (police, hospital, fire station): 112.



West University of Timisoara

- **A11** – 1st floor:
 - invited talks
 - tracks / workshops
- **A13** – ground floor:
 - opening
 - workshops
- **A01** – ground floor:
 - backup
- **A02** – ground floor:
 - backup
- **045c** – ground floor:
 - workshops
 - registration
- **031, 032** – ground floor:
 - workshops
 - project meetings
- **050a** – ground floor:
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