

Dilip Kumar Sarkar
Pradip Kumar Sadhu
Sunandan Bhunia
Jagannath Samanta
Suman Paul *Editors*

Proceedings of the 4th International Conference on Communication, Devices and Computing

ICCDC 2023

Editors

Dilip Kumar Sarkar
Department of Applied science
Aluminum Research Center REGAL
University of Quebec at Chicoutimi
Chicoutimi, QC, Canada

Sunandan Bhunia
Department of Electronics
and Communication Engineering
Central Institute of Technology
Kokrajhar, Assam, India

Suman Paul
Department of Electronics
and Communication Engineering
Haldia Institute of Technology
Haldia, West Bengal, India

Pradip Kumar Sadhu
Indian Institute of Technology (ISM)
Dhanbad, Jharkhand, India

Jagannath Samanta
Department of Electronics
and Communication Engineering
Haldia Institute of Technology
Haldia, West Bengal, India

ISSN 1876-1100 ISSN 1876-1119 (electronic)
Lecture Notes in Electrical Engineering
ISBN 978-981-99-2709-8 ISBN 978-981-99-2710-4 (eBook)
<https://doi.org/10.1007/978-981-99-2710-4>

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2023

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd. The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Prediction of Client Term Deposit Subscription Using Machine Learning	83
Muskan Singh, Namrata Dhanda, U. K. Farooqui, Kapil Kumar Gupta, and Rajat Verma	
Real Estate Price Prediction Using Machine Learning	95
Shilpa Yadav, Namrata Dhanda, Archana Sahai, Rajat Verma, and Sakshi Pandey	
A Comparative Study to Detect Cervical Dysplasia by Using Pap Smear Images	113
Jheelam Mondal and Subhankar Joardar	
Design of a Cost-Effective Remote Health Monitoring System Using IoT	125
Subhadeep Paul, Madhusudan Maiti, Dibyendu Chowdhury, and Subhas Chandra Saha	
Current Exploration in Microfluidics-Based Point-Of-Care Biosensor Applications: A Review	139
Pitam Chakrabarti, Sucheta Das, and Shamba Chatterjee	
A Review on Memristor-Based Reactance-Less Relaxation Oscillator	149
Rajesh Dutta, Amiya Karmakar, and Sudakshina Kundu	
Optimal Control and Voltage Sag Compensation in a PV/FC Integrated Microgrid Through Biography Based Optimization Technique	159
Gagan Kumar Sahoo, Subham Mohanty, and Subhashree Choudhury	
Performance Comparisons of MPEDE-Based Integer and Fractional-Order PID Controllers for a Cruise Control System	177
Mou Das Mahapatra, Shibendu Mahata, Ritu Rani De, Rajani Kanta Mudi, and Chanchal Dey	
Novel CMOS 1-Digit BCD-Adder Correction Circuit	189
Shatabhisa Goswami, Ananya Mandal, Aishikee Mishra, Joyoshri Goswami, and Alope Saha	
Digital Image Tampering Detection Using Deep Learning: A Survey ...	197
Sunen Chakraborty, Paramita Dey, and Kingshuk Chatterjee	
Nanorod Shaped TiO₂ Photoanode and Mixed Halide Absorber-Based Perovskite Solar Cell Device Fabrication	217
Anitesh Anand, Niranjana Polai, Madhu Paswan, Manas Mishra, Chanchal Kumar De, and Debasis De	

Performance Comparisons of MPEDE-Based Integer and Fractional-Order PID Controllers for a Cruise Control System



Mou Das Mahapatra, Shibendu Mahata, Ritu Rani De, Rajani Kanta Mudi, and Chanchal Dey

Abstract An effective technique for the optimal design of fractional-order proportional-integral-derivative (FOPID) controller in a cruise control application is presented. The minimization of step response error is formulated as an objective function. Such a proposal avoids evaluating the transient and steady-state response parameters at run-time of the optimizer. The optimization is carried out using a multi-population ensemble differential evolution (MPEDE) method. Comparisons with a classical PID controller also designed using MPEDE demonstrate the faster response time for the FOPID controlled system. The superiority of the proposed fractional controller over those of the recently reported models is demonstrated using various performance metrics.

Keywords Cruise control system · Fractional-order controller · Multi-population ensemble differential evolution · Optimization · PID controller

M. D. Mahapatra (✉) · S. Mahata · R. R. De
Department of Electrical Engineering, Dr. B. C. Roy Engineering College, Durgapur, India
e-mail: mou.dasmahapatra@bcrec.ac.in

S. Mahata
e-mail: shibendu.mahata@bcrec.ac.in

R. R. De
e-mail: riturani.de@bcrec.ac.in

R. K. Mudi
Department of Instrumentation and Electronics Engineering, Jadavpur University, Kolkata, India

C. Dey
Department of Applied Physics, University of Calcutta, Kolkata, India
e-mail: cdaphy@caluniv.ac.in