
**Department of Process Control**
Faculty of Mechanical Engineering and Robotics
AGH - University of Science and Technology

# 20th INTERNATIONAL CARPATHIAN CONTROL CONFERENCE PROGRAMME

Co-Organizers:
**Institute of Control and Informatization of Production Processes**
Faculty of Mining, Ecology, Process Control and Geotechnology
Technical University of Košice
**SLOVAK REPUBLIC**

**Department of Control Systems and Instrumentation**
Faculty of Mechanical Engineering
VŠB -Technical University of Ostrava
**CZECH REPUBLIC**

**Department of Automation and Communication Technology**
University of Miskolc
**HUNGARY**

**Department of Automatic Control**
Faculty of Automation, Computers and Electronics
University of Craiova
**ROMANIA**

**Kraków - Wieliczka, Poland**
**May, 26-29, 2019**



# International Carpathian Control Conference - Wieliczka 2019

| Time | Sunday, May 26th | Monday, May 27th | Tuesday, May 28th | Wednesday, May 29th |
|---|---|---|---|---|
| $7^{00}$ - $8^{00}$ | | **Breakfast** 7:00 - 9:00 | **Breakfast** 7:00 - 9:00 | **Breakfast** 7:00 - 9:00 |
| $8^{00}$ - $9^{00}$ | | | | |
| $9^{00}$ - $10^{00}$ | | **Session 3, 4, 5** 9:00 - 11:00 | **Session 9, 10** 9:00 - 11:00 | |
| $10^{00}$ - $11^{00}$ | | | | |
| $11^{00}$ - $12^{00}$ | | Coffee Break 11:00 - 11:20 | Coffee Break 11:00 - 11:20 | |
| $12^{00}$ - $13^{00}$ | **Registration** 12:00 - 16:00 | **Session 6, 7, 8** 11:20 - 13:00 | **Session 11, 12** 11:20 - 13:00 | |
| $13^{00}$ - $14^{00}$ | **Lunch** 13:00 - 14:30 | **Lunch** 13:00 - 14:30 | **Lunch** 13:00 - 14:30 | |
| $14^{00}$ - $15^{00}$ | | | | |
| $15^{00}$ - $16^{00}$ | **Opening Ceremony** 15:00 - 16:00 | **Scientific Committee Meeting** 15:00 - 16:30 | **Poster Session** 15:00 - 16:30 | |
| $16^{00}$ - $17^{00}$ | Coffee Break 16:00 - 16:15<br>**Session 1, 2** 16:15 - 18:15 | **Excursion** 16:40 - 19:30 | | |
| $17^{00}$ - $18^{00}$ | | | **Poster Session** 17:00 - 18:30 | |
| $18^{00}$ - $19^{00}$ | | | | |
| $19^{00}$ - $20^{00}$ | | | **Dinner** - 19:30 - 21:00 | |
| $20^{00}$ - $21^{00}$ | **Dinner - Welcome Party** 20:00 - Hotel Turówka | **Dinner - Grill** 20:00 - Hotel Turówka | | |

## Sunday – 26.05.2019

12:00 – 16:00 Registration

13:00 – 14.30 Lunch

15:00 – 16:00 Opening Ceremony

Plenary lecture

*Marek **PAWEŁCZYK***
Reduction of Device Noise by Controlling Vibration of its Casing

16:00 – 16:15 Coffee Break

16:15 – 18:15 **SESSION 1**
(Chairmen: *József **VÁSÁRHELYI**, Marek **PAWEŁCZYK*** )

*Dániel **DRÓTOS** and József **VÁSÁRHELYI***
Interrupt Driven Parallel Processing
*Karol **KOSTUR***
Control System Design for a Walking Beam Furnace
*Antonín **VITECEK** and Miluse **VITECKOVA***
Series 2DOF PID Controller for Integrating Plants with Time Delay
*Nan-Sheng **HUANG**, Jan-Matthias **BRAUN**, Jørgen Christian **LARSEN** and Poramate **MANOONPONG***
Teaching Hardware Implementation of Neural Networks using High-Level Synthesis in Less Than Four Hours for Engineering Education of Intelligent Embedded Computing
*Elżbieta **AUGUSTYN**, Marek S. **KOZIEŃ** and Daniel **ZIEMIAŃSKI***
Experimental Verification of the Method of Single-Modal Reduction of Torsional Vibrations of a Beam by Piezoelectric Elements
*Andrzej **BĄKOWSKI**, Vladimir **DEKÝŠ**, Leszek **RADZISZEWSKI** and Paweł **ŚWIETLIK***
Frequency Analysis of Urban Traffic Noise

