

2025 11th International Conference on Mechatronics and Robotics Engineering (ICMRE 2025)

**Lille, France
24-26 February 2025**



**IEEE Catalog Number: CFP25W13-POD
ISBN: 979-8-3315-0930-9**

**Copyright © 2025 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:	CFP25W13-POD
ISBN (Print-On-Demand):	979-8-3315-0930-9
ISBN (Online):	979-8-3315-0929-3
ISSN:	2996-1831

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

2025 11th International Conference on Mechatronics and Robotics Engineering (ICMRE 2025)

Table of Contents

Preface	viii
Committees	ix

Intelligent Monitoring and Image Processing Systems Based on Sensors

Edge Detection with Machine Vision Using Derivative of Gaussian Filters with q-Gaussian Kernels	1
<i>Jos F. E. Bruggeman, Kurt Stockman, Jeroen D. M. De Kooning</i>	
Design of a Scaled-Vehicle Research Platform for Software-Defined Vehicles	7
<i>Sung Bhin Oh, Young Soo Do, Se Jeong Lim, Hyeok Jun Choi, Sung Keun Cha, Hyeong Keun Hong, Seong Hyeon Lim, Jae Wook Jeon</i>	
Overcoming Core Challenges in Monocular Camera Drone Navigation of unknown maze	13
<i>Jeryes Danial, Yosi Ben asher</i>	
How Lightweight Deep Learning Enhances Performance in DPU-Accelerated Autonomous Driving on Zynq SoC	20
<i>Gyu Hyeon Hwang, HoBin Oh, Jae Wook Jeon</i>	
Design and Fabrication of Wearable Flexible 3D Tactile Sensors	25
<i>Naijia Xu, Daohui Zhang, Xin Fu, BaiSong Han, Xudong Hou, Xingang Zhao</i>	
Real-Time Flexible Accelerator for Fisheye Image Correction Based on Zynq SoC	31
<i>HoBin Oh, Gyu Hyeon Hwang, Jae Wook Jeon</i>	
Performance Evaluation of Modern Object Detection Models for Automated Fruit Recognition in Smart Agriculture	36
<i>Sarmad Ahmad, Saad Bin Imran, Usman Asad, Ayesha Zeb</i>	
QoS-Aware TAS Scheduling Algorithm with Latest-Data-Only Transmission	42
<i>Hyeok Jun Choi, Seong Hyeon Lim, Young Soo Do, Sung Bhin Oh, Se Jeong Lim, Jae Wook Jeon</i>	
A Simple, Efficient and Complete Software Pipeline for Constructing an RGB-D Camera Using RGB and ToF Depth Cameras	47
<i>Sunil Kumar, Sagar Dhatrak, Aayush Shah, Meet Gandhi, Amit Gupta, Mohammad Imran</i>	
A Spline-Based Path Planning for Lane Keeping in Autonomous Vehicles	55
<i>Hyeong Keun Hong, Jin Sun Lee, Eun Ho Kim, Yeong Kwang Choi, Young Hun Seo, Jae Wook Jeon</i>	

Comparative Analysis of Machine Learning Techniques for Arabic Text Classification Using the SANAD Dataset	60
--	----

Hani Attar, Yousef Sharrab, Saja Smadi, Safa Jbaily

An eBPF/XDP-based Architecture for Efficient SOME/IP Service Discovery	68
--	----

Seong Hyeon Lim, Sung Bhin Oh, Syng Keun Cha, Young Soo Do, Se Jeong Lim, Hyeok Jun Choi, Jae Wook Jeon

Robot Multimodal Motion Control and Dynamic Task Allocation

Deep Reinforcement Learning for Adaptive Job Shop Scheduling in Robotic Cells: Handling Disruptions Effectively	74
---	----

Eddi Miller, Anna-Maria Schmitt, Tobias Kaupp, Andreas Schiffler, Jan Schmitt

Autonomous Following Wheelchair for Passengers with Reduced Mobility at Airports	82
--	----

Aleksa Kostić, Matthias Schörghuber, Markus Hofstätter, Marco Wallner

Intelligent Nanorobots for Precision Cancer Diagnosis and Treatment using Deep Reinforcement Learning	90
---	----

Kapil Sharma, Ravi Ranjan

Effect of arm swinging and a flexible trunk on stable bipedal locomotion	95
--	----

Yuhi Saragai, Takashi Takuma

A High-precision Calibration Method for Microsurgical Robots: Combining Iterative Least Squares and PSO-Optimized Support Vector Machine.....	99
---	----

Linjun Pang, Haiming Li, Peiyuan Gao, Haotian Li, He Zhang, Jie Zhao

Design and Analysis of a Smart Solar Panel Cleaning Robot	104
---	-----

Meshari Almutlaq, Fouad Jastaniah, Ahmad Alharbi, Hatem Alghamdi, Mohammed Al Yousif, Feroz Shaik

Shape Estimation of Travel Path Using Reservoir Computing for Water-Driven Soft Robot	110
---	-----

