# Dr. Bhawana Singh

Assistant Professor
Department of Electrical Engineering
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**OBJECTIVE**

An enthusiastic professional aims to become a component in national and international progress through teaching and research activities.

**EDUCATION**

1. **Assistant Professor (24 June 2024 till Present)**, Department of Electrical Engineering, Indian Institute of Technology (Indian School of Mines) Dhanbad, Jharkhand, India
2. **Research Fellow in Autonomous Systems (14 September 2022-21 June 2024)**, School of Electronics, Electrical and Computer Science, Queen's University Belfast, United Kingdom
   - Research focused on **Path-planning and collision avoidance of Autonomous Surface Vehicles (Marine Vehicles)**.
3. **Ph.D. (2017-2021)**, Indian Institute of Technology (BHU), Varanasi, Uttar Pradesh, India (Thesis defended on 6 April 2022)
   - Specialization in Nonlinear Control Theory (Department of Electrical Engineering) with CGPA 9.84.
4. **M.Tech (2015-2017)** Centrally Funded Technical Institute (CFTI)
   - Specialization in Instrumentation and Control with CGPA 9.75.

**RESEARCH INTERESTS**

Contraction analysis, Lyapunov methods (Control Lyapunov functions), Interval Observers, Sliding mode control, Finite-time stability, Fixed-time stability, Prescribed-time stability, Passivity theory and Negative Imaginary theory, Guidance and Control of Autonomous Surface Vehicles.

**Google Scholar Link**

`https://scholar.google.com/citations?hl=en&user=8fUwd_EAAAAJ&view_op=list_works&sortby=pubdate`

**SOFTWARE SKILLS**

MATLAB, LaTeX, C, C++

**PROFESSIONAL ACTIVITY**

- Chairperson of IEEE Student Branch Chapter in IIT(BHU), Varanasi, India for 4 years in PhD.

**PUBLICATIONS**

## JOURNAL PAPERS

- **Bhawana Singh**, Anil Kumar Pal, Shyam Kamal, Thach Ngoc Dinh and Frédéric Mazenc, "Vector Control Lyapunov Function based Stabilization of Nonlinear Systems in Arbitrary Time", ***IEEE Transactions on Automatic Control***, 68(8), October 2022, pp. 4984-4989. DOI: 10.1109/TAC.2022.3213769. (Impact Factor: 6.8)

- **Bhawana Singh**, Shyam Kamal, Sourav Patra and Sandip Ghosh, "Finite, Fixed, and Prescribed-time Stability and Stabilization of Nonlinear Negative Imaginary Systems ***Automatica***, 153, pp. 111003, 2023.
  DOI: https://doi.org/10.1016/j.automatica.2023.111003. (Impact Factor: 6.4)
- **Bhawana Singh**, Shyam Kamal, Xinghuo Yu, Debdas Ghosh and Sandip Ghosh, "Controller and Observer design for Chaotic Systems: A Vector based Contraction Approach", ***IEEE Transactions on Circuits and Systems II: Express Briefs***, 67(12), pp. 3282-3286, 2020. DOI: 10.1109/TCSII.2020.2982327. (Impact Factor: 4.4)
- **Bhawana Singh**, Xiaogang Xiong, Shyam Kamal, Debdas Ghosh and Sandip Ghosh "Consensus Problems in Multi-agent Systems: A Vector based Contraction Approach", ***IET Control Theory & Applications***, 15(17), pp. 2195-2209, 2021. DOI: https://doi.org/10.1049/cth2.12185. (Impact Factor: 2.67)
- **Bhawana Singh**, Xiaogang Xiong, Thach Ngoc Dinh, Shyam Kamal and Sandip Ghosh, "Interval Observer Design for Nonlinear Systems using Simplified Contraction theory", ***IET Control Theory & Applications***, 16(10), pp. 935-944, 2022. DOI: https://doi.org/10.1049/cth2.12237. (Impact Factor: 2.67)
- Vinay Pandey, Eram Taslima, **Bhawana Singh**, Shyam Kamal, Thach Ngoc Dinh, "Predefined-Time Synchronization of Multi-agent Systems: A Passivity based Analysis", ***Sensors***, 23(8), pp. 3282-3286, 2023.
  DOI: https://doi.org/10.3390/s23083865. (Impact Factor: 3.84)
- **Bhawana Singh**, Karim Ahmadi Dastgerdi, Nikolaos Athanasopoulos, Wasif Naeem and Benoit Lecallard, "Provably Safe Finite-Time Guidance for Marine Vehicles", 2024, **https://arxiv.org/html/2402.06291v1**.