**SESSION 2**
(Chairmen: *Jiří **TŮMA,** Dusan **KROKAVEC***)

*Jiří **TŮMA***
Longitudinal Vibration of the Linear Piezoactuators
*Janusz **GOLDASZ** and Bogdan **SAPIŃSKI***
Influence of Temperature on the MR Squeeze Mode Damper Output
*Dejan **IVEZIC**, Milos **TANASIJEVIC**, Predrag **JOVANCIC** and Radisa **DJURIC***
A Fuzzy Expert Model for Availability Evaluation
*Ho Pyeong **LEE***
Robust Control of a Two-Axis Gimbaled Seeker Using Loop Shaping Design Procedure
*Dusan **KROKAVEC** and Anna **FILASOVA***
Fault Detection Using Consensus-Based Linear Distributed Kalman Filtering
*Olga **ANDRIANOVA** and Alexey **BELOV***
On Robust Performance Analysis of Linear Systems with Polytopic Uncertainties Affected by Random Diturbances

20:00 – 23:00 Welcome party

# Monday – 27.05.2019

07:00 – 09:00 Breakfast

09:00 – 11:00 **SESSION 3**
(Chairmen: *Ivo* ***PETRAS,*** *Miluse* ***VITECKOVA***)

*Ivo* ***PETRAS***
Tuning of the Non-linear Fractional-order Controller
*Katarzyna* ***ADAMIAK***
Discrete Time Trajectory Following Sliding Mode Control Strategy
*Piotr* ***OSTALCZYK***
Analysis of a Closed Loop System with DC Micro-motor Electrical Driver with Propeller and Variable-fractional Order PID Controller
*Judit Mária* ***PINTER*** *and Márton L.* ***KISS***
Determination and Measurement of Parameters Affecting Indoor Comfort
*Andrius* ***NEMEIKŠIS*** *and Vitālijs* ***OSADČUKS***
Development of Fuzzy Blocks Intended for Agents Constituting Intelligent System of Mobile Robot Movement Planning
*Mihai* ***LUNGU****, Olfa* ***BOUBAKER*** *and Romulus* ***LUNGU***
Multiple Observer with Applications to Airplane Landing in Lateral-Directional Plane

**SESSION 4**
(Chairmen: *Radim* ***FARANA,*** *Tamás* ***KOVÁCSHÁZY***)

*Tomáš* ***HANZELY****, Radim* ***FARANA*** *and Cyril* ***KLIMEŠ***
System for Automating the Search for Coloured Cells in Images
*Jan* ***GEBAUER****, Petr* ***PODESVA****, David* ***FOJTIK*** *and Miroslav* ***MAHDAL***
The Welding Current and Voltage Smart Sensor
*Petr* ***DOLEZEL****, Jan* ***PIDANIC****, Tomas* ***ZALABSKY*** *and Miroslav* ***DVORAK***
Bin Picking Success Rate Depending on Sensor Sensitivity
*Łukasz* ***JASTRZĘBSKI*** *and Arkadiusz* ***KOZIEŁ***
Measurement-control System Based on the CORTEX-M7 Core Microcontroller for Testing Energy Harvesting Structures
*Dénes Nimród* ***KUTASI***
Process Control with IIoT Capabilities of the Hollow Cathode Plasma Nitriding
*Adrian* ***PAWEŁEK*** *and Piotr* ***LICHOTA***
Arrival Air Traffic Separations Assessment Using Maximum Likelihood Estimation and Fisher Information Matrix