Junya Mieno, Hidenobu Sumioka, Takashi Takuma

Contact-based Grasp Control and Inverse Kinematics for a Five-fingered Robotic Hand.....	116
--	-----

Robinson Umeike

Evaluating the Impact of Resource Distribution on Efficiency of Multi-Robot Task Allocation System	122
--	-----

Sujeet Kashid, Ashwin Dharmesh Kumat

Multi-Agent Robot Swarms: A Review of Sensing and Perceptual Strategies for RoboCup Soccer	126
--	-----

Tan Minh Cao, Hoang Anh Pham, Margaux Walter, Valentin Gies, Thierry Soriano

Ultrasound Robotic-Assisted Teleoperation Over Networks: Performance Evaluation of Commercial 5G, Wi-Fi, and Ethernet	132
---	-----

Seyed MohammadReza Sajadi, Kim Mathiassen, Håvard Solvin, Henrik Brun, Per Hjalmar Lehne, Ole Jakob Elle

Swarm Intelligence in Robotics: Optimizing PSO Parameters for Target Search in Single and Multiple Scenarios.....	140
---	-----

Vikas Sharma, Rahul Gupta, Kapil Sharma

Vision-Based Multi-agent Collaborative Control and Intelligent Control

Autonomous Driving Vehicle Control Using YOLO11-Based Pose Estimation with infrastructure Sensors...	145
--	-----

Yeong Gwang Choi, Eun Ho Kim, Young Hoon Suh, Jae Wook Jeon

A Comprehensive Survey on Intelligent Reflecting Surfaces and Unmanned Aerial Vehicles Integration for Enhanced Communication in Massive Networks.....	149
--	-----

Hani Attar, Jafar Ababneh, Mohamed Hafez, Ali Rachini, Ahmed Solyman, Ramy M. Bahy

Real-Time Dynamic Image Stitching Using GNN-Based Feature Matching	156
--	-----

Young Hoon Suh, Eun Ho Kim, Yeong Gwang Choi, Jae Wook Jeon

Multi-Agent Lane Optimization in Cluttered Environments	161
---	-----

Maryam Khazaei Pool, Matthew Morozov, Marcelo Kallmann

Experimental Validation of a Partially Decoupled Extended Observer for Set-Membership State Estimation on an Autonomous Surface Vehicle	169
---	-----

Thalia Morel, Manuel Gantiva-Osorio, Guillermo Bejarano, Pablo Millán, Luis Orihuela, Christophe Combastel

Optimizing Multi-Agent System Swarm Performance through Explainable AI	175
--	-----

Shekhar Mahmud, Mustafa Kutlu, Alper Turan Alan

Reinforcement Learning Based Optimization of Autonomous Aircraft Performance.....	181
---	-----

Metin SARI, Fikret CALISKAN

Fuzzy-PID control with state estimation for the regulation of an aero-pendulum system	187
---	-----

Jose-Raúl Alvarado-Hernandez, Jorge-Enrique Pérez-Perea, Alfredo Martínez-De La Cruz, Oscar Domínguez-Ortega, Esteban-Misael Ramos-Gálvez, Patricio Ordaz, Mario-Oscar Ordaz-Oliver

Functional Design and Control of Intelligent Robots

Design and Engineering of an Affordable 6-DoF Humanoid Robot Featuring a Torso, Arms, and Head for Enhanced People Identification.....	193
--	-----

Sobers LX Francis, Dani Abdo, Muhammad Umair, Osama Hassan, Walid Ayadi, Shaaban Ali

Analysis and design of a 3-DOF spatial underactuated differentially flat robot.....	202
---	-----

Michele Tonan, Matteo Bottin, Alberto Doria, Giulio Rosati

Pypethon: Design of an Multibody Pipe Inspection Robot using Artificial Vision	208
--	-----

Franco Rivadeneira, Fracisco Cuellar

Path Tracking Error Minimization of Differential Drive Wheel Mobile Robot Carrying Off-Center Heavy Load	214
--	-----

Mohammadreza Montazerijouyabari, Luc Baron, Sousso Kelouwani

Forearm-Driven Soft Prosthetic Hand Designed for Children with the Ability to Execute Intricate and Skillful Motions	221
<i>Hironari Taniguchi, Ren Yakami, Kosuke Morinaga, Shuichi Wakimoto</i>	
Design and analysis of a 5-DOF dynamically balanced serial robot with variable payloads	227
<i>Michele Tonan, Nicolas Rojas, Alberto Doria</i>	
e-Cattie: A versatile climbing quadrupedal robot	234
<i>Emmanouil Papadakis, Markos Sigalas, Michail Vangos, Panos Trahanias</i>	
varyMorph, a Simple Tool to Automatically Generate Legged Robot Morphologies	241
<i>Oussama Jaffal, Zahra Taghizadeh, Melike Cezayirlioglu, Weipeng Li, Xuan Wu, Kamilo Melo</i>	