## INTERNATIONAL CONFERENCES PAPERS

- **Bhawana Singh**, Xiaogang Xiong, Debdas Ghosh and Shaym Kamal,"Numerical Integrator based on Implicit Euler Discretization of Twisting Control Algorithm", ***17th International Workshop on Variable Structure Systems (VSS)***, 21-24 October, 2024.
- Karim Ahmadi Dastgerdi, **Bhawana Singh**, Wasif Naeem, Nikolaos Athanasopoulos and Benoit Lecallard, "Uncertainty Aware Path Planning and Collision Avoidance for Marine Vehicles", ***15th IFAC Conference on Control Applications in Marine Systems, Robotics and Vehicles, 2024***, 03-05 September 2024.
- Karim Ahmadi Dastgerdi, **Bhawana Singh**, Wasif Naeem and Nikolaos Athanasopoulos, "Adaptive Velocity Obstacle Avoidance for Multi-Vessel Encounters", ***14th United Kingdom Automatic Control Council (UKACC), International Conference on Control***, 10-12 April 2024.
- Karim Ahmadi Dastgerdi, **Bhawana Singh**, Nikolaos Athanasopoulos, Wasif Naeem and Benoit Lecallard, "Geometric Path Planning for High Speed Marine Craft", ***22nd World Congress of the International Federation of Automatic Control 2023***, 56(2), pp. 5729-5734, July 2023.
- **Bhawana Singh**, Shyam Kamal, Nikolaos Athanasopoulos and Wasif Naeem, "A Passivity based Approach to Predefined-Time Stabilization", ***22nd World Congress of the International Federation of Automatic Control 2023***, 56(2), pp. 8536-8541, July 2023.
- Eram Taslima, Bhawana Singh, Vinay Pandey, Shyam Kamal, Thach Ngoc Dinh, R.K. Saket "A Passivity based approach to Synchronize Multi-agent Systems in Predefined Time", ***IECON 2022-48th Annual Conference of the IEEE Industrial Electronics Society***, October 2022.

- Shyam Kamal, Anil Kumar Pal, **Bhawana Singh**, Bijnan Bandyopadhyay, Xinghuo Yu, "Stabilization of Continuous Time Uncertain Systems with Predefined Upper bound of Settling Time", ***16th International Workshop on Variable Structure Systems (VSS)***, September 2022.
- Yogita Choudhary, **Bhawana Singh**, Shyam Kamal and Sandip Ghosh, "Arbitrary Time Attitude Stabilization and Tracking of Rigid Body on SO(3)", ***In 2021 29th Mediterranean Conference on Control and Automation (MED)***, pp. 292-297, June 2021.
- Vijay Kumar Singh, Parijat Prasun, **Bhawana Singh**, Shyam Kamal and Sandip Ghosh, "Neural Network Control based Stabilization of Nonlinear Systems in Arbitrary Time", ***In IECON 2021-47th Annual Conference of the IEEE Industrial Electronics Society***, pp. 1-6, October 2021.
- **Bhawana Singh**, Shyam Kamal, Debdas Ghosh, Sandip Ghosh, Antonella Ferrara, Anil Kumar Pal, and Jitendra Kumar Goyal, "Controller and Observer Design using Vector Framework with Simplified Contraction Analysis", ***In 2020 IEEE International Conference on Industrial Technology (ICIT)***, pp. 29-34, February 2020.
- Anil Kumar Pal, **Bhawana Singh**, Shyam Kamal, Shyam Krishna Nagar and Jitendra Kumar Goyal, "Arbitrary time stabilization of a coupled tank system: A contraction based approach", ***In 2020 IEEE International Conference on Industrial Technology (ICIT)***, pp. 23-28, February 2020.
- Jitendra Kumar Goyal, Shubham Aggarwal, Sandip Ghosh, Shyam Kamal, Pawel Dworak, **Bhawana Singh** and Anil Kumar Pal, "Experimental design of robust decentralized PI controller for TRMS through polytopic modeling", ***In 2020 IEEE International Conference on Industrial Technology (ICIT)***, pp. 47-52, February 2020.

## ACHIEVEMENTS AND AWARDS

- Recipient of **PROM Scholarship Programme-International Scholarship Exchange of PHD Candidates and Academic Staff, Poland**, 2021.
- Attended the course on **Homogeneity Based Design of Sliding Mode Controllers organized by EECI 2020 International Graduate School on Control**, October 2020.
- Attended in person **22nd World Congress of the International Federation of Automatic Control**, Yokohama, Japan, 2023.
- Attended in person **17th International Workshop on Variable Structure Systems (VSS)**, Abu Dhabi, 2024.
- Attended **International Symposium on Power, Energy and Cybernetics ISPEC 2020 in Hanoi Vietnam**, December 2020.
- Institute **Silver Medal** in M.Tech (2017).