**SESSION 5**
Dynamics and control of structures
(Chairmen: *Paweł* ***OLEJNIK,*** *Jaroslaw* ***KONIECZNY***)

*Paweł* ***OLEJNIK*** *and Jan* ***AWREJCEWICZ***
A Mechatronic Experimental System for Control of Fluid Level in LabVIEW
*Waldemar* ***RĄCZKA****, Jaroslaw* ***KONIECZNY*** *and Marek* ***SIBIELAK***
The use of SMA in Smart Vibrating Systems
*Jarosław* ***RZEPECKI****, Anna* ***CHRAPOŃSKA****, Krzysztof* ***MAZUR****, Stanisław* ***WRONA*** *and Marek* ***PAWEŁCZYK***
Semi-active Reduction of Device Casing Vibration Using a set of Piezoelectric Elements
*Sara El* ***HERAIKI****, Buse* ***TACAL*** *and Levent* ***UCUN***
Robust H_inf Controller Design for Active Vibration Suppression with Input Constraints
*Dorin* ***SENDRESCU****, Dan* ***POPESCU****, Emil* ***PETRE****, Dan* ***SELISTEANU*** *and Dan* ***CHINTESCU***
Iterative Learning Control for Active Suspension System of a Railway Vehicle
*Marek* ***GAJOWY***
Operational Properties of Vibratory Conveyors of the Anti-resonance Type

11:00 – 11:20 Coffee Break

11:20 – 13:00 **SESSION 6**
(Chairmen: *Paolo* ***MERCORELLI,*** *Andrzej* ***URBANIAK***)

*Mateusz* ***PIETRALA*** *and Marek* ***JASKUŁA***
IAE Minimization in Sliding Mode Control for Second Order Systems with Velocity Constraint
*Tanja* ***ZWERGER*** *and Paolo* ***MERCORELLI***
Combining SMC and MTPA Using an EKF to Estimate Parameters and States of an Interior PMSM
*Radu-Lucian* ***CONSTANTINESCU****, Monica* ***ROMAN****, Bogdan* ***POPA*** *and Dan* ***SELISTEANU***
An Improved Numerical Method for the Simulation of Nonlinear Systems
*Frank E.* ***SCHNEIDER*** *and Dennis* ***WILDERMUTH***
Real-World Robotic Competitions for Radiological and Nuclear Inspection Tasks
*Yanli* ***HUANG****, Xiao* ***LIANG****, Fang* ***GENG*** *and Sen* ***MU***
Load Balancing System based on Virtual Points in High-density Wireless Local Area Networks
*Andrzej* ***URBANIAK****, Przemysław* ***ZAKRZEWSKI****, Ariel* ***ANTONOWICZ*** *and Alicja* ***BAŁUT***
Algorithm for Early Warning System in Water Contamination Network

**SESSION 7**
(Chairmen: *Renata* ***WAGNEROVÁ,*** *Bogdan* ***POPA***)

*Martin* ***JUREK*** *and Renata* ***WAGNEROVÁ***
Mathematical Model of Real CNC Machine
*Jakub* ***GAJ****, Bogdan* ***WALEK****, Radim* ***FARANA*** *and Martin* ***KOTYRBA***
Comparison of a Saturation Flow Method and an Expert System to Optimise Traffic Crossroads Control
*Samad* ***DADVANDIPOUR*** *and Mohammad* ***ALSHARIF***
On the Analysis and Tool Development of the Long Term Evolution (LTE) Cell Planning
*Dariusz* ***GRZYBEK****, Dariusz* ***KATA****, Bogdan* ***SAPIŃSKI*** *and Wojciech* ***SIKORA***
Impact of PZT Layer Properties in a Cantilever Beam on Energy Harvesting Performance
*Joanna* ***SZULCZYK*** *and Piotr* ***LICHOTA***
Evolutionary Algorithm Based Multisine Inputs
*Wojciech* ***SIKORA****, Dariusz* ***GRZYBEK****, Piotr* ***MICEK*** *and Dariusz* ***KATA***
Impact of a Carrying Layer Properties on Stress in a Multilayer Piezoelectric Harvester

