

2023 11th International Conference on Control, Mechatronics and Automation (ICCMA 2023)

**Grimstad, Norway
1-3 November 2023**



**IEEE Catalog Number: CFP23T47-POD
ISBN: 979-8-3503-1569-1**

**Copyright © 2023 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:	CFP23T47-POD
ISBN (Print-On-Demand):	979-8-3503-1569-1
ISBN (Online):	979-8-3503-1568-4
ISSN:	2837-5114

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

2023 11th International Conference on Control, Mechatronics and Automation

ICCMA 2023

Table of Contents

Preface	x
Committees	xi

Intelligent Control System Based on Machine Vision

Optimal State Estimation for DNN Visual Servoing Systems with Detection Loss.....	1
<i>Christian Novrup, Thomas Kjær Nowak, Daniel Ortiz Arroyo, Simon Lennart Sahlin, Petar Durdevic</i>	
Development of a Wearable Device for Analyzing Plantar Load in the Human Gait Cycle.....	7
<i>Mariana Alegria, Citlali Alvarado, Mariana Ballesteros, Diana Tobon-Vallejo, David Cruz-Ortiz</i>	
Obstacle detection by multi-sensor fusion of a laser scanner and depth camera	13
<i>Zainab Saleem, Philip Long, Saif Huq, Marion McAfee</i>	
Fusion of Multiview Images for EV Battery Disassembly	19
<i>Muhammad Talha Bilal, Ilya Tyapin, Martin Marie Hubert Choux</i>	
Informed clustering for encounter type categorization based on AIS data.....	25
<i>Weiwei Tian, Peihua Han, Mingda Zhu, Øivind Kåre Kjerstad, Guoyuan Li, Houxiang Zhang</i>	
Multi-Target Classification using Deep Learning Models for Automotive Applications	31
<i>Soumya. A, Linga Reddy Cenkeramaddi, Chalavadi Vishnu, Yash Vinod Lanjewar, Krishna Mohan C</i>	
EEG Based Emotion Recognition using Variational Mode Decomposition and Convolutional Neural Network for Affective Computing Interfaces.....	37
<i>Thacchan Dondup, M. Sabarimalai Manikandan, Linga Reddy Cenkeramaddi</i>	
Application of Model-Based System Engineering to a planetary rover design	43
<i>Hugo Castaing, Gilbert Tang, Marco Chacin, Fabien Bonnefoi</i>	

Data Driven System Model and Parameter Optimization

Discretization-Robust Safety Barrier of Partial Differential Equation	49
<i>Younghwa Park, Christoffer Sloth</i>	

Optimizing Curvature and Clearance of Piecewise Bézier Paths	55
<i>Maryam Khazaei Pool, Matthew Morozov, Marcelo Kallmann</i>	
Which methods perform better for real-time Hurst parameter estimation?	63
<i>Daniel Chen</i>	
Banking in Terms of Deposit Prediction Based on Machine Learning and Big Data Analytics	69
<i>Nourah Alessa, Amal Majdua, Sharifah Alshehri, Maryam Alhawiti, Resan Aljohani, A'aeshah Alhakamy</i>	
Industrial Genomics: A Novel Approach to System Behaviour Discovery	75
<i>Morad Danishvar, Sebelan Danishvar, Alireza Mousavi</i>	

