

# **2016 XII International Conference on Perspective Technologies and Methods in MEMS Design (MEMSTECH 2016)**

**Lviv - Polyana, Ukraine  
20 – 24 April 2016**



**IEEE Catalog Number: CFP1664A-POD  
ISBN: 978-1-5090-1414-9**

**Copyright © 2016, Lviv Polytechnic National University  
All Rights Reserved**

***\*\*\*This publication is a representation of what appears in the IEEE  
Digital Libraries. Some format issues inherent in the e-media version may  
also appear in this print version.***

IEEE Catalog Number:	CFP1664A-POD
ISBN (Print-On-Demand):	978-1-5090-1414-9
ISBN (Online):	978-617-607-913-2

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

## CONTENTS

**Analysis, Design and Modeling of MEMS**

<b>Accelerometers Production Technological Process Decomposition Parameters Model</b>	1
<i>Igor Nevlydov, Vladyslav Yevsieiev, Svitlana Miliutina, Viktoriia Bortnikova</i>	
<b>Algorithms and Approaches for Processing an Output Signal from Lab-on-a-Chip Devices in Bioanalysis</b>	6
<i>Danylo Lizanets, Rafal Walczak</i>	
<b>Analytical Modelling of Bossed Membrane</b>	12
<i>Cezary Maj, Piotr Zajac, Michal Szermer, Mykhaylo Melnyk, Andrzej Napieralski, Mykhaylo Lobur</i>	
<b>Applying Composite Design Pattern for MEMS Program Model Creation</b>	16
<i>Andriy Zelinskyy, Vasyl Teslyuk, Taras Maloid</i>	
<b>Applying Decorator Design Pattern for MEMS Program Model Creation</b>	19
<i>Andriy Zelinskyy, Vasyl Teslyuk, Taras Maloid</i>	
<b>Composite Materials Microlevel Structure Models Visualization Distributed Subsystem Based on WebGL</b>	22
<i>Nazariy Jaworski, Marek Iwaniec, Mykhaylo Lobur</i>	
<b>Diamond-Based Metal Matrix Composite Effective Heat Conduction Coefficient Synthesis Microlevel Model Verification</b>	25
<i>Nazariy Jaworski, Marek Iwaniec, Mykhaylo Lobur, Ihor Farmaga</i>	
<b>Mask Layout Design of Single- and Double-Arm Electrothermal Microactuators</b>	28
<i>Andriy Holovatyy, Vasyl Teslyuk, Mykhaylo Lobur, Michal Szermer, Cezary Maj</i>	
<b>Mechatronic Laboratory Stand</b>	31
<i>Pawel Knapkiewicz, Mykhaylo Melnyk, Vasyl Teslyuk, Jan Dziuban, Mykhaylo Lobur, Michal Szermer</i>	
<b>Modeling of the Thin Microscopic Shells for Microfluidic Cell Analysis</b>	34
<i>Danylo Lizanets, Oleh Matviykiv</i>	
<b>Optimization of the Accelerometer Design Using Ansys</b>	37
<i>Taras Petruk, Vasyl Teslyuk, Mykhaylo Melnyk, Olga Narushynska</i>	
<b>Usage of Acceleration and Angle of Rotation of Hand for Wireless Control of Computer</b>	45
<i>Volodymyr Dutka, Stanislav Starychenko, Andriy Kernytskyy, Mykhaylo Melnyk</i>	