**SESSION 8**
Dynamics and control of structures
(Chairmen: *Janusz* ***KOWAL***, *Marek* ***SIBIELAK***)

*Krzysztof J.* ***KALIŃSKI****, Marek A.* ***GALEWSKI****, Michał R.* ***MAZUR*** *and Natalia* ***MORAWSKA***
Minimization of Vibrations During Milling of Flexible Structures Using Mechatronic Design Techniques
*Marek* ***SIBIELAK****, Waldemar* ***RĄCZKA*** *and Jaroslaw* ***KONIECZNY***
Modelling and Control of a Full Vehicle Active Suspension System
*Magdalena* ***PIWOWARCZYK*** *and Jaroslaw* ***KONIECZNY***
Experimental Research of the Controllable Suspension Strut
*Adam* ***SMOTER*** *and Marek* ***SIBIELAK***
Experimental and numerical investigation of the active double wishbone suspension system
*Mateusz* ***KOZIOŁ*** *and Piotr* ***CUPIAL***
Experimental Investigation of a Rotor Vibration by Using Signals from Shaft Mounted Piezoelectric Patches

13:00 – 14:30 Lunch

15:00 – 16:30 Scientific Committee Meeting

16:40 – 19:30 Excursion – "Wieliczka" Salt Mine

20:00 – 22:00 Dinner – Grill

## Tuesday – 28.05.2019

07:00 – 09:00 Breakfast

09:00 – 11:00 **SESSION 9**
(Chairmen: *Dan **POPESCU,** Antonín **VITECEK***)

*Bogdan **POPA**, Dan **POPESCU**, Monica **ROMAN** and Radu Lucian **CONSTANTINESCU***
Optimizing Algorithms for Low CPU Usage in Different Scenarios
*András **PALKÓ** and László **SUJBERT***
Time and Frequency Domain Description of Gilbert-Elliott Data Loss Models
*João Marcos Simões **RIBEIRO**, Mathaus **FERREIRA DA SILVA**, Murillo **FERREIRA DOS SANTOS**, Vinícius Ferreira **VIDAL**, Leonardo **HONORIO**, Luiz Augusto **ZILLMANN SILVA**, Henrique **BORGES REZENDE**, Accacio Ferreira Dos Santos **NETO**, Paolo **MERCORELLI** and Antônio **ALENCAR NOGUEIRA PANCOTI***
Ant Colony Optimization Algorithm and Artificial Immune System Applied to a Robot Route
*Jan Thore **LASSEN** and Paolo **MERCORELLI***
Self-tuning of a Kalman Filter Applied in a DC Drive and in a Kalman-based Sensor
*Paweł **MARTYNOWICZ** and Maciej **ROSÓŁ***
Wind Turbine Tower-Nacelle System with MR Tuned Vibration Absorber: Modelling, Test Rig, and Identification
*Maciej **ROSÓŁ** and Paweł **MARTYNOWICZ***
Identification of the Wind Turbine Model with MR Damper Based Tuned Vibration Absorber

**SESSION 10**
(Chairmen: *Karol **KOSTUR,** Emil **PETRE***)

*Alberto **MANERO CONTRERAS** and Chingiz **HAJIYEV***
Comparison of Conventional and Robust Adaptive Kalman Filters Based Integrated Altimeters
*Przemysław **IGNACIUK** and Michał **MORAWSKI***
Discrete Sliding-Mode Control of Remote Peer in MPTCP Streaming Applications
*Paweł **DRĄG** and Krystyn **STYCZEŃ***
A New Procedure for Solving Differential-algebraic Equations
*Emil **PETRE** and Vladimir **RASVAN***
Controlling Systems of Conservation Laws - The Case of the Open Canals
*Radda **IUREVA**, Alexey **BELOV**, Alexey **MARGUN** and Artem **KREMLEV***
Electric Drive Attack Detection based on State Observers
*Eszter **VIRÁGH** and Bálint **KISS***
Grobman-Hartman Theorem for Control Systems Containing Parameter Uncertainties

