

2020 21st International Conference on Research and Education in Mechatronics (REM 2020)

**Cracow, Poland
9 – 11 December 2020**



**IEEE Catalog Number: CFP2045X-POD
ISBN: 978-1-7281-6225-6**

**Copyright © 2020 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. 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:	CFP2045X-POD
ISBN (Print-On-Demand):	978-1-7281-6225-6
ISBN (Online):	978-1-7281-6224-9

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
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

Conference Title:
**2020 21st International Conference on Research and Education
in Mechatronics (REM)**
Cracow, Poland, December 9th – 11th 2020

Article index

No.	Title	Author(s)	Article ID
1	The Analysis of the Influence of Suspension Parameters in Reducing Motion Sickness in Vehicles	Abinandh Ananthakrishnan, Johannes Moeller and Daniel Schilberg	paper_2
6	Accurate UAS Flight inside a Greenhouse A novel algorithm combining sparse block matching optical flow with UWB localization	Cock Heemskerk, Mark Ramaker, Ton Boode and Lucien Fesselet	paper_4
12	HiPerGreen: Greenhouse crop scouting by a UAS, lessons learned from a cross domain cooperation in applied research	Cock Heemskerk, Ton Boode, Petra Arntzen and Lucien Fesselet	paper_5
17	The Predictability of Driving in Typical Traffic Conditions	Martin Hellwig and Wolf Ritschel	paper_6
23	Design and development of a novel control regime for microgenerating wind turbines	Virginia Kramer, Suman Pradham, Rakesh Mishra and Karsten Schmidt	paper_7
27	Survey on 3D Technologies: Case Study on 3D Scanning, Processing and Printing with a Model	Mohamed Abdelmomen, Fuat Ozan Dengiz and Mart Tamre	paper_8
33	Hybrid Position-Force-Posture-Moment Control Based on Euler Angle/Quaternion Feedback	Yusuke Nakamura and Toshiyuki Murakami	paper_9
39	Development of a 5 DOF manipulator for a mobile Robot	Lukas Sohlbach, Sven Erchen and Karsten Schmidt	paper_10
43	Model-Based Motion Control and Drift Compensation through Pose Estimation	Giuliano Montorio, Hannes Dittmann, Arno Bergmann and Christoph Krimpmann	paper_12
49	An empirical study on the usage of agile methods in the mechatronics industry	Sagar Mule and Peter Hehenberger	paper_13
55	Defect detection on the surface of the technical ceramics using image processing and deep learning algorithms	Denys Havryliv and Maksym Semenchenko	paper_15
58	Transitioning services to result-oriented Product Service Systems: a mechatronic-based approach	Alexander Holzinger, Dominik Leherbauer and Peter Hehenberger	paper_16
64	Unmanned Ground Vehicle Control using IoT	Tarek Tutunji, Mohammed Salah-Eddin and Hisham Abdalqader	paper_17
69	Design of the Vision Control System for the Laboratory test rig	Petr Noskievic and Melvin Alex Lara de León	paper_18
74	Age estimation from human skeleton by machine learning	Takeshi Nagata, Kei Taniguchi, Yoshinori Ogawa and Kazuhiko Imaizumi	paper_19
78	SLAM using ICP and graph optimization considering physical properties of environment	Ryuki Suzuki, Ryosuke Kataoka, Yonghoon Ji, Hiromitsu Fujii, Hitoshi Kono and Kazunori Umeda	paper_20
83	Design of a Neural Controller Using Reinforcement Learning to Control a Rotational Inverted Pendulum	Dominic Brown and Martin Strube	paper_21

