## **2021 7th International Conference** on Mechatronics and Robotics **Engineering (ICMRE 2021)**

**Budapest, Hungary** 3 – 5 February 2021



**IEEE Catalog Number: CFP21W13-POD ISBN**:

978-1-6654-3053-1

## Copyright © 2021 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:
 CFP21W13-POD

 ISBN (Print-On-Demand):
 978-1-6654-3053-1

 ISBN (Online):
 978-1-6654-1489-0

#### **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



# 2021 The 7th International Conference on Mechatronics and Robotics Engineering

#### **ICMRE 2021**

#### **Table of Contents**

Prefacevii	
Conference Committeesviii	
Chapter I: Robot Design and Path Planning	
An On-line Continuous Cable Tension Distribution Algorithm for Cable-Driven Robot Based on Generalized Inverses	
Ya'nan Lou, Haoyu Lin, Pengkun Quan and Shichun Di	
Static Gait Planning of a Quadruped Robot with Four-Bar Shock Absorbing Mechanism5	
Dong Zhang, Tianyu Fang, Yansen Yang and Zhongyi Guo	
Building a Flexible Mobile Robotics Teaching Toolkit by Extending MATLAB/Simulink with ROS and Gazebo	
Yun Niu, Hafeezullah Qazi and Yalin Liang	
Neural Network System For Ground Robot Path Planning and Obstacle Avoidance17	
Vladimir Parkhomenko and Mikhail Medvedev	
Initial Development of Image Processing Based Computer Vision Technology on Robotic Arm Manipulator for Tool Wear Monitoring on Micro-Milling	
Gandjar Kiswanto, Ramandika Garindra Putra, Christiand, M. Ramadhani Fitriawan, Fachryal	
Hiltansyah and Shabrina Kartika Putri	
A Software Based Self-Recovering Robotic System Architecture Using ROS29	
Luis Figueroa Rivera and Balasubramaniyan Chandrasekaran	
Development of the Neural-Based Navigation System for a Ground-Based Mobile Robot35	
Mikhail Medvedev, Azhar Kadhim and Dmitry Brosalin	

### **Chapter II: Intelligent Robot Control and**

## **Application**

SVM-based State Estimation of Biped Robot	. 41
Chengzhi Gao, Ye Xie, Lingyu Kong, XingYu Chen, Anhuan Xie and Dan Zhang	
Dynamics Modelling and Robust Passivity-Based Control of Cable-Suspended Parallel Robots Fluidic Environment	
Mahmoud Zarebidoki, Jaspreet Dhupia and Weiliang Xu	
A Learning Method for Stiffness Control of a Drum Robot for Rebounding Double Strokes	. 54
Seyed Mojtaba Karbasi, Rolf Inge Godøy, Alexander Refsum Jensenius and Jim Tørresen	
Neural Network Adaptive Control of Hand Rehabilitation Robot Driven by Flexible Pneumatic Musc	les
	. 59
Feifei Shao, Wei Meng, Qingsong Ai and Sheng Q. Xie	
Velocity Constrain Control of Ground Mobile Robots	. 64
Haochun Ling	
Development of Robotic Arm Manipulator Control System for Micromilling Tool Wear Monitoring Bas on Computer Vision	
Gandjar Kiswanto, Fachryal Hiltansyah, Muhammad Ramadhani Fitriawan, Ramandika Garind	ra
Putra, Christiand and Shabrina Kartika Putri	
Compliance Control of a Lower Limb Rehabilitation Robot in Mirror Therapy	.77
Gaoxin Cheng, Linsen Xu	
Chapter III: Mechanical and Electronic	
Technology	
Could Arthroscopes Be Better	. 83
Paweł Żak and Kamila Gwizdała	
Liquid Metal Based Flexible Electronic Patches for Wearable Device and CT Position Assistant	. 87
Qi Yan	
A Novel Design of A Locomotion System for Active Capsule Endoscopy	. 93
Ahmad M. Alshorman, Omar A. Ababneh, Anas I. Abushaker, Emran M. Tamimi, Osama Z.	
Bani-yassin	
Deep & Attention: A Self-Attention based Neural Network for Remaining Useful Lifetime Predictions	
	. 98
Yuanjun Liu and Xingang Wang	
Unpowered Knee Exoskeleton during Stair Descent	106