11:00 – 11:20 Coffee Break

11:20 – 13:20 **SESSION 11**
(Chairmen: *Andrzej **KOT***, *Waldemar **RĄCZKA***)

*Nirvana **POPESCU**, Mircea **IVANESCU**, Mircea **NITULESCU**, Decebal **POPESCU** and Cristian **VLADU***
Fuzzy Algorithms for the EEG Signal Evaluation
*Barbara **KUC**, Igor **TYLMAN**, Karol **HARABURDA**, Adam **BUCZYŁOWSKI**, Paweł Rółkowski, Kazimierz **DZIERŻEK**, Paweł **FREJDA** and Jarosław **SIDUN***
The Concept of POSTURON Braces for Patients with a Damaged Labyrinth
*Viorel **STOIAN**, Ionel Cristian **VLADU**, Cristina **PANA**, Ileana **VLADU** and Daniela **PATRAȘCU***
Locomotion Solution for Stair Climbing Wheelchair with ER Fluid Based Control
*Florin **MANTA**, Dorian **COJOCARU**, Ionel Cristian **VLADU**, Andrei **DRAGOMIR** and Alexandru **MARINIUC***
Wheelchair Control by Head Motion Using a Non-contact Method in Relation to the Patient
*Dorota **MARSZALIK** and Waldemar **RĄCZKA***
Surgical Tool Trajectory Optimization in Brain Tumour Resection
*Narek **UNANYAN** and Alexey **BELOV***
Signal-Based Approach to EMG-Sensor Fault Detection in Upper Limb Prosthetics

**SESSION 12**
(Chairmen: *Vojtech **VESELY,** Andrzej **BARTOSZEWICZ***)

*Marlena **DRĄG***
The Predictive Differential-algebraic Model for Nano-fibrous Webs Production
*Dusan **KROKAVEC** and Anna **FILASOVA***
H2 Norm Principle in Order Reduction of Discrete-time Systems
*Dusan **KROKAVEC** and Anna **FILASOVA***
State Constraints in Discrete-time Positive System Control
*Constantin Florin **CARUNTU***
A Less Conservative Condition for Flexible Control Lyapunov Functions used in Networked Predictive Control Systems
*Karla **SLADKÁ** and Miluse **VITECKOVA***
2DOF PI Controller Tuning for Integrating Plants with the Setting of Setpoint Weight
*Alžběta **HORNYCHOVÁ** and Milan **HOFREITER***
Shifting Method for Relay Feedback Identification Implemented in PLC Tecomat
*Mateusz **GAWLIK** and Wiesław **WSZOŁEK***
Intonation Accuracy Parameter as the Pointer of Voice Quality and Experience Level of Singers

13:00 – 14:30 Lunch

15:00 – 16:30 **Poster Session**
(Chairmen: *Agata **NAWROCKA**, Marek **LACIAK***)

*Zoltán **GYENES** and Emese Gincsainé **SZÁDECZKY-KARDOSS***
Traffic Regulation Velocity Obstacles Method
*Kanstantsin **MIATLIUK**, Maciej **PIETRZAK** and Anders Glent **BUCH***
Controlling an Industrial Robotic System Based on Received Visual Information
*Stanislav **PALÚCH** and Tomáš **MAJER***
Computation of Fair Crew Schedules in Regular Bus Transport
*Marek **KVET***
Fast Approximate Algorithm for Robust Emergency System Design
*Dorin **SENDRESCU** and Gheorghe **BUJGOI***
Iterative Learning Control for a Rotary Flexible Joint Experiment
*Marcin **APOSTOŁ**, Grzegorz **KACZMARCZYK** and Kamil **TKACZYK***
SCARA Robot Control based on Raspberry Pi
*Jan **CVEJN** and Milan **ZAPLETAL***

