



MEMSTECH'2021

CONFERENCE PROGRAM



**IEEE XVIIth International Conference on the
PERSPECTIVE TECHNOLOGIES AND METHODS IN MEMS
DESIGN**

12-16 May 2021, Polyana (Zakarpattya), Ukraine

IEEE MEMSTECH 2021 Timetable

Wednesday, May 12	
16 ⁰⁰ -17 ⁰⁰	TEST CONNECTION
Link to connect	https://us02web.zoom.us/j/85267855101?pwd=VWswWDBFd0ZtMGcxWmozL1B2R3ZrUT09 Meeting ID: 852 6785 5101 Password: MemstecH
Thursday, May 13	
11 ⁰⁰ -11 ²⁵	OPENING CEREMONY
11 ²⁵ -12 ⁴⁵	https://us02web.zoom.us/j/85267855101?pwd=VWswWDBFd0ZtMGcxWmozL1B2R3ZrUT09 Meeting ID: 852 6785 5101 Password: MemstecH
	Plenary Session
	Chairman: Prof. Mykhaylo Lobur Secretary: Dr. Mykhaylo Melnyk
12 ⁴⁵ -13 ⁰⁰	Coffee Break
13 ⁰⁰ -15 ⁰⁰	Session 1
	https://us02web.zoom.us/j/85267855101?pwd=VWswWDBFd0ZtMGcxWmozL1B2R3ZrUT09 Meeting ID: 852 6785 5101 Password: MemstecH
	Chairmen: Prof. Jan Dziuban, Secretary: Dr. Nazariy Jaworski, Dr. Andriy Kernytskyy
15 ⁰⁰ -15 ²⁰	Coffee Break
15 ²⁰ -17 ²⁰	Session 2
	https://us02web.zoom.us/j/85267855101?pwd=VWswWDBFd0ZtMGcxWmozL1B2R3ZrUT09 Meeting ID: 852 6785 5101 Password: MemstecH
	Chairmen: Prof. Mykhaylo Andriyчук Secretary: Dr. Nataliia Bokla
Friday, May 14	
10 ³⁰ -13 ³⁰	Session 3
	https://us02web.zoom.us/j/85267855101?pwd=VWswWDBFd0ZtMGcxWmozL1B2R3ZrUT09 Meeting ID: 852 6785 5101 Password: MemstecH
	Chairmen: Prof. Marek Iwaniec Secretary: Dr. Nazariy Jaworski, Dr. Andriy Kernytskyy
13 ³⁰ -14 ⁰⁰	Coffee Break
14 ⁰⁰ -16 ³⁰	Session 4
	https://us02web.zoom.us/j/85267855101?pwd=VWswWDBFd0ZtMGcxWmozL1B2R3ZrUT09 Meeting ID: 852 6785 5101 Password: MemstecH
	Chairmen: Dr. Nazariy Andrushchak Secretary: Dr. Andriy Zdobytskyi, Dr. Uliana Marikutsa
Saturday, May 15	
11 ⁰⁰ -13 ⁰⁰	Final Session
	Chairman: Prof. Mykhaylo Lobur Secretary: Dr. Mykhaylo Melnyk

TIME OF PRESENTATIONS

Paper presentation at the plenary session - 15 min.

Paper presentation at the regular session - 7 min.

Discussion, questions - 5 min.

IEEE XVIIth International Conference on the PERSPECTIVE TECHNOLOGIES AND METHODS IN MEMS DESIGN (MEMSTECH)

Organized by:



IEEE Ukraine Section

IEEE Ukraine Section (West)

MTT/ED/AP/EP/SSC Societies Joint Chapter



Lviv Polytechnic National University,

CAD Department, Ukraine



Wroclaw University of Science and Technology,

Faculty of Microsystem Electronics and Photonics, Poland



AGH-University of Science and Technology,

The Faculty of Mechanical Engineering and Robotics, Poland

Technical Co-Sponsors:

1. Lviv Polytechnic National University

2. IEEE Ukraine Section (West) MTT/ED/AP/EP/SSC Societies Joint Chapter

CONFERENCE ORGANIZING COMMITTEE

Prof. Mykhaylo Lobur	Honorary Chairpersons , Head of CAD Department, Lviv Polytechnic National University, Ukraine
Prof. Jan Dziuban	Honorary Chairpersons , Faculty of Microsystem Electronics and Photonics, Wroclaw University of Science and Technology, Poland
Prof. Marek Iwaniec	Honorary Chairpersons , Faculty of Mechanical Engineering and Robotics, AGH-University of Science and Technology, Poland
Dr. Mykhaylo Melnyk	Chairperson , CAD Department, Lviv Polytechnic National University, Ukraine
Dr. Mykhaylo Andriychuk	Technical Program Committee Chairperson , CAD Department of Lviv Polytechnic National University, Ukraine
Dr. Nataliia Bokla	Financial Chair , CAD Department, Lviv Polytechnic National University, Ukraine
Prof. Sergiy Shcherbovskiyh	Publication Chair , CAD Department, Lviv Polytechnic National University, Ukraine
Dr. Nazariy Andrushchak	Member , CAD Department, Lviv Polytechnic National University, Ukraine
Dr. Michal Borecki	Member , Warsaw University of Technology, Poland
Dr. Pavlo Denysyuk	Member , CAD Department, Lviv Polytechnic National University, Ukraine
Dr. Uliana Marikutsa	Member , CAD Department, Lviv Polytechnic National University, Ukraine
Dr. Igor Farmaga	Member , CAD Department, Lviv Polytechnic National University, Ukraine
BSc. Danylo Horyk	Member , CAD Department, Lviv Polytechnic National University, Ukraine
BSc. Yulian Salo	Member , CAD Department, Lviv Polytechnic National University, Ukraine

INTERNATIONAL PROGRAM COMMITTEE

M. Lobur	Honorary Chairperson, Lviv Polytechnic National University, Ukraine
S. Shcherbovskykh	Lviv Polytechnic National University, Ukraine
M. Andriychuk	Lviv Polytechnic National University, Ukraine
M. Banas	AGH-University of Science and Technology, Poland
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J. Golebiowski	Lodz University of Technology, Poland
A. Dzedzic	Wroclaw University of Technology, Poland
J. Dziuban	Wroclaw University of Technology, Poland
M. Iwaniec	AGH-University of Science and Technology, Poland
T. Kamisinski	AGH-University of Science and Technology, Poland
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A. Lukaszewicz	Bialystok University of Technology, Poland
O. Matviyiv	Lviv Polytechnic National University, Ukraine
A. Napieralski	Lodz University of Technology, Poland
W. Pleskacz	Warsaw University of Technology, Poland
L. Starzak	Lodz University of Technology, Poland
E. Suhir	Portland State University, USA
D. Fedasyuk	Lviv Polytechnic National University, Ukraine
V. Hahanov	Kharkiv National University of Radio Electronics, Ukraine
M. Szermer	Lodz University of Technology, Poland
A. Jakubiak	Warsaw University of Technology, Poland
M. Weyrich	University of Stuttgart, Germany
E. Yashchyshyn	Warsaw University of Technology, Poland

LOCATION

We are really interesting to conduct the IEEE MEMSTECH Conference in a regular way and in scheduled time. However, this time, the COVID-19 coronavirus and related quarantine in the whole world make definite adjustments to our plans.

Due to the current situation, we must hold IEEE MEMSTECH 2021 not as an in-person conference in beautiful Polyana (Zakarpattya) as originally planned, but as an online virtual conference for the first time, Memstech 2021 conference will be held online.

TEST CONNECTION

Wednesday, May 12	16⁰⁰-17⁰⁰
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OPENING CEREMONY

Thursday, May 13	11⁰⁰-11²⁵
Link to connect: https://us02web.zoom.us/j/85267855101?pwd=VWswWDBFd0ZtMGcxWmozL1B2R3ZrUT09 Meeting ID: 852 6785 5101 Password: MemstechH	

Chairman: Prof. Mykhaylo Lobur

Secretary: Dr. Mykhaylo Melnyk

Speech of the Conference's Honorary Chairperson - *Prof. Mykhaylo Lobur*, Head of CAD Department of the Lviv Polytechnic National University

IEEE Ukraine Section: Plans and Prospects - Eugene Pichkalov, IEEE Ukraine Section Vice-Chair/Chair-Elect

PLENARY SESSION

Thursday, May 13	11²⁵-12⁴⁵
Link to connect: https://us02web.zoom.us/j/85267855101?pwd=VWswWDBFd0ZtMGcxWmozL1B2R3ZrUT09 Meeting ID: 852 6785 5101 Password: MemstechH	

