

**PROCEEDINGS**  
**OF**  
**2025 7<sup>TH</sup> IEEE INTERNATIONAL CONFERENCE**  
**ON**  
**SIGNAL PROCESSING, COMPUTING AND CONTROL**  
**(ISPCC 2k25)**



**MARCH 06-08, 2025**

**Dr. RAJIV KUMAR, Dr. HARSH SOHAL, DR. SHWETA PANDIT**

**DEPARTMENT OF ELECTRONICS & COMMUNICATION  
ENGINEERING**

**JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY  
WAKNAGHAT, SOLAN**

**Technical Sponsors:**

- IEEE, USA
- IEEE Delhi Section, India
- IEEE Student Branch, Jaypee University of Information Technology, Wagnaghat, India

**Financial Sponsors:**

- Jaypee University of Information Technology (JUIT), India



## Table of Contents

Paper ID	Paper Title	Authors	Page No.
3	Drug Recommender System Based on Cost Minimization Technique for Customized Clinical Prescription	Ashtosh Satapathy, Mahima Kumar Gandu, Aslesha Parisa	1 - 7
21	Scalable Land Cover Classification with Linear Kernel SVM on Sentinel-2 Imagery via GEE: A Case Study	Gundla Karunasri, Sheshikala Martha, Vishwanath Bijalwan	8 - 14
42	Sustainable Solution for Voltage Stability through Fuzzy Controlled FACTS Devices	Abinash Singh	15 - 20
50	Super-Resolved Monkeypox Image Dataset for Enhanced Classification and Detection	Akhil Kumar, Abisek kamthnan R S, Nookala Anvesh Reddy, Ambrish Kumar	21 - 27
52	E2W: A Paradigm Shift in Sustainable Mobility	Abinash Singh, Gurinder Singh, Amanpreet Singh, Preetinder Singh, Sanandeep Singh	28 - 33
53	A Unified Deep Learning Framework for Lip Reading and Deep Fake Audio Classification	Vijay A Sangolgi, Mithun B Patil, Omkar Nagnath Bhosale, Anurag Vivek Deshmukhe, Pallavi Bhimrao Jawalgi, Srushti Prabhakar Katwe	34 - 40
54	Internal-Model-Control using a Complex-Order Filter: Design for Fractional-Order Delayed System	Anjana Ranjan, Utkal Mehta, Kishore Bingi, Arshaque Ali	41 - 46
81	Securing IoT Networks with Deep Belief Network-Based Intrusion Monitoring Systems	S. Preethi, S. Maheswari, R. Sahila Devi, D. Karthikeyan, Samsudeen shaffi S, M. Perarasi	47 - 51
93	Defect Detection in Steel Castings Using Deep Learning with X-ray Images	K. Kalaiarasi, V. Ramachandran, S. Karuppaiah, M. Senthil Murugan, M. Thirunavukkarasu, M. Durairaj	52 - 57
108	Predictive Modeling and Comprehensive Analysis of Cardiovascular Disease Risk Factors	Kanishika, Praveen Kumar Manneppalli, Bobbinpreet Kaur	58 - 63
122	A Comprehensive Review Analysis for early-stage prediction of Alzheimer's disease using Deep Learning	Gagandeep Kaur, Sachin Ahuja, Abhishek Kumar	64 - 69
129	Glaucoma Classification from Fundus Images Using Meta-Learning Models	Anirban Dasgupta, Anwesha Sengupta, Abhranil Das	70 - 74
145	Model Based Robust Adaptive Dynamic Programming Control Design for Electromagnetic Levitation System	Dipak Adhyaru, Amit Pandey, Sunil Kumar Singh, R.S. Bajpai	75 - 80
148	Enhancing Supply Chain Management with Ethereum 2.0 : Advancement in Blockchain Technology	Ayush Gupta, Ambuj Kumar Agarwal	81 - 86
156	Crop and Weed Image Classification Using Machine Learning Algorithms	Pramod Kumar P, Deepika Samudrala, Bhuvana Thumma, Chandana Azith Namburu, Krishnaveni Kelapu, Srinivas M	87 - 92
169	Plant Disease Prediction Using Feature Selection Based Multilayered ANN with Genetic Algorithm	A. A. Mohamed Faizal, Rajeshwar Goud Jangampally, Naveenkumar kaliyan, Katam naga lakshman, Katam aga Lakshman, D. Karthikeyan,	93 - 98
180	Detection of Suicide and Depression for Early Intervention and Initiative-taking Mental Healthcare	Esraa hassan, Roheet Bhatnagar, Tarek Abd El-Hafeez, Mahmoud Y. Shams	99 - 104
185	Advancing Skin Cancer Detection with CNNs, and Max Pooling Layers	Ayush Tiwari, Rishu Mishra, Tushar Vats, Yojna Arora	105 - 110
187	Wavelet-Enhanced hybrid CNN Models for Precise Brain Tumor Classification	Rajaswi Borkar, Gyanendra Kumar Verma	111 - 117
194	A Comparative Study of PID, FOPID, and TID Controllers Using Harris Hawk Optimization for Load Frequency Control of Renewable Energy Grids in Deregulated Environments	Atanu Maji, Soumen Biswas, Saptaparna Basu Roy Chowdhury, Aweek Chattopadhyaya, Sanjoy Saha, Sudipta Banerjee	118 - 123