A Disturbance Observer-Based Control of Drilling Vibrations
*Vojtech **VESELY** and Ladislav **KÖRÖSI***
Robust Gain Scheduled PI-D Controller Design for Descriptor System
*Pavel **SMUTNÝ**, Marek **BABIUCH** and Petr **FOLTYNEK***
A Review of the Virtual Reality Applications in Education and Training
*Nabeel Shaway Shyaa **AL – ATWAN** and Mircea **NITULESCU***
Wireless Control System for an Intelligent Home
*Adela **PUSCASIU**, Alexadra **FANCA**, Dan-Ioan **GOTA** and Honoriu **VALEAN***
Cooperative Traffic Control Based on Greenhouse Gases Footprint Minimization
*Ryszard **DINDORF** and Piotr **WOŚ***
Force and Position Control of the Integrated Electro-hydraulic Servo-drive
*Piotr **WOŚ** and Ryszard **DINDORF***
Nonlinear Modeling and Parameter Identification for Electro-hydraulic Servo System
*Ernő **HORVÁTH**, Claudiu **POZNA**, Csaba **HAJDU** and Áron **BALLAGI***
Range Sensor-based Occupancy Grid Mapping with Signatures
*Igor **TYLMAN**, Robert **GRABOWY** and Maciej **REĆKO***
Thrust and Ignition Control of Valveless Pulse Jet Engine
*Laszlo **ARVAI** and Szilvia **HOMOLYA***
Filtering and Fingerprint Matching Methods for Wi-Fi Radio Map Based Indoor Localization
*Petr **FOLTÝNEK**, Marek **BABIUCH** and Pavel **SMUTNÝ***
Using the ESP32 Microcontroller for Data Processing
*Tomáš **HUSZANÍK**, Ján **TURÁN** and Ľuboš **OVSENÍK***
On Mitigation of Four-Wave Mixing in High Capacity Ultra-DWDM System
*Lukas **HUBKA***
Electric Cars in the Czech Republic – The Analysis of CO2 Emissions Reduction
*Attila Károly **KANÁL** and Tamás **KOVÁCSHÁZY***
IoT Solution for Assessing the Indoor Air Quality of Educational Facilities
*Sona **SEDIVA** and Radek **ŠTOHL***
Uncertainty Budget for Calibration of Platinum Resistance Thermometer
*Štefan **PEŠKO** and Zuzana **BORČINOVÁ***
A Modified Micro-genetic Algorithm for Robust Emergency System Designing
*Dominik **SIEROCIUK** and Michał **WIRASZKA***
Variable Order PI Control Algorithm with Order Scheduled According to the Control Error
*Danica **ROSINOVA** and Maria **HYPIUSOVA***
Robust LMI Based Control of Magnetic Levitation Laboratory Plant

17:00 – 18:30 **Poster Session**
(Chairmen: *Leszek **CEDRO,** Jana **POCSOVA***)

