

**2018 18th International  
Conference on  
Mechatronics - Mechatronika  
(ME 2018)**

**Brno, Czech Republic  
5-7 December 2018**



**IEEE Catalog Number: CFP1857K-POD  
ISBN: 978-1-5386-4364-8**

**Copyright © 2018, Brno University of Technology  
All Rights Reserved**

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

IEEE Catalog Number:	CFP1857K-POD
ISBN (Print-On-Demand):	978-1-5386-4364-8
ISBN (Online):	978-80-214-5542-9

**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

## Table of Contents

Thomas Hieninger, Florian Goppelt, Ronald Schmidt-Vollus: On-Line Self-Tuning for Centrifugal Pumps Driven in Parallel Mode Using Dynamic Optimization .....	1
Amir Samiee, Nicolas Tiefnig, Jidu P. Sahu, Michael Wagner, Andreas Baumgartner, László Juhász: Model-Driven-Engineering in Education .....	9
Ian Mangion, Jean Paul Azzopardi, Carl Caruana, Mario Farrugia, Robert Ghirlando: Electronic Ignition Based on In-Cylinder Pressure from a Pressure Sensor Glow Plug .....	15
Martin Dosedel, Zdenek Havranek: Design and Performance Evaluation of Smart Vibration Sensor for Industrial Applications with Built-in MEMS Accelerometers .....	22
Hiroyuki Nabae: Simulation Approach to Effect of Elasticity on Actuation Time of Displacement-amplified Electromagnetic Actuator .....	30
Petr Hadraba, Zdenek Hadas: Virtual Twin of the Multi-spindle Lathe for the Chatter Time-domain Analysis .....	35
Pei-Chun Lin, Yen-Feng Cheng, Kuo-Shen Chen: Design and Realization of a Novel Elastomer Characterization System for Precision Positioning Application .....	41
George Juraj Stein, Andrej Krafčík, Peter Tobolka, Ivan Frollo: Attenuation of Beam Transversal Vibrations by Electro-magnetic Means .....	47
Andrzej Andrzejewski: Investigation into the Moment of Inertia Estimation Process Occurring in Electric Drive of a Mechatronic System .....	53
Karel Kalista: A Proposal of the Methodology for Dynamic Force Coefficients Identification of Labyrinth Seal with Use of Active Magnetic Bearings .....	61
Jiri Ctibor, Ivo Pazdera, Jan Knobloch: One-axis Radial Active Magnetic Bearing Simulink Model with Respect of Nonlinear Ferromagnetics .....	66
Radomir Prusa, Rostislav Huzlik, Vladimir Haban: Design of Passive Magnetic Axial Bearing for Seal-less Pump .....	72
Vojtech Blahnik, Tomas Kosan, Jakub Talla: Electromagnetic Interference of Single-phase AC-DC Traction Converter .....	78
Oleg Sivkov, Martin Novak, Jaroslav Novak: Comparison between Si IGBT and SiC MOSFET Inverters for AC Motor Drive .....	83
Luboš Streit, Jakub Talla, Martin Janda: Tram LC Filter Stabilization by Supercapacitor Storage System .....	88
Jan Martis, Pavel Vorel: Wireless Power Transfer 2.5 kW with Simple Control and High Efficiency .....	93
Pavel Vorel, Jan Martiš, Petr Huták: Battery Supplied Arc Welder .....	99
Martin Pittermann, Jiri Fort, Jan Diesl, Vladimir Pavlicek: Converters for Switched Reluctance Motor - Topology Comparison .....	104
Florian Goppelt, Thomas Hieninger, Ronald Schmidt-Vollus: Modeling Centrifugal Pump Systems from a System - Theoretical Point of View .....	112
Ivo Pazdera, Petr Prochazka, Radoslav Cipin, Jiri Ctibor: Synchronous Machine Model and Equivalent Circuits Based on Hybrid Parameters of Two-Port Network .....	120
Dariusz Horla: On Applying a Generalized Padé Approximation to Stability Analysis - Experimental Results .....	126
Bo Zhang, Tao Dong, Nuno Pires, Zhaochu Yang: Modeling and Simulation of Facility Planning Problem Based on Improved SLP Method .....	N/A
Roman Pechanek, Vladimir Kindl, Jiri Franc: Different Approach in Thermal Modeling of Permanent Magnet Synchronous Motor .....	137
Zdeněk Machů, Oldřich Ševeček, Zdeněk Majer, Zdeněk Hadaš, Michal Kotoul: Optimization of the Electro-mechanical Response of the Multilayer Piezoelectric Energy Harvester .....	143
Radoslav Cipin, Marek Toman, Petr Prochazka, Ivo Pazdera: Nonlinear Equivalent Circuit of Induction Machine .....	149
Ladislav Knebl, Cestmir Ondrusek, Jiri Kurfurst: Ferrite Assisted Synchronous Reluctance Motor Design, Manufacturing and Material Influence on Motor Characteristics .....	154
Jan Sobra, Tomas Kavalir, Michal Krizek, Bohumil Skala: Experimental Verification of the Finite Element Analysis of an Induction Machine with Implemented Static Eccentricity Fault .....	160