856	Certain Investigation in Optimizing User Experience through LSTM-Enhanced Movie Recommendations	Damodharan Palaniappan, Premavathi T, Kumar Parmar, Rituraj Jain, Sangeeta Rajole	764 - 769
860	Machine Learning Enhanced Stress Assessment and Learning Outcome Analysis using Skin Conductance in Virtual Reality Environments	B Mohan, S Mahalakshmi, Sunil Kumar Suman, Y Monikarchana, S P Santhoshkumar, P Vigneshwaran	770 - 775
862	Analyzing the effect of Artifacts Removal and Preprocessing Techniques on Mammographic Image Quality	Isha Bhardwaj, Kriti	776 - 781
866	Leveraging CNNs and Transformers: The Hybrid Model for Brain Tumor Detection and Segmentation	Krupa Chary Pasunoori, Ch.Rajendra Prasad, K.Raj Kumar	782 - 787
893	A Machine Learning Based Diabetes Mellitus Classification on Weighted Class using Inverse Class Frequency Method	Hari Singh, Prateek Thakral, Kunal Rathor, Dinesh Chander Verma	788 - 793
900	Adaptive Headlight Control for Automotive System Based on Curvature Detection Technique	Manjunath B Dariyagol, Pradeep U Badiger, Ayan N Sayed, Vishwanath M Hurakadli	794 - 799
901	Development of EMG based Epileptic Seizure Detection using LSTM Approach	Siva Priyanka.S, Rahul Raman.B, Rohit Sudhaanshu.M, Ajitha.G	800 - 805
906	Soil Moisture Classification Using Computer Vision and Deep Learning Techniques	Archit Agarwal, Sanjana Dey, Ashish Patwari	806 - 811
910	Financial Market Forecasting: Enhancing RNNs for Improved Stock Prediction	Mudita Uppal, Deepali Gupta, Deepam Goyal, Sukhvinder Singh Bamber, Rajeev Kumar Dang	812 - 817
911	FPGA Implementation of Image Pre- processing module for Glaucoma Detection	Shilpa Kaushal, Harsh Sohal, Shruti Jain, Balwinder Singh	818 - 823
916	Design and Implementation of FPGA-Based System for Angle Estimation Using FMCW Radar	Gani Nawaz Khan, Mujeev Khan, Mohammed Usman, Abhishek Srivastava, Mohd Wajid	824 - 829
918	UAV PID Controller Optimization for Improved Flight Stability: Simulation and Analysis	Munish Patial, Rajiv Kumar, M. J. Nigam	830 - 834
919	ResNet Based Plant Disease Diagnosis Platform	Sireesha Chittepu, Suchith B, Deepthi M	835 - 839
922	Automated Helmet and Number Plate Detection Using YOLOv9: Enhancing Road Safety Compliance	Shankar K, Sekar K, Dheepa T, Kamalesh S, Naidhru Raj R, Pawin A	840 - 845
924	Explainable AI for Hematological Diagnostics: Integrating Image Processing and LIME for Leukemia Detection	Sekar K, Bavashree GS, Niraimathi A K, Dheepa T	846 - 851
933	Effectiveness of CC-FO Hybrid controller over PID,FOTID,3DOF-PID for LFC of Solar,Wind & EV based multisource system	Soumya Kanti Bandyopadhyay, Soumen Biswas, Susanta Dutta, Sidhartha Ghosh, Aavek Chattopadhyaya, Sudipta Banerjee	852 - 857
934	Smart Yoga Mat: An AI-Integrated Affordable Yoga Mat for Personalized Guidance and Progress Tracking	M.Saravanapandian, Jayaram B, Karthik B, Vigneshkumar S, J.Roscia Jeya Shiney, S.Sivakumar	858 - 862
935	Enhancing Medical Image Classification: A Hybrid Deep Learning Approach with ResNet, Vision Transformer and Capsule Networks	Smita.S. Konda, Viteshkumar D. Gaikwad, Vijay A. Sangolgi	863 - 868
936	Investigation on different color spaces for non-contact heart rate monitoring using facial videos	Arpita Panigrahi, Hemant Sharma,	869 - 873
939	Fuzzy Logic-Driven Throttle Adjustment for Z-Path Navigation in Electric Vehicles	Puneet Mugabasav, Shivaraj Panishettar, Adwait Sanikop, Shreyas M Salotagi, Raghvendra M Shet, Venkatesh Uttam, Nalini Iyer, Ujwala Patil	874 - 879
943	Adaptive Joint Space Control of Planar Underwater Robotic Manipulator Using Non-singular Fast Terminal Sliding Mode Technique	Vikas L. Karade, Girish V. Lakhekar, Sumit S. Ghate	880 - 885
951	Smart Air Quality Monitoring and Prediction System With Data-driven Insights	C. Shanmugapriya, E .Kothai	886 - 891