Chairmen: Prof. Mykhaylo Lobur

Secretary: Dr. Mykhaylo Melnyk

1. **Searching for life: Highly integrated high vacuum MEMS instruments for Venus and Mars missions**
Jan Dziuban
2. **Avoiding Inelastic Strains in Solder Joint Interconnections of IC Packages**
Ephraim Suhir
3. **Modeling of Linear Electromagnetic Damper for Walking Assistance and Energy Harvesting**
Ludwin Molina Arias, Ramesh Narina, Marek Iwaniec

SESSION 1

Thursday, May 13	13⁰⁰-15⁰⁰
Link to connect: https://us02web.zoom.us/j/85267855101?pwd=VWswWDBFf0ZtMGcxWmozL1B2R3ZrUT09 Meeting ID: 852 6785 5101 Password: MemstechH	

Chairmen: Prof. Jan Dziuban

Secretary: Dr. Nazariy Jaworski, Dr. Andriy Kernytskyy

1. **Design of Electrochemical Reactor for Manufacturing Aluminum Oxide Nanoporous Membrane**
Urtė Ciganė, Arvydas Palevičius
2. **Design and Simulation of Microfluidic Lab-chip for Detecting Heavy Metals in Water Sample**
Nataliia Bokla, Tamara Klymkovych, Oleh Matviykyv, Volodymyr Stakhiv, Mykhaylo Melnyk
3. **Features of Porous Composites Dispersion Relations Simulation based on Voxel-like Microlevel Models and Supercell Approach in COMSOL System**
Nazariy Jaworski, Nazariy Andrushchak, Yurii Dziurakh
4. **Magnetoconductance of Polycrystalline Silicon in SemOI-structures for Sensors Application**
Anatoly Druzhinin, Yuriy Khooverko, Anton Lukianchenko, Igor Kogut, Taras Benko, Victor Golota
5. **Modelling of Heat Transfer in Particle and Fiber Reinforced Composite Materials**
Ihor Farmaga, Petro Shmigelskyi, Anastasiia Khudiak
6. **Numerical and Experimental Investigation of Micro Matrix Hot Embossing Process**
Justas Ciganas, Giedrius Janušas, Kesha Vishweshkumar Vyas
7. **Study on Manufacturing of High Purity thin Iron Foi**
Nitin Satpute, Marek Iwaniec, Prakash Dhoka, Pankaj Karande, Ramesh Narnia
8. **Thermal Calibration and Filtration of MEMS Inertial Sensors**
Yurii Bezkorovainyi, Olha A. Sushchenko, V. Golitsyn, O. Salyuk
9. **Thermomechanical Behavior Computer Forecasting for Bimetallic Plates in Their Magnetic Pulse Treatment**
Roman Musii, Nataliia Melnyk, Veronika Dmytruk, Oksana Kaminska, Beata Kushka, Hanna Shayner
10. **Automated ARM CPU-based Cloud System For Industrial Internet Of Things**
Mykhailo Lobur, Yulian Salo, Ihor Farmaha, Olha Senkovich, Krzysztof Pytel

SESSION 2

Thursday, May 13	15²⁰-17²⁰
Link to connect: https://us02web.zoom.us/j/85267855101?pwd=VWswWDBFf0ZtMGcxWmozL1B2R3ZrUT09 Meeting ID: 852 6785 5101 Password: MemstechH	