Vladimir Pavlicek, Martin Pittermann, Jiri Fort: Development of the Measuring Device for Standstill Frequency Response (SSFR) Testing for Electric Machine .....	165
Zdenek Novak, Martin Novak: Design of High-Speed Permanent Magnet Synchronous Motor for Advanced and Sensorless Control Techniques Validation.....	171
Jan Laksar, Lukas Veg: Reduced Schwarz-Christoffel Conformal Mapping in Surface-Mounted PMSM .....	179
Tien Sy Le, Holger Schlegel, Welf-Guntram Drossel, Matthias Putz: Fitnessindex Based Fault-Tolerant Control .....	187
Bartłomiej Wicher, Stefan Brock: Tuning Optimization of Extended State Observer for Two Mass System with Elastic Joint and Backlash .....	195
Luke Spiteri, Mario Farrugia: FeedForward Control of a TurboCharger Hot Gas Test Stand.....	201
Matej Rajchl, Martin Brabc: Inverse Model Approximation Using Iterative Method and Neural Networks with Practical Application for Unstable Nonlinear System Control .....	209
Nadia Sultan, Muhammad Najam ul Islam, Asif Mahmood Mughal: Postural Control During Standing Posture For Small Perturbations With Feedback Linearization .....	216
Joanna Zietkiewicz: Nonlinear Predictive Control with Constraint Propagation Strategy .....	222
Tomas Kosan, Jakub Talla, Stepan Janous, Vojtech Blahník: FPGA-Based Accelerator for Model Predictive Control of Induction Motor Drive .....	229
Jakub Talla, Tomáš Košan, Vojtěch Blahník: FOC-based Speed Control Algorithms of Induction Motor Drive with System Parameter Mismatch.....	235
Péter Stumpf, Ádám Lajos Váradi: Investigation of Estimator Algorithms for High Speed Drive Systems.....	243
Martin Votava, Tomas Glasberger, Zdenek Peroutka: Predictive Real Time Minimization of Power Losses with Improved Space Vector Preselection Algorithm .....	251
Martin Pittermann, Jiri Fort, Jan Diesl, Vladimir Pavlicek: Optimal SRM-Control Algorithm to Achieve Maximum Torque and Real Converter Limits .....	257
Adrian Wójcik, Tomasz Pajchrowski: Torque Ripple Compensation in PMSM Direct Drive with Position-based Iterative Learning Control.....	265
Jaroslav Mlýnek, Michal Petrů, Tomáš Martinec: Optimization of Industrial Robot Trajectory in Composite Production .....	270
Paweł Żak: Master Manipulator Orientation Determination Method Using Extended Kalman Filter.....	276
Nikolay Krinitsyn, Atrem Babaev, Evgeniy Stolov: Robotized System for Processing of Helical Surfaces .....	281
Dmitrii Yu. Kolpashchikov, Nikita V. Laptev, Viacheslav V. Danilov, Igor P. Skirnevskiy, Roman A. Manakov, Olga M. Gerget: FABRIK-Based Inverse Kinematics for Multi-Section Continuum Robots.....	288
Jiri Krejsa, Stanislav Vechet: Fusion of Local and Global Sensory Information in Mobile Robot Outdoor Localization Task.....	296
Nikolay Krinitsyn, Vladimir Kurochkin, Ivan Shcherbakov, Maksim Murin, Evgeniy Stolov, Denis Rakov: Ultrasonic-Based Solution for Mapping Task .....	301
Konrad Urbanski: Control of the Quadcopter Position Using Visual Feedback .....	307
Mehmet Ugur Soydemir, İshak Alkuş, Parvın Bulucu, Aykut Kocaoğlu, Cüneyt Güzeliş, Savaş Şahin: Data Dependent Stable Robust Adaptive Controller Design for Altitude Control of Quadrotor Model.....	313
Gabriel Gašpar, Juraj Dudak, Pavol Tanuska, Tomas Meravy: Implementation of nSoric Measuring System on a PLC .....	319
Moritz Scharff, Richard A. Rivera Campos, Lukas Merker, Jorge H. Alencastre, Carsten Behn, Klaus Zimmermann: Flow Detection using an Artificial Vibrissa-Like Sensor – Simulations and Experiments .....	326
Jawad Masood, Bruno Martinez-Bargiela, Ruben Paz-Cibeira, David Gomez-Loureda, Maria del Carmen Fernandez-Gonzalez, Angel Dacal-Nieto, Victor Alonso-Ramos: Testing of Autonomous High Precision Panel Assembly Process .....	332
Tomas Spacil, Matej Rajchl: Compensation of Linear Acceleration in Single-Mass MEMS Gyroscope.....	338