# Effectiveness of CC-FO Hybrid controller over PID,FOTID,3DOF-PID for LFC of Solar,Wind & EV based multisource system

Publisher: IEEE

[Cite This](#) PDFSoumya Kanti Bandyopadhyay ; Soumen Biswas ; Susanta Dutta ; Sidhartha Ghos ; Aweek Chattopadhyaya ; Sudipta Banerjee [All Authors](#)8  
Full  
Text Views

## Abstract

### Document Sections

- I. Introduction
- II. Description of the Static Model and Mathematical Analysis
- III. Conclusion

[Authors](#)[Figures](#)[References](#)[Keywords](#)[Metrics](#)[More Like This](#)

### Abstract:

Conventional energy may soon run out in the next epochs. In order to supplement the usage of conventional energy in the power sectors, non-conventional energy sources must be employed. Because solar and wind qualities alternate quickly with changes in atmospheric phenomenon, this would cause synchronisms in the power systems to be lost. Forced allowance is used by automatic generation control (AGC) to improve frequency deviation within a given range. A new cascade fractional order hybrid controller combination of PID, FOTID, 3DOF-PID, and PID has been developed and its stability performance has been tested in a deregulated structure. For the suggested system in a deregulated environment, the objective of this article is to design a new architecture controller called cascade fractional order (CC-FO) to replace the current control. Based on the earlier analysis, we have demonstrated that in the event of step load disruptions the proposed CC-FO hybrid controller bring the system to zero frequency deviation and tie-line power in the shortest time possible.

**Published in:** [2025 7th International Conference on Signal Processing, Computing and Control \(ISPCC\)](#)**Date of Conference:** 06-08 March 2025**DOI:** [10.1109/ISPCC66872.2025.11039461](#)**Date Added to IEEE Xplore:** 24 June 2025**Publisher:** IEEE**► ISBN Information:****Conference Location:** SOLAN, India**▼ ISSN Information:**[Sign in to Continue Reading](#)

Authors	▼
Figures	▼
References	▼
Keywords	▼
Metrics	▼



**IEEE Personal Account**

CHANGE USERNAME/PASSWORD

**Purchase Details**

PAYMENT OPTIONS  
VIEW PURCHASED DOCUMENTS

**Profile Information**

COMMUNICATIONS PREFERENCES  
PROFESSION AND EDUCATION  
TECHNICAL INTERESTS

**Need Help?**

US & CANADA: +1 800 678 4333  
WORLDWIDE: +1 732 981 0060  
CONTACT & SUPPORT

**Follow**



[About IEEE Xplore](#) | [Contact Us](#) | [Help](#) | [Accessibility](#) | [Terms of Use](#) | [Nondiscrimination Policy](#) | [IEEE Ethics Reporting](#) | [Sitemap](#) | [IEEE Privacy Policy](#)

A public charity, IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

© Copyright 2025 IEEE - All rights reserved, including rights for text and data mining and training of artificial intelligence and similar technologies.

