Saurabh Chaudhary

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Education

Indian Institute of Technology Jodhpur **January 2020 – Present**
PhD in Mechanical Engineering (Robotics), CGPA: 7.5/10 *Jodhpur, Rajasthan, IN*

Indian Institute of Engineering Science and Technology Shibpur **July 2017 – May 2019**
Master of Technology in Mechatronics, Grade: 76.4% *Howrah, West Bengal, IN*

Indraprastha Engineering College Ghaziabad **July 2012 – June 2016**
Bachelor of Technology in Mechanical Engineering, Grade: 67.06% *Ghaziabad, Uttar Pradesh, IN*

Technical Skills

Programming: MATLAB, Python(Basic), INTLAB- INTerval LABoratory
Software & Tools: ROS, CoppeliaSim, Vicon Motion Capture, AutoCAD, Catia, Solidworks, LaTeX, Microsoft Office
Technologies/Frameworks: Linux, Windows
Hands-On: Universal Robot 5(UR5), TurtleBot3 Waffle Pi, Open Manipulator X, 3D Printer

Research Interest

- Robot Kinematics, Dynamics
- Robot Path and Motion Planning
- Model-Based Robot Control
- Data-Driven Robot Control
- Interval Arithmetic

Research Experience

Linear System Identification and Control of Free-Floating Space Robot | **March 2024–Present**
- Obtained a control-oriented linear system model of a free-floating space robot using Koopman Operator Theory
- Developed Koopman Operator-Based Model Predictive Control(MPC) for free-floating space robot
- Used the preceding controller for time delay compensation
- Two journal articles are in preparation

Data-Driven Robust Control of Free-Floating Space Robot | **April 2021 - Feb. 2024**
- Obtained linear system model of free-floating space robot using feedback linearisation
- Developed a Gaussian Process-based MPC controller for control of a free-floating space robot in the presence of uncertainties
- Published journal article in AIAA-JGCD and IEEE-TAES
- Conference article accepted and presented in Advances in Robotics (AIR) 2025

Robust Control of Free-Floating Space Robot | **Oct. 2020 - March 2021**
- Obtained linear system model of free-floating space robot using feedback linearisation
- Developed a robust controller using Linear Quadratic Regulator for a free-floating space robot with payload uncertainty
- Presented a conference article in Advances in Robotics (AIR) 2021, Virtual

Design Optimisation of RR Planner Robot | **June 2018 - May 2019**
- Performed the design optimisation of RR manipulator for maximum manipulability using Interval Arithmetic
- Published conference article in IEEE-NCETSTEA 2020 and iNaCoMM 2021

Projects

Dynamic Modelling of Space Robot | **Sept. 2020**
- Obtained Equation of Motion of Single-Arm and Dual-Arm Space robot using Euler-Lagrange Method

Development of GUI version of ReDySim | **June 2020 - Present**
- Co-Developer and Mentor of the development of the GUI version of Recursive Dynamics Simulator (ReDySim)

Simulation of RRR Planner Robot | **August 2020**
- Developed a RRR planner manipulator in SolidWorks and imported into CoppeliaSim
- Controlled the robot in CoppeliaSim using MATLAB

Path Planning of SCARA Robot | **April 2020 - May 2020**
- Obtained the forward and Inverse kinematics of the SCARA robot
- Developed a path planning algorithm for obstacle avoidance using Artificial Potential Field

Professional Experience

Teaching Assistant **Jan. 2020 – Dec. 2024**

IIT Jodhpur *Jodhpur, Rajasthan IN*

- Teaching assistant for the courses: Engineering Mechanics, Introduction to Robotics, Experimental Robotics, Control of Mechanical Systems

Mentor **Jan. 2024 – Present**

IIT Jodhpur *Jodhpur, Rajasthan IN*

- Mentoring B.Tech Students in Design Credit Project on *Development of C# based Standalone GUI version of ReDySim*