Ondrej Rubes, Pavel Tofel, Robert Macku, Pavel Skarvada, Filip Ksica, Zdenek Hadas: Piezoelectric Micro-fiber Composite Structure for Sensing and Energy Harvesting Applications .....	344
Joo-Young Ryu, So-Young Lee, Ngoc-Loi Dang, Jeong-Tae Kim: Impedance-based Tension Force Measurement Technique for Cable Structure.....	N/A
Patrik Kutilek, Ivan Vareka, Vaclav Krivanek, Petr Molnar, Zdenek Svoboda, Ondrej Nemecek, Slavka Viteckova: Gait Evaluation in Patients with Transtibial Prosthesis using Force Platforms.....	356
Pavel Hnyk, Lukas Kvarda, Lukas Vojtech, Marek Neruda, Tomas Zitta: Electrode Shapes and Frequency Band Analysis for Human Body Communication.....	360
Te-Hsin Chang, Hiroyuki Nabae, Gen Endo, Koichi Suzumori, Kazutoshi Hatakeyama, Satoaki Chida, Yoichi Shimada: Design of a Wearable Deep Vein Thrombosis Prevention Device Using Thin McKibben Muscles .....	366
Veronika Novotna, Dalibor Cervinka: Current Distribution in the Tissue during Electroporation Process.....	372
Lukas Veg, Jan Laksar: Thermal Model of High-Speed Synchronous Motor Created in MATLAB for Fast Temperature Check .....	377
Vaclav Sova, Martin Brabc, Robert Grepl: FPGA Implementation of Multiplierless Low-Pass FIR Differentiator.....	382
Tomas Zitta, Marek Neruda, Lukas Vojtech, Martina Matejkova, Matej Jehlicka, Lukas Hach, Jan Moravec: Penetration Testing of Intrusion Detection and Prevention System in Low-Performance Embedded IoT Device.....	387
Lukasz Fracczak, Barbara Bryl-Nagórska, Paweł Zak: A Simulation of Snake-like Robot Module Bending by Transverse Artificial Muscles.....	392
Akeel Othman, Dusan Maga: Indoor Photovoltaic Energy Harvester with Rechargeable Battery for Wireless Sensor Node.....	397
Zhiqiang Huo, Yu Zhang, Lei Shu, Yunrong Lv, Shuiquan Lin: Bearing Fault Diagnosis using Multi-sensor Fusion based on Weighted D-S Evidence Theory .....	403
Krzysztof Przystupa: Reliability Assessment Method of Device under Incomplete Observation of Failure .....	409
Miguel Tabone, Jean Paul Azzopardi, Mario Farrugia: Emulation of Vehicle Speed and Impact on Vehicle Event Data Recorder .....	415
Minh Tuan Bui, Radek Dorskocil, Vaclav Krivanek: Distance and Angle Measurement using Monocular Vision.....	422
Štěpán Janouš, Jakub Talla, Václav Šmídl, Zdeněk Peroutka: Model Predictive Control of Dual Induction Motor Single Inverter Drive.....	428
Radek Mařík: Thresholding Using Extreme Value Theory Threshold Models .....	434
Maciej Grabowski, Artur Jędrusyna: A Portable Colloidal Silver Generator with an Integrated Sprayer.....	442
Tomáš Richta, Fernando Macías, Adrian Rutle, Vladimír Janoušek: Domain Specific Modeling for Reconfigurable Distributed Embedded Control Systems .....	N/A
Jaroslav Kovář, Vladimír Fuis: Comparing the Results of Probability of Ceramic Head Fracture According to Weibull's Theory with Inclusion of One or Three Principal Stresses.....	453
Jiri Hajek, Zbynek Kocur, Jiri Vodrazka, Tomas Zitta: Remote Controlled Emulator of Communication Channel for Industrial Testing.....	461
Karel Hruska, Jan Laksar, Jan Sobra: The Determination of Iron Core Loss Characteristics of Special Electrical Steel Types.....	465
Aleksandr Andreev, Olga Peregudova, Katherine Sutyorkina: Trajectory Tracking Control of Robot Manipulators with Revolute Joints using Only Position Measurements.....	471
Jiri Tuma, Michal Holub, Rostislav Huzlik, Jan Pavlik: Calculation of Component Durability Based on Simulation Model .....	477
Daniel Zuth, Tomáš Marada: Comparison of Faults Classification in Vibrodiagnostics from Time and Frequency Domain Data.....	482
Petr Strecha, Petr Makula: Comparison of Particle Filter Resampling Methods in Aircraft Positioning .....	488
Irina Makarova, Ksenia Shubenkova, Anton Pashkevich: Development of an Intelligent Human Resource Management System in the Era of Digitalization and Talentism .....	493