# Effectiveness of CC-FO Hybrid controller over PID, FOTID, 3DOF-PID for LFC of Solar, Wind & EV based multisource system

Soumya Kanti Bandyopadhyay

Department of Electrical Engineering,  
Brainware University, India,

Sidhartha Ghos

Department of Electrical Engineering,  
Dr. B.C Roy Engineering College,  
India,

Soumen Biswas

Department of Electrical Engineering, Dr.  
B.C Roy Engineering College, India,

Aveek Chattopadhyaya

Department of Electrical Engineering, Guru  
Nanak Institute of Technology, India,

Susanta Dutta

Department of Electrical Engineering,  
Dr. B.C Roy Engineering College, India,

Sudipta Banerjee

Department of Computer Science and  
Engineering, Symbiosis Institute of Technology  
Pune, Symbiosis International (Deemed  
University) Pune, India,  
sudiptab.iiitism@gmail.com

**Abstract**—Conventional energy may soon run out in the next epochs. In order to supplement the usage of conventional energy in the power sectors, non-conventional energy sources must be employed. Because solar and wind qualities alternate quickly with changes in atmospheric phenomenon, this would cause synchronisms in the power systems to be lost. Forced allowance is used by automatic generation control (AGC) to improve frequency deviation within a given range. A new cascade fractional order hybrid controller combination of PID, FOTID, 3DOF-PID, and PID has been developed and its stability performance has been tested in a deregulated structure. For the suggested system in a deregulated environment, the objective of this article is to design a new architecture controller called cascade fractional order (CC-FO) to replace the current control. Based on the earlier analysis, we have demonstrated that in the event of step load disruptions the proposed CC-FO hybrid controller bring the system to zero frequency deviation and tie-line power in the shortest time possible.

**Index Terms**—Solar, Nuclear, Two Area system, Load Frequency Control, Renewable system .

## I. INTRODUCTION

Reliability can therefore be defined as the ability of a power system to be able in the provision of electricity so balance the quantity of electricity to be generated in the power plant to the type of loads available. A certain amount of system frequency must be maintained in order to maintain equilibrium. Maintaining the tie power at its optimal level and preventing transients and harmonics in the system requires automatic generation control, or AGC. AGC essentially serves as a conduit between the generating station and the dispatch center. To achieve the required system parameters, the generator output is controlled and regulated by the use

of AGC. The analysis of performance evaluation parameters shows that the HWOA has higher efficiency in comparison to other studied algorithms in terms of benchmark functions, convergence rate, statistical characteristics and realistic situation. Several controllers for Automatic Generating Circuits (AGC) in deregulated systems have been developed by researchers. They include an FOPI-FOPD controller with a redesigned fuzzy controller, a TID controller, an FOTID controller adapted by using path finder algorithm, a “grey wolf optimization” tuned 2DOFPID controller, TIDF adapted by differential evolution algorithm, hTLBO-PS, ASOS, “hybrid PID fuzzy-PID” controller optimized by fuzzy-based SOS” controller, and a robust two-DOF TIDF controller has been proposed and developed along with integrated with the WOA to address AGC problems in a two-area hydro-thermal system. To assess these solutions, several scenarios have been used such as physical constraints, varying load patterns, and the new controller configurations [1-9]. MATLAB/Simulink was utilized to examine the average generating capacity (AGC) of linked power systems in variations of load demands utilizing elephant herding optimization (EHO). For the load frequency control of HFS, Irudayaraj et al designed an atom search optimized FOPID controller using Matignon theorem. For the modulation of LFC of the Great Britain power system, Shouran and associates restaurative a fuzzy PIDF, FOPID controller. To constrain the disturbances of loads in interconnected time delayed power systems. Kumar et al. created a robust PIDD2 controller. Described in detail, Bagheri and his coauthors employed a terminal sliding mode controller derived from the ABC method and optimized by