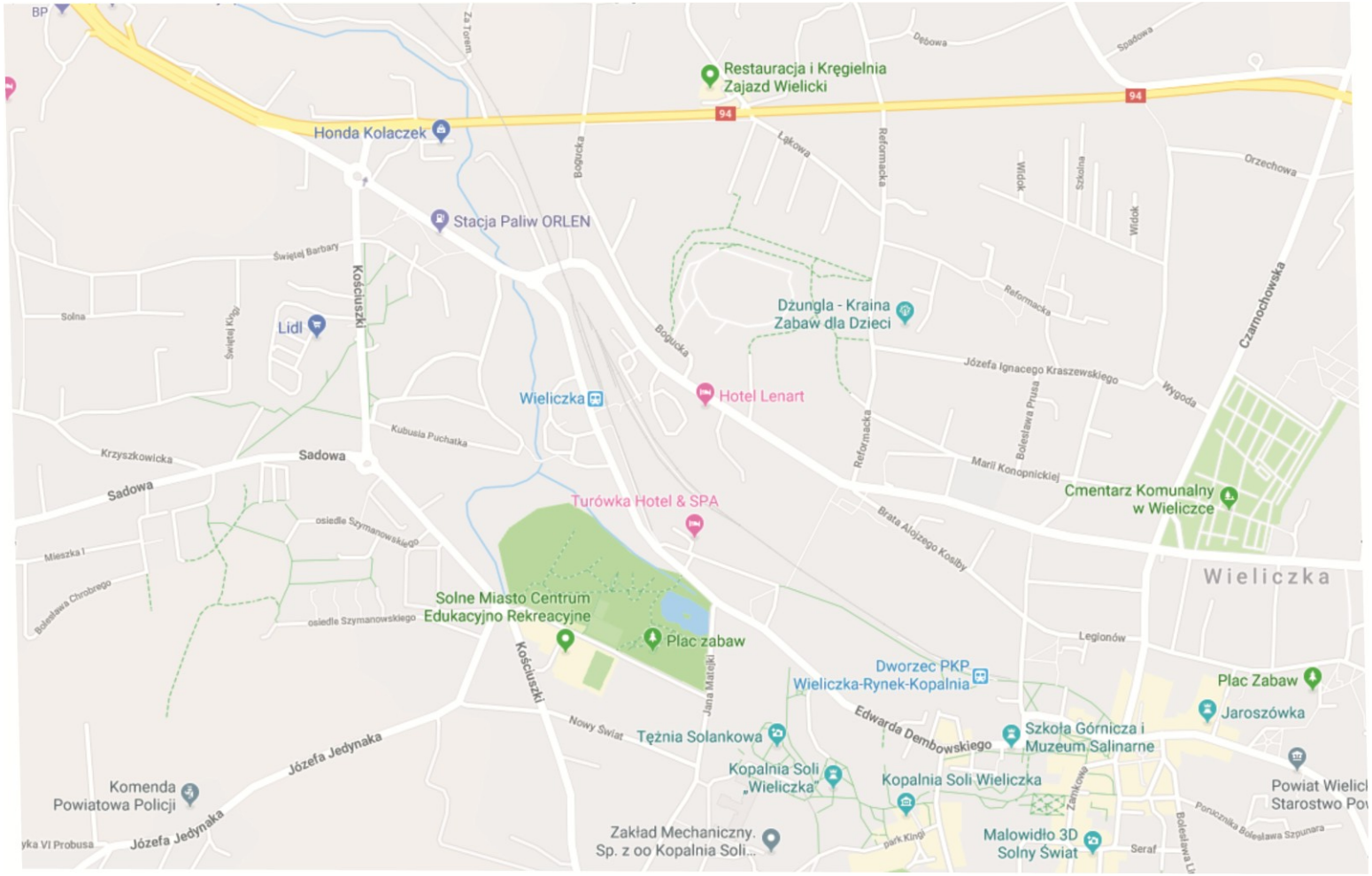
*Józef **DUDA***
Parametric Optimization of a Second Order Time Delay System with a PD-Controller
*Jan **SIKORA**, David **FOJTÍK**, Milan **MIHOLA** and Jiří **CZEBE***
Storage Kind Recognition of Truck's Timber Load
*Jiří **CZEBE**, Pavel **ŠURÁNEK**, Jiří **TŮMA** and David **FOJTÍK***
Finding Similarities in Laser Micrometers Scanned Data Using Cross-covariance
*Dávid **FARAGÓ**, István **BODNÁR**, Péter **BENCS**, Dániel **KOÓS**, Patrik **ISKI** and Ádám **SKRIBANEK***
Laboratory Measurements and Numeric Simulation of a Solar Cell
*István **BODNÁR**, Bálint **CSEHI**, Botond **SUKÁLY** and Ágoston Csaba **GÁSPÁR***
Examination of Voltage Drop of the Solar Panel as a Function of Environmental Factors
*Václav **PAVELKA** and Pavel **ŠURÁNEK***
Shock Response Spectrum Calculation from Container Placing
*Radek **GURÁŠ** and Miroslav **MAHDAL***
Parking House Action Subsystem Control
*Alexandru-Nicolae **TUDOSIE***
Coolant Injection System for Aircraft Engines' Compressor
*Tomáš **PAWLENKA** and Jaromír **ŠKUTA***