88	Development of an energy self-sufficient sensor system to identify gradual changes in the behaviour of a vehicles shock absorber	Simeon Kremzow-Tennie, Tobias Scholz, Martin Hellwig and Friedbert Pautzke	paper_22
94	A study on the influencing factors regarding energy consumption of electric vehicles	Simeon Kremzow-Tennie, Martin Hellwig and Friedbert Pautzke	paper_23
100	Investigation of the Control Law Influence on the Dynamic Characteristics of Vehicle Movement Control System Model	Markian Nakonechnyi, Orest Ivakhiv, Roman Velgan, Mykhaylo Geraimchuk and Oleksandr Viter	paper_26
108	Solution for Corresponding problem of Stereovision by Using AKAZE Features	Shunya Yamabayashi and Yabuta Yoshito	paper_28
113	Investigation of the Stewart Platform Workspace Using MATLAB-Simulink and Simscape Multibody Library	Petr Noskievic and Dominik Walica	paper_29
118	Three-dimensional Human Tracking of a Mobile Robot by Fusion of Tracking Results of Two Cameras	Shinya Matsubara, Akihiko Honda, Yonghoon Ji and Kazunori Umeda	paper_30
122	Development of a chain-based mobile robot	Sven Erchen, Max Triller, Lukas Sohlbach and Karsten Schmidt	paper_31
126	Closed-Loop heartrate Control with Electric Bicycles for Cardiac Rehabilitation	Hauke Neuber and Martin Strube	paper_32
131	Development of IoMT Device for Mobile Eye Examination Via Cloud-based TeleOphthalmology	Cinay Dilibal, Ali Murat Hacimustafaoglu and Savas Dilibal	paper_33
136	Improving the Reliability of Autonomous Vehicles in a Branded Service System Using Big Data	Irina Makarova, Polina Buyvol, Larisa Gabsalikhova, Anton Pashkevich, Eduard Tsybunov and Aleksey Boyko	paper_34
142	The Piezoelectric Effect - a Descriptive Representation of an Essential Solid Body Effect Enabling Various Sensor and Actuator Applications in Mechatronics and Microtechnology	Rüdiger G. Ballas and Dierk Schoen	paper_35
148	Expandable YOLO: 3D Object Detection from RGB-D Images	Masahiro Takahashi, Alessandro Moro, Yonghoon Ji and Kazunori Umeda	paper_36
153	The Electric CafE-Racer Project	Martin Hellwig and Wolf Ritschel	paper_37
158	Design of single-powered tendon drive mechanism for walking assist device	Kosuke Kashiwa, Satoshi Komada and Masato Koyama	paper_38
164	Influence of Digitization in Mechatronics Education Programmes: A Case Study between Taiwan and Austria	Mario Jungwirth, Peter Hehenberger, Simon Merschak, Wei-Chen Lee and Chen-Yu Liao	paper_40
171	Bike Gear Mode Detection and Automated Chain Maintenance Using Solid-Borne Sound Analysis	Thomas Schlechter, Johannes Fischer and Pia Heins	paper_41
175	Educational Example on Optimum Cool Refrigerating Capacity Adjustment for Fridges and Freezers by Fill Level Indication using Series of Pressure Measurements	Thomas Schlechter and Johannes Fischer	paper_42
180	Motivation Role in Engineering Education in the Transition to a Digital Society	Irina Makarova, Anton Pashkevich, Vladimir Shepelev, Eduard Mukhametdinov, Larisa Fatikhova and Vadim Mavrin	paper_43
186	Spherical Camera Localization by Color Difference Minimization Using 3D Model of the Environment	Dongxu Yang, Hiroshi Higuchi, Sarthak Pathak, Alessandro Moro, Atsushi Yamashita and Hajime Asama	paper_45