Chairmen: Prof. Mykhaylo Andriychu

Secretary: Dr. Nataliia Bokla

- 1. Approximation of PM DC Micromotor Transfer Function By Fractional Order Transfer Function**
Bohdan Kopchak, Andrii Kushnir, Marianna Kopchak
- 2. Design and Analysis of Eddy Current Damper**
Nitin Satpute, Marek Iwaniec, Ramesh Narnia, Idris Presswala, Ludwin Molina Arias
- 3. Development of Multiband Flame Detector with Fuzzy Correction Bloc**
Andrii Kushnir, Bohdan Kopchak
- 4. Development of the Architecture of the Base Platform Agricultural Robot for Determining the Trajectory Using the Method of Visual Odometry**
Igor Nevliudov, Sergiy Novoselov, Oksana Sychova, Serhii Tesliuk
- 5. Efficiency Use of Flow Digital Methods of Measure Signals Pre-Processin**
Iryna Manuliak, Stepan Melnychuk, Marian Slabinoha
- 6. Optical Sensor Based on Data Fusion Concept**
Hryhorii Barylo, Mariia Ivakh, Iryna Kremer, Taras Prystay, Halyna Kuchmiy, Yurii Kachurak
- 7. Optimization of Parameters of Nanocomposite Hip Implants**
Andriy Zdobytskyi, Tamara Klymkovych, Hryhorii Seniv, Svitlana Tsymbrylo, Andriy Kernytskyy
- 8. Scattering Properties of Microantenna Based on an Array Consisting of Thin Wires**
Mykhaylo Andriychuk, Yarema Kuleshnyk, Volodymyr Senyk
- 9. Software Development for the Monitoring System of Renewable Energy Generation Process**
Marian Slabinoha, Nataliia Klochko, Yuriy Kuchirka, Oleksandr Krynytsky, Stepan Melnychuk, Iryna Manuliak
- 10. Three Types of PCB Defects and Image Processing Algorithms for their Detection**
Roman Melnyk, Yurii Havrylko, Yevheniya Levus

SESSION 3

Friday, May 14	10³⁰-13³⁰
Link to connect: https://us02web.zoom.us/j/85267855101?pwd=VWswWDBFd0ZtMGcxWmozL1B2R3ZrUT09 Meeting ID: 852 6785 5101 Password: MemstechH	

Chairmen: Prof. Marek Iwaniec

Secretary: Dr. Nazariy Jaworski, Dr. Andriy Kernytskyy

- 1. Application of FEM with Piecewise Mittag-Leffler Functions Basis for the Linear Elasticity Problem in Materials With Fractal Structure**
Volodymyr Shymanskyi, Yaroslav Sokolovskyy, Iryna Boretska, Ivan Sokolovskyy, Oleksandr Markelov, Oleksandr Storozhuk
- 2. Discrete Modelling of System Statistical Parameters by Fibonacci Probability Distribution**
Petro Kosobutskyy, Nazariy Jaworski, Marek Iwaniec
- 3. Equations of State Variables of Electromagnetic Circuits**
Vasil Tchaban, Serhii Kostyuchko, Bohdan Krokhmalny
- 4. Investigation and Animation of Spring Dynamic Absorber**
Yaroslav Pelekh, Mykola Ihnatyshyn, Roksolyana Stolyarchuk, Andrii Kunynets, Tania Magerovska, Serhii Mentynskyy
- 5. Numerical Calculation of the Electromagnetic Torque of an Induction Motor with a Hollow Rotor**
Volodymyr Gritsyuk, Igor Nevliudov, Mykola Zablodskiy, Nataliia Demska
- 6. Prediction of Resonant Thermomechanical Behavior of Bimetallic Plates Under the Action of Amplitude-Modulated Radio Impulse**
Roman Musii, Nataliia Melnyk, Khrystyna Drohomiretska, Nadiia Vilkhovchenko, Liudmyla Huk, Valentyn Shynder
- 7. Radius Measurements of Angular Bearing Raceways in the Context of Analytical Computations of Contact Interactions**
Maciej Kaźmierczak, Mateusz Muszyński, Vasyl Tomyuk
- 8. Selected Possibility of Using MEMS to Assess the Demand and Transmission Capacity of Electric Power Systems**
Michał Borecki, Yuriy Khanas
- 9. Design and Construction of a Gutter-Cleaning Robot as an Example of Engineering Education**
Wiktor Hudy, Uliana Marikutsa, Krzysztof Pytel, Stanislaw Gumula, Henryk Noga, Marcin Niedbalec
- 10. Some Aspects on [numerical] Stability of Evolution Equations of Stiff Type; Use of Computer Algebra**
Winfried Auzinger, Othmar Koch, Petro Pukach, Roksolyana Stolyarchuk, Ewa Weinmüller

11. Design and Construction of a Laser Plotter as an Example of Engineering Education

Wiktor Hudy, Mykhaylo Lobur, Krzysztof Pytel, Stanislaw Gumula, Małgorzata Piaskowska-Silarska, Dawid Szczepaniak

12. A Comparative Analysis of the Performance of Implementing a Java Application Based on the Microservices Architecture, for Various AWS EC2 Instances