Pengfan Wu, Xiaoan Chen, Ye He and Zhi Liu  Underwater Vehicle Localization by Hybridization of Indirect Kalman Filter and Neural Network111
Nabil Shaukat, Ahmad Ali, Muhammad Moinuddin and Pablo Otero
Real-Time Automatic Anomaly Detection Approach Designed for Electrified Railway Power System
Huiqiao Ren, Fulin Zhou and Katsuki Fujisawa
Chapter IV: Mechanical Design and Control
Engineering
Evaluation of Two Path Following Controllers for an Ackermann Off-road Vehicle in Winter and Summer Conditions
Magnus Baksaas, Lars Erik Olsen and Kim Mathiassen
Design and Analysis of a Drive and Perception Integration Manipulator for Spinal Surgery131
Lunan Wu, Zhijiang Du, Hongjian Yu and Jiancheng Wang
Mechanical Design and Torque Estimation Model of a Variable Stiffness Joint with Hysteresis Characteristics
Tatsuya Ohe, Jae Hoon Lee and Shingo Okamoto
Modeling, Simulation, and Analysis of Cutting Force in Micro End Milling Process of Mild Steel Using Mechanistic Model
Gandjar Kiswanto, Shabrina Kartika Putri, Christiand, Muhammad Ramadhani Fitriawan, Fachrya
Hiltansyah and Ramandika Garindra Putra
Real-Time Nonlinear Model Predictive Control of Unmanned Surface Vehicles for Trajectory Tracking and Collision Avoidance
Yifan Xue, Xingyao Wang, Yanjun Liu and Gang Xue
Development of Robotic Arm Manipulator Mechanical System for Micromilling Tool Wear Monitoring Based on Computer Vision
Gandjar Kiswanto, Muhammad Ramadhani Fitriawan, Fachryal Hiltansyah, Ramandika Garindra
Putra, Christiand and Shabrina Kartika
Towards an Autonomous RIRS: Design, Structure Investigation and Framework
Miftahur Rahman, Haochen Liu, Isidro Durazo Cardenas, Andrew Starr, Amanda Hall and Rob
Anderson

## **Chapter V: Electronic Engineering and Motion**

#### Control

A Novel Discrete Whale Optimization Algorithm for Solving the Capacitated Vehicle Routing Problem
Ahmed S. ElMousel, Omar M. Khairy, Omar M. Shehata and Elsayed I. Morgan
Interactive Corridor-Based Path Planning for Teleoperated Driving
Dmitrij Schitz, Gaetano Graf, Dominik Rieth and Harald Aschemann
Kinematic and Performance Analysis of a Novel Reconfigurable Parallel Mechanism180
Guanyu Huang, Dan Zhang, Lingyu Kong and Qi Zou
Reconfigurable Generalized Parallel Mechanisms with Kinematotropic Linkages
Chunxu Tian, Dan Zhang, Hongyan Tang and Jian Liu
Fast and Accuracy Camera Calibration Based on Tsai Two-Step Method
Shaokang Tang, Zhengqiong Dong, Wei Feng, Qi Li and Lei Nie
Terminal Control Researching with Application of the Key Points to Assess the Defined Problem Realization
Victor Soloviev, Andrej Lashchev, Valery Finaev, Boris Gurenko, Dmitry Brosalin and Igor Shpak
Painter Prediction from Artworks with Transfer Learning
Ceren Cömert, Murat Özbayoğlu and Coşku Kasnakoğlu
Camera-Based Surgical Navigation System: Evaluation of Classification and Object Detection CNN Models for X-markers Detection
Oliver Gieseler, Omar Gamal, Shashank Kumar and Hubert Roth