Visual Based Remote Control and Trajectory Optimization of UAV

Towards Cognitive Battery Monitoring on Hybrid VTOL Fixed-Wing sUAS with Maximized Safe Endurance	80
<i>Derek Hollenbeck, Di An, Rafal Krzysiak, YangQuan Chen</i>	
Dual-UAVs maneuvering strategy generation algorithm based on cooperative reward mechanism and MATD3	86
<i>Jiazhen Wang, Zhen Yang, Shiyuan Chai, Weiyu Huo, Deyun Zhou</i>	
Estimation of UAV Count Using Thermal Imaging and Lightweight CNN	92
<i>Wilson A N, Ajit Jha, Abhinav Kumar, Linga Reddy Cenkeramaddi</i>	
Vision based Micro-UAV Navigation through Narrow Passages	97
<i>Jayakant Kumar, Himanshu, Harikumar Kandath, Pooja Agrawal</i>	
Proposal of an Instantaneous Cognitive Map Acquisition Method for Visual Information Presentation Considering Work States and Cognitive States in Unmanned Construction.....	103
<i>Hiroyasu Iwata, Shutaro Motohashi, Takumi Moteki, Ryuya Sato, Yuichi Mizukoshi</i>	
Path Planning and Formation Control for Multiple Quadrotor UAV Leader-Follower Systems	109
<i>Arystan Amangeldi, Sanzhar Kusdavletov</i>	
Single Reinforcement Learning Policy for Landing a Drone under Different UGV Velocities and Trajectories	115
<i>Jose Amendola, Linga Reddy Cenkeramaddi, Ajit Jha</i>	

Kinematic Analysis and Trajectory Tracking of Mobile Robots

Trajectory Generation using RoboDK for a Staubli SCARA TS 60 Robot.....	121
<i>João Paulo Carvalho Henriques, Egidio Raimundo Neto, João Pedro Magalhães de Paula Paiva, Leticia Carneiro de Souza, Alexandre Baratella Lugli, Flávio Miranda Florentino, Giuliano Clayton de Andrade Carvalho</i>	
An Algorithm Restricting Motion into Curve-Like Forbidden Regions.....	127
<i>Emre YAZICI, Nusrettin GULEC</i>	

Dynamic and Static Obstacles Avoidance Strategies using Parallel Elliptic Limit-Cycle Approach for Autonomous Robots.....	133
<i>Sara Abdallaoui, El-Hassane Aglzim, Ali Kribeche, Halima Ikaouassen, Ahmed Chaibet, Salah Eddine Abid</i>	
Building Digital Twin of Mobile Robotics Testbed using Centralized Localization System.....	139
<i>Junru Ren, Lazaros Nalpantidis, Nils Axel Andersen, Ole Ravn</i>	
Parameterization of robotic welding trajectories from demonstration.....	146
<i>Isacco Zappa, Giovanni Fracassi, Andrea Maria Zanchettin, Paolo Rocco</i>	
Time-Varying Tracking Control of a Unicycle Mobile Robot: A Composite Lyapunov Function Approach	152
<i>Luis Añorve, Manuel Mera, Hector Rios, Mariana Ballesteros, Ivan Salgado</i>	
Software Framework of Autonomous Mobile Robots on Isaac Sim and ROS.....	158
<i>Mahfud Jiono, Hsien-I Lin</i>	
Dynamic Modelling and Simulation of Two-link Flexible Robot Using Rayleigh Beam Theory	164
<i>Mebaye Belete Mamo, Morten Kjeld Ebbesen, Mohammad Poursina</i>	

Intelligent Unmanned System Operation and Control

Height Change Feature Based Free Space Detection	171
<i>Steven Schreck, Hannes Reichert, Manuel Hetzel, Konrad Doll, Bernhard Sick</i>	
Applications of Linear Adaptive Dynamic Programming (ADP) to a Non-linear Four-bar Mechanism.....	177
<i>Emil Mühlbradt Sveen, Jing Zhou</i>	
Toward Remote Control Center for Marine Operation: A Case Study of R/V Gunnerus	183
<i>Guoyuan Li, Finn Tore Holmeset, Houxiang Zhang</i>	
Lidar-mmW Radar Fusion for Safer UGV Autonomous Navigation with Collision Avoidance	189
<i>Didrik Nicolai Robsrud, Ørjan Øvsthus, Lars Muggerd, Jose Amendola, Linga Reddy Cenkeramaddi, Ilya Tyapin, Ajit Jha</i>	
A Robust Approach for Real Time Activity Classification Using Wearable Sensors and Ensemble Learning	195
<i>Md. Zia Uddin</i>	
Comparative Analysis of Energy Efficiency: Knuckle Boom Crane Driven by Motor-Controlled Cylinders versus Valve-Controlled Cylinders.....	201
<i>Wei Zhao, Morten Kjeld Ebbesen, Torben Ole Andersen</i>	