*Piotr **MICEK** and Dariusz **GRZYBEK***
Experimental Investigation on an Energy Storage in a Piezoelectric Harvester for a Rotating Shaft
*Jan **KACUR**, Marek **LACIAK**, Patrik **FLEGNER**, Jan **TERPAK** and Milan **DURDAN***
Application of Support Vector Regression for Data-driven Modeling of Melt Temperature and Carbon Content in LD Converter
*Marius **MARIAN**, Dan **POPESCU**, Adelin **CUSMAN** and Dragos **IONICA***
Electronic Signature Support for Industrial Control Systems
*Krzysztof **PYTEL**, Wiktor **HUDY**, Stanisław **GUMUŁA**, Malgorzata **PIASKOWSKA - SILARSKA**, Mykhailo **LOBUR** and Mykhailo **MELNYK***
Application of Evolutionary Algorithms to Analysis the Possibilities of Solar Energy Use
*Constantin **MARIN**, Dan **POPESCU**, Emil **PETRE** and Dan **SELISTEANU***
Distortions Correction Plants in Textile Industry. Nonlinear Modelling and Control
*Razvan **PREJBEANU** and Ion Marian **POPESCU***
Modeling and Simulation of Autonomous Systems with Voltage Inverters Output Filters and Asynchronous Motors
*Andrzej **KOT** and Agata **NAWROCKA***
Human Sway Response for the Sine Excitation
*Andrea **MOJZISOVA** and Jana **POCSOVA***
Automatic Test Generator for Analytic Geometry
*Krzysztof **PYTEL**, Wiktor **HUDY**, Stanisław **GUMUŁA**, Malgorzata **PIASKOWSKA - SILARSKA**, Uliana **MARIKUTSA** and Ihor **FARMAHA***
Application of Evolutionary Algorithms to Analysis the Possibilities of Wind Energy Use
*Tamas **KOVACSHAZY** and Sámuel **VÁRALLYAY***
Time-Driven Sub-GHz Wireless Communication Protocol for Real-Time Cyber-Physical Systems
*Krzysztof **PYTEL**, Franciszek **KURDZIEL** and Adam **KALWAR***
The Impact of Changes in Operating Parameters on the Bag Filter in the WR - 25 Water Boiler
*Agata **NAWROCKA**, Marcin **NAWROCKI** and Andrzej **KOT***
Artificial Neural Network for Robot Manipulator Control
*Emil **PETRE**, Dan **SELISTEANU**, Constantin **ȘULEA-IORGULESCU** and Sorin **MEHEDINTEANU***
Mathematical Modelling and Control for an Activated Sludge Process in a Wastewater Treatment Plant

19:30 – 21:00 Dinner

## Wednesday – 29.05.2019

07:00 – 09:00 Breakfast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Restauracja i Kręgielnia Zajazd Wielicki
Honda Kołaczek
94
Stacja Paliw ORLEN
Lidl
Dżungla - Kraina Zabaw dla Dzieci
Hotel Lenart
Wieliczka
Turówka Hotel & SPA
Cmentarz Komunalny w Wieliczce
Wieliczka
Solne Miasto Centrum Edukacyjno Rekreacyjne
Plac zabaw
Dworzec PKP Wieliczka-Rynek-Kopalnia
Plac Zabaw
Jaroszówka
Tężnia Solankowa
Szkoła Górnicza i Muzeum Salinarne
Kopalnia Soli „Wieliczka"
Kopalnia Soli Wieliczka
Komenda Powiatowa Policji
Zakład Mechaniczny Sp. z oo Kopalnia Soli...
Malowidło 3D Solny Świat
Powiat Wielicki Starostwo Powiatowe
Józefa Jedynaka
Kościuszki
Sadowa
Krzyszkowicka
Mieszka I
Bolesława Chrobrego
osiedle Szymanowskiego
Kubusia Puchatka
Świętej Barbary
Solna
Świętej Kingi
Bogucka
Reformacka
Łąkowa
Widok
Szkolna
Orzechowa
Czarnochowska
Józefa Ignacego Kraszewskiego
Wygoda
Bolesława Prusa
Marii Konopnickiej
Brata Alojzego Kosiby
Legionów
Edwarda Dembowskiego
Nowy Świat
Jana Matejki
Zamkowa
Dębowa
Spadowa
Za Torem
park Kinga
Seraf
Ponczmika Bolesława Szpunara