Damian Kubiak, Wojciech Zabierowski

SESSION 4

Friday, May 14	14⁰⁰-16³⁰
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Chairmen: Dr. Nazariy Andrushchak

Secretary: Dr. Andriy Zdobytskyi, Dr. Uliana Marikutsa

1. A Model Analysis for Embedded Control of Known Continuous-Time Scalar Nonlinear Systems

Pavlo Tymoshchuk, Iryna Pastyrskaya

2. Algorithmic Approach to Design of New Medical Equipment

Leonid Berezko, Serhii Sokolov, Iryna Yurchak, Oleksandr Berezko

3. Construction of Asynchronous Cell-Automatic Model For Research the Thermal Mass Transfer Process

Yaroslav Sokolovskyy, Oleksiy Sinkevych, Volodymyr Shymanskyi, Iryna Boretska, Tetiana Samotii

4. Evaluation of Noise Signals in Wavelet Domain

Adrian Nakonechnyi, Denys Mozola, Roman Musii

5. Modeling and Design of the Industrial Production Process Mathematical Model

Svitlana Poperehnyak, Anastasiya Vecherkovskaya

6. Experimental Solar-Based Rechargeable Battery Charger as an Example of Engineering Education

Wiktor Hudy, Oleh Matviykyv, Krzysztof Pytel, Stanislaw Gumula, Michał Koziol, Krystian Bilski

7. Parallel Computing Algorithm and Visualization of Particles Wave Functions in a Quantum System

Bogdan Sus, Sergiy Zagorodnyuk, Oleksandr Bauzha, Alla Ivanyshyn

8. Practical Implementation of Algorithms in a Discontinuous System of Vector Control Synchronous Motors

Evgen Rudnev, Volodymyr Gritsyuk, Ivan Shevchenko, Rostyslav Brozhko, Halyna Bielokha

9. Development of a Small Scale Laboratory Centrifuge as an Example of Engineering Education

Wiktor Hudy, Mykhaylo Melnyk, Krzysztof Pytel, Stanislaw Gumula, Franciszek Kurdziel, Jakub Tastekin

10. Software and Algorithmic Aspects of Parallel Calculation of Non-Isothermal Moisture Transfer in Fractal-Structure Materials

Yaroslav Sokolovskyy, Volodymyr Yarkun, Mar'iana Levkovich, Olexandr Storozhuk, Ihor Kapran

11. Proposal of a Five Degrees-of-Freedom Manipulator as an Example of Engineering Education

Wiktor Hudy, Mykhaylo Lobur, Krzysztof Pytel, Stanislaw Gumula, Adam Kalwar, Adam Rusin

12. Model Explainability Using SHAP Values for LightGBM Predictions

Michal Bugaj, Krzysztof Wrobel, Joanna Iwaniec

FINAL SESSION

Saturday, May 15	11⁰⁰-13⁰⁰
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Chairman: Prof. Mykhaylo Lobur

Secretary: Dr. Mykhaylo Melnyk

1. Concluding reports of Section's Chairmen.
2. Discussion.
3. Conference summary.
4. Conference closing.

In this conference, we will use the web conferencing system Zoom.

SHORT INSTRUCTION

<https://www.youtube.com/watch?v=3VebiA5pGq0>

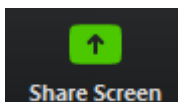
1. Install the App here: <https://otago.zoom.us/client/latest/ZoomInstaller.exe>

Go to <https://otago.zoom.us/join> and Enter the Meeting ID that you have been provided with in the appropriate field and click 'Join' (the Meeting ID will be a 9 or 10 digit number)

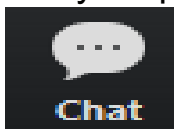
Join a Meeting



- 2 According to the conference program, we recommend that you connect 10-15 minutes before the section begins



2. **Share Screen:** Start [sharing your screen](#) so participants can see your presentation.



3. **Chat** Using chat. You can use the Chat tool to send a text question to all participants or privately to certain members.



4. **Start Video** **Audio only.** It is possible that during the conference participants will be ask to turn off their cameras and move to audio only, particularly if there are problems with the available bandwidth. To do this simply click on the camera icon at the bottom of the Zoom window.



5. **Unmute** **Mute/Unmute:** This allows you to mute or unmute your microphone. Please mute the microphone if you are not the speaker.