## Embedded System Modeling and Design

<b>Automated Processing of Cytological and Histological Images</b>	51
<i>Oleg Berezsky, Oleh Pitsun</i>	
<b>Conceptual Structure of Application for Personalized News Feeds</b>	54
<i>Viktoriiia Puzankova, Oleg Faitas, Yuri Tyhun</i>	
<b>Control Processes of Floating Docks Based on SCADA Systems with Wireless Data Transmission</b>	57
<i>Yuriy Kondratenko, Andriy Topalov, Oleksiy Kozlov</i>	
<b>Development of Fractional Order Differential-Integral Controller By Using Oustaloup Transformation</b>	62
<i>Bohdan Kopchak</i>	
<b>Epileptic Seizure Detection from EEG Signals by Using Wavelet and Hilbert Transform</b>	66
<i>Polat Hasan, Ozerdem Sirac</i>	
<b>FPGA-based Digital Filter Design for Biomedical Signal</b>	70
<i>Erman Ozpolat, Baris Karakaya, Turgay Kaya, Arif Gulden</i>	
<b>Processing Module of FFT in Monolithic Single-Chip MEMS</b>	84
<i>Ihor Prots'ko, Vasyl Teslyuk</i>	
<b>Reliability Modeling of Bridge Structure System with Load-Sharing Taking into Account</b>	87
<i>Mykhaylo Lobur, Serhiy Shcherbovskykh, Tetyana Stefanovych</i>	
<b>Research Cluster Topology of Sensor Networks for Environmental Monitoring</b>	90
<i>Ivan Tsmots, Olexander Kuzmin, Vasyl Fedeka</i>	
<b>The Construction of Technological Problems Cases for the Purpose of Intelligible Control</b>	96
<i>Vasyl Sheketa, Vitaliy Melnyk, Yulia Romanyshyn, Mykola Chesanovskyy</i>	
<b>The Role of Sensors in the Electric Drive Wheel: Ways of Enhancing Informatory Functions</b>	101
<i>Mykola Kulpa, Kostyantyn Kolesnyk</i>	
<b>Vision System Model for Mobile Robotic Systems</b>	104
<i>Kateryna Matviichuk, Vasyl Teslyuk, Taras Teslyuk</i>	

## Information Technologies in Microsystems

<b>Automated Simulation of Scanning Tunneling Microscope Functional Parameters</b>	107
<i>Roman Maisakovskyy, Kostyantyn Kolesnyk, Roman Panchak, Ruslan Golovatskyy</i>	
<b>Electric Field Measurements of a Base Station at 2G and 3G Frequencies</b>	110
<i>Etem Taha, Abbasov Teymuraz</i>	
<b>Statistical Methods for Data Prediction</b>	120
<i>Jan Napieralski</i>	
<b>Structural Model of Passenger Counting and Public Transport Tracking System of Smart City</b>	124
<i>Oleg Boreiko, Vasyl Teslyuk</i>	
<b>Trade-off Optimization in the Problem of Software System Architecture Choice</b>	132
<i>Alexandr Kharchenko, Ihor Bodnarchuk, I. Raichev, N. Zagorodna</i>	

## **Algorithms and Methods of Modeling**

<b>Application Mirroring of Matrices to Prevent Excessive Reduction</b>	143
<i>Yuriy Khanas, Roman-Andriy Ivanciv</i>	
<b>Application of Fuzzy Predicates and Quantifiers by Matrix Presentation in Informational Resources Modeling</b>	146
<i>Vyacheslav Shebanin, Igor Atamanyuk, Yuriy Kondratenko, Yuriy Volosyuk</i>	
<b>Evaluation of Emotional State of a Person Based on Facial Expression</b>	161
<i>Filip Prikler</i>	
<b>Geometric Calculation of Pi Using the Monte Carlo Method</b>	167
<i>Petro Kosobutskyy, Andrii Kovalchuk, Mariia Kuzmynykh, M. Shvarts</i>	
<b>Identification of Moving Objects in Video by Using Graph Model</b>	170
<i>Mykhaylo Melnyk, Oleksandr Basalkevych</i>	
<b>Mathematical Foundations of Multiple Inheritance: Reflexive-transitive Closure of the Binary Relations</b>	192
<i>Dmytro Buy, Olena Shyshatska, Sunmade Fabunmi, Karam Mohammed</i>	
<b>Planning of Routes Based on Distribution of Passenger Flows in Time and Space</b>	196
<i>Vitaliy Mazur</i>	
<b>Recursive Algorithm of Traversing Reliability Block Diagram for Creation Reliability and Refuse Logical Expressions</b>	199
<i>Maksym Seniv, Andrii Mykuliak, Andriy Senechko</i>	
<b>Research Block Ciphers Based on Matrix Transformations</b>	202
<i>Andriy Maherovsky, Yuri Kurko, Roman-Andriy Ivanciv, Danylo Vivchar</i>	
<b>Software for Automatic Calculation and Construction of Chamber Drying Wood and its Components</b>	209
<i>Yaroslav Sokolovskyy, Oleksiy Sinkevych</i>	
<b>Synthesis of Optimal Recovery Systems in Distributed Computing Using Ideal Ring Bundles</b>	220
<i>Oleg Riznyk, Iryna Yurchak, Oleksandr Povshuk</i>	
<b>Working Hours Controls Methods and Increasing Its Efficiency in the IT Company</b>	235
<i>Maksym Seniv, Andriy Sambir, Mariana Seniv</i>	