Structural Control and Functional Analysis of Intelligent Robots

A Mobile Inspection Robot Design Analysis in ANSYS Simulation for Extreme Weather Conditions.....	208
<i>Misha Afaq, Rafiq Ahmad</i>	

Adaptive tracking controller with exponential restrictions for robotic manipulators	215
<i>Manuela Gomez-Correa, Ulises Villela, David Cruz-Ortiz, Ivan Salgado, Mariana Ballesteros</i>	
A Comparison of NUI Interfaces as Control Interfaces for Robotic Arms in EOD Applications	221
<i>Nicolás O. Medina Chilo, Luis F. Canaza Ccari, Elvis Supo, Yuri Silva Vidal, Erasmo Sulla Espinoza, Lizardo Pari</i>	
Robotic lung phantom for the assessment of radiopharmaceuticals in nuclear imaging systems.....	227
<i>Hellen Rivero-Pineda, Diego Flores-Solorzano, Mariana Ballesteros, Rodrigo Hernandez-Martinez, Clara Santos-Cuevas, Gerardo Ramírez-Nava, David Cruz-Ortiz</i>	
Design and Development of an Anthropomorphic Gripper for Service Robotics and Prosthetic Applications	233
<i>Ravi Kumar, Jørgen Dale, Jayant Singh, Jing Zhou</i>	
A Framework to Design and Build a Height Controllable Eversion Robot.....	239
<i>Danyaal Kaleel, Benoit Clement, Kaspar Althoefer</i>	

Control Model and Automation Application of Industrial Robots

Assembly Task Modelling Method for Automatic Robot Program Generation	245
<i>Alberto Sartori, Simon Faarvang Mathiesen, Lars Carøe Sorensen, Ralf Waspe, Christian Schlette</i>	
Self-learning Skill Parameters for Robotic Peg-in-Hole Assembly Task.....	253
<i>Ali Roshanbin, Yang Zhang, Muhammad Raheel Afzal</i>	
Enhancing Flexibility in Power Electronics Production: A Study on Robotic Handling of Copper Clips for Laser Bonding	259
<i>Lucas Janisch, Manuela Ockel, Johannes Schlichting, Marius Breuer, Jörg Franke</i>	
Anomaly Detection in Robotic Welds - Investigation of LSTM Autoencoder Model Performance.....	265
<i>Eirik Magnus Skår, Jon-Erick Kloumann, Kjell G. Robbersmyr, Tørfinn Lovåsen</i>	
A Cost-Efficient Robotic Through-Hole Assembly System for Dual-Pin Component Insertion	271
<i>Mikhail Polikarpov, Yousuf Mehmood, Daniel Boiar, Lukas Schulte, Jochen Deuse</i>	
Mobile Robotic Manipulator based Autonomous Warehouse Operations	278
<i>Ørjan Øvsthus, Didrik Nicolai Robsrud, Lars Muggerud, Jose Amendola, Linga Reddy Cenkeramaddi, Ilya Tyapin, Ajit Jha</i>	
Design and Control of a 7-degree-of-freedom Symmetric Manipulator Module for In-Orbit Operations	284
<i>Irene Cotrina de los Mozos, Gilbert Tang</i>	

Complex System Control, State Monitoring, and Data Measurement Based on Sensing Systems

A Proximal Point Sensing System for Mapping Soil Moisture Using A Miniaturized Spectrometer	290
<i>Di An, Rafal Krzysiak, Shiang Cao, Tiebiao Zhao, YangQuan Chen</i>	