Radek Cermak, Roman Pechanek: Thermal Study of Permanent Magnet Direct Drive Wheel Motor.....	499
Vladimír Fuis: Sensitivity Analysis of the Material Parameters Obtained from the Measurements....	505
Rostislav Huzlik, Vladimir Haban, Martin Kroupa, Martin Hudec: Evaluation of Pressure Pulsation Frequency by Motor Current Signature Analysis .....	511
Marek Toman, Radoslav Cipin, Pavel Vorel: Thermal Networks Respecting Asymmetric Cooling of Electrical Machine Parts .....	516
Zdenek Frank, Karel Hruška: Design, Construction and Measurement of an Educational Synchronous Machinery.....	522
Roland Reginald Zana, Ambrus Zelei: Swept Laser Based 3D Pose Detection of the Swinging Robot Acroboter.....	527
Lubomír Drápal, Jan Vopařil: Design Concept of a Crankshaft for Reduction of Main Bearings Power Losses and a Deep Skirt Engine Block Load .....	533
Tomas Marek, Jan Berthold, Michal Holub, Joachim Regel: A Quasi-online Geometric Errors Compensation Method on CNC Machine Tool.....	537
Radek Bystick, Michal Dub, Milos Andrlé: GPS Applicability for UAV Wind Measurement.....	542
Ondrej Andrs, Michal Maliszewski: Optimization of the DC Motor State Space Controller for FPGA .....	547
Ludek Janak, Zdenek Hadas: Feasibility Study of Micro Thermoelectric Power Supply for Aircraft Sensor Node .....	554
Petr Marcon, Christian Diedrich, Frantisek Zezulka, Tizian Schröder, Alexander Belyaev, Jakub Arm, Tomas Benesl, Zdenek Bradac, Ivo Vesely: The Asset Administration Shell of Operator in the Platform of Industry 4.0.....	559
Eduard Nemlaha, Bohuslava Juhásová: System for Elimination of Faults in Fuel Filling .....	564
Radek Vlach, Filip Musil: Coupled Modeling of Permanent Magnet Generator Cooling using CFD .....	569
Patrik Kutilek, Katerina Benediktova, Jan Svoboda, Petr Volf, Jana Adamkova, Vaclav Krivanek, Jan Hejda, Eva Kutilkova, Ana Carolina D'Angeles M. de Brito: Processing Methods of Camera Record of Animal Movement.....	575