Design, System Control and Development of Medical Rehabilitation Devices

Adaptation Mechanism of Human Balance Control Strategy Resisting Long-Duration Perturbations.....	247
<i>Yuyao Liu, Ronglei Sun</i>	
Formalization of Biological Circuit Block Diagrams for formally analyzing Biomedical Control Systems in pHRI Applications	253
<i>Adnan Rashid, Sa'ed Abed, Osman Hasan</i>	
Influence of Scaling Mass and Height on a Musculoskeletal Model of Joint Moments During Walking: A Simulation Study	259
<i>Ameur Latreche, Torstein E Dæhlin, Stephanie A. Ross, Nicolai Konow, Andrew A. Biewener, Nilima Nigam, James Wakeling</i>	
A Modular Soft Hand Exoskeleton with Interactive Interface: Design and Implementation for Spinal Cord Injury Rehabilitation.....	265
<i>Danna I. Arias, Dante A. Elías</i>	
Design and PID Control of a Lower Limb Exoskeleton for Virtual Reality-Based Telerehabilitation	272
<i>Mehmet Emin Aktan, Piotr Falkowski, Krzysztof Zawalski, Kajetan Jeznach, Vasfi Emre Ömürlü, Erhan Akdoğan</i>	
Towards a Comfortable Model-based Control of a Fleet of Wheelchairs	278
<i>Yehya SHARIF, Gilles TAGNE, Meziane LARBI, Guilherme ESPINDOLA, Rochdi MERZOUKI, Christophe SUEUR</i>	
Analysis of Cervical Spine Load due to the Presence of Headrest in Assist Device for Overhead Work...	285
<i>Chiharu Ishii, Kanta Hirasawa</i>	
Design and experimentation of an bacteria-like bionic robot based on low Reynolds number hydrodynamics	291
<i>Yun-Zhe Lin</i>	
Optimizing Exoskeleton Assistance with Emotion-Based Control	297
<i>Tingwei He, Chunjie Chen, Zhuo Wang, Hui Chen</i>	

Modern Electromechanical Systems and Intelligent Control Technology

Simulation-Based Design of DDS Ownership QoS for Autonomous Driving Control Systems.....	303
<i>Sung Keun Cha, Sung Bhin Oh, Hyeong Keun Hong, Jae Wook Jeon</i>	
A Lower Limb Exosuit for Assisting Knee Joint in Rehabilitation During Walking	307
<i>Yao Huang, Haotian Ju, Songhao Guo, Tianjiao Zheng, Jie Zhao, Yanhe Zhu</i>	
Research on Hole and Shaft Selection Assembly Optimization Based on JSD and Monte Carlo Simulation	313
<i>Yuting Zhang, Chaoyun Gu, Heng Li, Zhe Wang, Hongyi Zhang, Dongyue Qu</i>	
Intelligent Control of Air Combat Maneuvers Using Fuzzy Logic.....	319
<i>Mohanad A. Deif, Mohamed A. Hafez, Hani Attar, S.F. Rezeka, T. Awad, E.M. Attia, M.B. Badawi</i>	
Virtual Commissioning of Mass Personalisation Manufacturing System based on Digital Twins in Smart Factory Environment	327
<i>Yaser Al-Obaidi, Zeyad Al-Shibaany, Marianthi Leon</i>	
A Contribution for Vehicule Routing Problem in a warehouse environnement.....	333
<i>Benoît Trouillet</i>	

Nonlinear Dynamics Modeling and Robust Control Strategies for Complex Electromechanical Systems

Energy Prediction for CNC Machines using G-code Evaluation, Machine Learning and a Real-World Training Part.....	340
<i>Anna-Maria Schmitt, Eddi Miller, Andreas Schiffler, Jan Schmitt</i>	
Development and application of intelligent thermal error compensation system for CNC machine tools ..	348
<i>Jiapeng Xing, Lei Song, Huan Yang, Kuo Liu, Yongqing Wang</i>	
Raise Damping in Electro-Hydraulic Systems with Observed Pressure	353
<i>Xieli Zhang, Damiano Padovani</i>	
Ore sorter as part of Mining 4.0 from mechatronics Approach	359
<i>Nasia Balakera, Fotios K. Konstantinidis, Savvas Sifnaios, George Tsimiklis, Angelos Amditis</i>	
Experimental evaluation of backstepping speed control for an autonomous marine vehicle with set-membership extended state observer.....	364
<i>Manuel Gantiva-Osorio, Thalia Morel, Luis Orihuela, Guillermo Bejarano, Pablo Millan Gata</i>	
The Analysis of Parameters Affecting the Vibration of Substations.....	370
<i>Meng Chenxu, Xiao Xing, Fan Dehe, Ouyang Liu</i>	
Efficient One-dimensional Current Configuration and Encoding Method for ITSC Diagnosis of Three-phase Induction Motor using CNN	376
<i>Yeong-Jin Goh, Kyoung-Min Kim</i>	

Author Index