Neuro-Identifier for the Musculoskeletal System of the Upper-Limb to Map Electromyographic Signals to Inverse Kinematics	296
<i>Ulises Villela, Manuela Gomez-Correa, Mariana Ballesteros, David Cruz-Ortiz, Ivan Salgado, Francesca Gasparini</i>	
Multi-Modal SLAM for Accurate Localisation in Self-similar Environments.....	302
<i>Peter Ørnulf Ivarsen, Jan Sramota, Martin Eek Gerhardsen, Henrik Lundkvist, Richard J. D. Moore</i>	
Layer Height Estimation using Laser Line Scanners for Closed-Loop Directed Energy Deposition.....	308
<i>Salar Adel, Eirik B. Njaastad, Mathias Hauan Arbo, Frank Lindseth</i>	
Competitive Reinforcement Learning Agents with Adaptive Networks	314
<i>Herman Pareli Nordaunet, Trym Bø, Evan Jåsund Kassab, Frank Veenstra, Ulysse Côté-Allard</i>	
A Virtual Learning Platform for Biomedical Laboratory Scientists Using Unity3D	320
<i>Peihua Han, Guoyuan Li, Sai Rana Thattavelil Sunilkumar, Yanran Cao</i>	
Hybrid Physics-Inspired Machine Learning Framework for Predictive Maintenance of Forklift Chains: Leveraging Sensor Data Characteristics	326
<i>Osman Akcatepe, Michael Moeckel</i>	
Lightweight Photoplethysmogram Waveform Change Detection for Resource-Constrained IoT Enabled Remote Health Monitoring Devices	330
<i>Sivaranjini P N, M. Sabarimalai Manikandan, Linga Reddy Cenkeramaddi</i>	

Circuit Model, Functional Control, and Parameter Optimization in Power Systems

Magnetic Flux Calculation in a Novel Linear-Rotary Electromagnetic Actuator Using 3D Magnetic Equivalent Circuit	336
<i>Bogdan Miroschnitschenko</i>	
Enhancing Stability and Performance of Hybrid Offshore Wind Platforms: A Novel Fuzzy Logic Control Approach with Computational Machine Learning	346
<i>Irfan Ahmad, Fares M'zoughi, Payam Aboutalebi, Izaskun Garrido, Aitor J. Garrido</i>	
Mechatronics Design and Implementation of a Smart Plastic Injection Moulding Machine	352
<i>Mutaz Ryalat, Hashem Alawamleh, Hisham Elmoaqet, Natheer Almtireen</i>	
Power Supply with Condition Monitoring of the Output Capacitor via Parametric Observer	358
<i>Bărbulescu Corneliu, Căiman Dadiana-Valeria, Sorin Nanu, Dragomir Toma-Leonida</i>	
Model-Free Adaptive Nonlinearity and Hysteresis Compensation Control Strategy with Application to Nano-Precision Piezoelectric Stage.....	363
<i>Chih-Chin Liu, Chuxiong Hu, Bingyang Hou, Ze Wang, Yu Zhu</i>	

Modern Power System Control and Manufacturing Technology

Calibration of a Translational 3-DOF Parallel Kinematic Machine using Full Pose Measurements and Mechanical Adjustments	369
<i>Sébastien Wyckaert, Jan Fredrik Rosjordet, Hanne Bergstol, Tomas Lyngroth, Andreas Auen, Teodor Aune, Dipendra Subedi, Vegard E. Sodal, Asle Pedersen, Geir E. Hovland</i>	
Tool Path Adaptation of a Cobot Using Supervisory Control with Machine Learning	375
<i>Anran Li, Hakan Gurocak</i>	
A fixed-time convergence adaptive fast sliding mode guidance law with angle constraint	380
<i>Yuan Liu, Zhen Yang, Weiyu Huo, Yupeng He, Deyun Zhou</i>	
Design and prototyping of low cost, 3D printed body powered hand prosthesis for transradial amputees in Bolivia ...	386
<i>Fabio Rodrigo Oporto-Tejerina, Silvia Cecilia Tapia-Siles</i>	
Towards Development of a Novel Variable Stiffness Instrumented Gripper	392
<i>Bhawnath Tiwari, Marjan Ghorbani, Dan Cisier, Yves Perriard</i>	
Impact of System Initial Values on Multivariate LSTM Neural Network Performance: A Finding from a Control Process Perspective.....	397
<i>Mahsa Kashani, Stefan Jespersen, Zhenyu Yang</i>	
Reinforcement Learning-based Response Shaping Control of Dynamical Systems	403
<i>Chepuri Shivani, Harikumar Kandath</i>	