192	The Q-Holon: a quadridimensional holon to design and operate an adaptive and scalable architecture for CPPS	Douha Macherki, Thierno Diallo, Jean-Yves Choley, Amir Guizani, Maher Barkallah and Mohamed Haddar	paper_47
198	Glass Detection Using Polarization Camera and LRF for SLAM in Environment with Glass	Eri Yamaguchi, Hiroshi Higuchi, Atushi Yamashita and Hajime Asama	paper_48
204	Ecological Approach for Object Relationship Extraction in Elderly Care Robot	Adnan Rachmat Anom Besari, Wei Hong Chin, Naoyuki Kubota and Kurnianingsih	paper_49
210	Data-Driven Modeling of a Two-Link Flexible Manipulator (TLFM)	Samuel Ayankoso and Maki Habib	paper_50
216	Automated Tension Belt Status Monitoring	Thomas Schlechter, Johannes Fischer and Michael Röhrig	paper_53
222	Two Kalman Models for Chirp-Sequence Radar Data Filtering of a Periodically Moving Hand	Lisa-Franziska Susanne Schäfer, Dmitrii Kozlov and Peter Ott	paper_54
228	Electromagnetic Configurations in Steering Micro/Nano Robots inside Y-shaped Blood Vessel	Mostafa Abdelaziz and Maki Habib	paper_55
234	A Multi-Stakeholders Co-Design Methodology Applied to an Insulin Pump Mechatronic System	Elmehdi Azzouzi, Faïda Mhenni, Jean-Yves Choley and Daniel Bouskela	paper_56
240	Development of IoT/Cloud Integration for Autonomous Networked Robots (ANR)	Maki Habib and Chukwuemeka Chimsom .I.	paper_57
250	Interfacing Computing Platforms for Dynamic Control and Identification of an Industrial KUKA Robot Arm	Laith Salameen, Abdelkarim Estatieh, Salman Darbisi, Tarek Tutunji and Nathir Rawashdeh	paper_58
255	Development of Knee Joint Mechanism with Variable Transmission and Joint Stop for Bipedal Robot Inspired by Human Structure	Kimitake Ueki, Ryuki Sato, Aiguo Ming, Makoto Shimojo, Moncef Hammadi and Jean-Yves Choley	paper_59
261	SPEECH QUALITY MEASUREMENTMETHODS AND MODELS OVER IP-NETWORKS	Oleksandr Tymchenko, Bohdana Havrysh, Orest Khamula, Svitlana Vasiuta and Adam Jagielło	paper_60
267	Control, simulation and validation of a hybrid actuator for a Maglev train model on a scale of 1:20	Jan Philipp Rickwärtz, Johann Kolb and Kay Hameyer	paper_61
273	Concept of a soft gripper based on a magnetoactive polymer: Static calculations	Denys Gutenko	paper_62
278	Opportunities of the Polarized Light Modulation for Astronomic Polarimeters Using	Sergii Petrenko, Petro Nevodovskyi, Anatoliy Vidmachenko, Orest Ivakhiv, Mykhaylo Geraimchuk and Anatolii Omelyan	paper_66
283	Automatic video surveillance system: recognition of critical behaviors in the process of machine learning.	Adam Surówka	paper_67
287	Development of an analytical inverse kinematics for a 5 DOF manipulator	Daniel Kusmenko and Karsten Schmidt	paper_68
292	Design and Manual Control of a 3 Degrees of Freedom Social Robotic Manipulator	Pouria Khajepour and Esmaeil Najafi	paper_69
297	MBSE approach for the improvement of manufacturing system flexibility	Khalil Tliba, Olivia Penas, Thierno Diallo, Romdhane Benkhalifa, Noureddine Benyahia and Jean-Yves Choley	paper_70

303	Modeling and Control of a Double Inverted Pendulum using LQR with Parameter Optimization through GA and PSO	Maki Habib and Samuel Ayankoso	paper_71
309	ROS-based Motion Planner for Gazebo-Simulated Rescue Robots in RoboCup	Mohammad Reza Mirzaei, Nima Karimi and Esmaeil Najafi	paper_72
314	ROS-based SLAM and Navigation for a Gazebo-Simulated Autonomous Quadrotor	Yousef Alborzi, Behzad Safari Jalal and Esmaeil Najafi	paper_73
319	A categorical framework for Safety critical mechatronic systems modeling	Nourhene Abdeljabbar, Faïda Mhenni and Jean-Yves Choley	paper_74
324	Mechatronics: Experiential Education and Project based Learning	Maki Habib and Fusaomi Nagata	paper_75
330	Action Planning Logic in Intelligent IT Systems Using the Example of Bots	Sergii Telenyk, Eduard Zharikov, Grzegorz Nowakowski, Jevgenii Vovk and Olena P. Tokmenko	paper_76
341	Analytical and Numerical Thermal Model of Static Electric Machines	Gabriel Mendes, Ângela Ferreira and Ednei Miotto	paper_77
347	The Comparison of the Current and Industry 4.0 Automation and Protection Standards	Lukasz Soltyssek and Jerzy Szczepanik	paper_79