Advanced Fault-Tolerant Control and Functional Simulation for Industrial Systems

CNC Simulation and Control System for the Industrial Cutting of Fabric in the Manufacture of Peruvian T-shirts.....	409
<i>Alvin Rivera, Diego Amau, Carlos Perea</i>	
A Control Pipeline for Robust Lane Keeping in Model Cars	415
<i>James Vero Asghar, Paul Auerbach, Maximilian Matthé, Carsten Knoll</i>	
Online Self Optimizing Posicast Controller Framework for Smart Process Control.....	421
<i>Justus Nwoke, Jairo Viola, YangQuan Chen</i>	
Stiffness Model for an Overhead PUU	427
<i>Jian-Dong Ke, Yu-Jen Wang</i>	
Robust Control for a Human-Machine Interface Based on a Joystick System and its Digital Twin	433
<i>Roderico Garcia-Leal, Luis Añorve, David Cruz-Ortiz, Joel C. Huegel, Mariana Ballesteros</i>	
Noise suppression and disturbance rejection control for piezo-actuated nanopositioning stages.....	439
<i>Xinyu Wang, Jianying Zheng, Dongyu Li, Fei Dong, Jianpeng Zhong, Qinglei Hu</i>	

Towards Spiking Control for Dielectric Elastomer Actuators.....	445
<i>Lukas Sohlbach, René Harmann, Fernando M. Quintana, Heng Wei Zhang, Fernando Perez-Peña, Karsten Schmidt</i>	
Model Predictive Control based on Dynamics Matrix embedded in a Programmable Logic Controller	452
<i>João Paulo Carvalho Henriques, Egidio Raimundo Neto, João Pedro Magalhães de Paula Paiva, Leticia Carneiro de Souza, Alexandre Baratella Lugli, Túlio Vinicius Carvalho Rocha, Martin Lucas Teixeira Rip</i>	
Industrial Engineering with Large Language Models: A case study of ChatGPT’s performance on Oil & Gas problems	458
<i>Oluwatosin Ogundare, Srinath Madasu, Nathaniel Wiggins</i>	

Data-Driven Fault Diagnosis, Control Models, and Parameter Optimization in Modern Industrial Systems

Filling Process Optimization Through Fully Flexible Automatic Yogurt Filling Machine Using Industry 4.0 Concepts	462
<i>Bashir Salah, Razaullah Khan, Ibrahim A. Almuheidib</i>	
Angle-specific Paint Deposition Modeling for an L-shaped Plane with the Variable Posture of a Painting Gun.....	467
<i>Genichiro Tanaka, Fangshou Chang, Yoshinobu Takahashi, Fumihiko Kato, Hiroyasu Iwata</i>	
Towards Data-Driven Material Removal Rate Estimation in Bonnet Polishing	473
<i>Michal Darowski, Muhammad Faisal Aftab, Hongyu Li, David Walker, Guoyu Yu, Chenghui An, Christian W. Omlin</i>	
Systems Engineering approach to design of process gas chromatographs for the Philippine industries.....	480
<i>Selverino A. Magon, Teofilo D. De Sagun, Vener C. Macatangay</i>	
A ROS 2 and TwinCAT Based Digital Twin Framework for Mechatronics Systems	485
<i>Alexander Sterk-Hansen, Bjørn H. H. Saghaug, Daniel Hagen, Muhammad Faisal Aftab</i>	
Digital prototyping of a stocked cage with multi-sensor integration.....	491
<i>Sihan Gao, Kana Banno, Zhicheng Hu, Peihua Han, Lars Christian Gansel, Guoyuan Li, Houxiang Zhang</i>	

Author Index