Extracurricular

- Conducted a workshop with Prof. S.K. Saha on Dynamics of Robotic Systems: Theory and Practice at AIR 2025
- Volunteered in workshop on field robotics 2023 hosted by IIT Jodhpur and TRS India
- Hostel Secretary (2021-2022) of Green 6 Hostel at IIT Jodhpur
- Member of the organizing team of the IMSD-ACMD 2022 conference hosted by IIT Delhi
- Volunteered in IIW International Congress 2014
- Member of the organizing team of the annual techno-cultural fest of the college(IPEC) (2014-2016)
- Member of the organizing team of the departmental forum of the college (2013-2015)

Publications

- **Chaudhary, S.**, Tripathy, N.S. and Shah, S.V., "Event-Triggered Model Predictive Control for Reactionless Manoeuvring of a Satellite-Mounted Robotic Arm" *Accepted and Presented in Conference on Advances in Robotics-2025 (AIR '25).*
- **Chaudhary, S.**, Tripathy, N.S. and Shah, S.V., "SGP-Based Stochastic Predictive Control of Free-Floating Space Robot in Pre-Capture Phase" *IEEE-TAES*, 2025.
- **Chaudhary, S.**, Dubey, R., Tripathy, N.S. and Shah, S.V., "Data-Driven Event-Triggered Predictive Post-Impact Control of Space Robot with Uncertainties", *AIAA-JGCD*, 2025.
- **Chaudhary, S.**, Patel, S.M., Dal, P.N., Joshi, S.K., Tripathy, N.S. and Shah, S.V., "Robust Control Strategy for Reactionless Manoeuvring of a Dual-Arm Space Manipulator", *Proceedings of the* 2021 *Conference on Advances in Robotics (AIR '21)*, 2022.
- **Chaudhary, S.**, Kumar, V., and Sen, S., "An Optimization-Based Design of Open-Chain Manipulator Arm: Incorporating Dimensional Uncertainty", *Proceedings of the* 2021 *International and National Conference on Machines and Mechanisms (iNaCoMM 2021)*, 2022.
- **Chaudhary, S.**, Kumar, V., and Sen, S., "Design of serial link manipulator with uncertainties using interval method", *Proceedings of the* 2020 *National Conference on Emerging Trends on Sustainable Technology and Engineering Applications (NCETSTEA)*, 2020.
- Dubey, R., Gupta, S., **Chaudhary, S.**, Tripathy, N.S. and Shah, S.V., "Finite-Time Convergence of Multi-robot Segregation using MPC with Aperiodic Motion Smoothing", *Proceedings of the* 2024 *International Conference on Automation Science and Engineering (CASE)*, 2024.
- Chandratreya, P.S., Bhardwaj, G., Sharma, S., **Chaudhary, S.**, Dan, A., Nandihal, P.V., Shah, S.V., and Saha, S.K., "Standalone C# Based Graphical User Interface for Recursive Dynamic Simulator", *Accepted in International Conference on Industrial Problems on Machines and Mechanism (IPROMM 2024)*, 2024.
- Gupta, A., Dan, A., **Chaudhary, S.**, Saha, S.K., and Shah, S.V., "Development of Graphical User Interface (GUI) for Recursive Dynamics Simulator (ReDySim) for Legged System", *Proceedings of the* 2023 *International and National Conference on Machines and Mechanisms (iNaCoMM 2023)*, 2024.
- Dan, A., **Chaudhary, S.**, Jallepalli, D., Samiur, M., and Gupta, S., "Enhanced Graphical User Interface (GUI) of Recursive Dynamics Simulator (ReDySim) for Multibody Systems", *Proceedings of the* 2022 *International Conference on Industrial Problems on Machines and Mechanism (IPROMM 2022)*, 2024.
- Gupta, S., **Chaudhary, S.**, Maurya, D., Joshi, S.K., Tripathy, N.S., and Shah, S.V., "Segregation of Multiple Robots Using Model Predictive Control With Asynchronous Path Smoothing", *Proceedings of the* 2022 *Conference on Control Technology and Applications (CCTA)*, 2022.

References

- **Dr. Suril V Shah**
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  Indian Institute of Technology Jodhpur
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- **Dr. Subir Kumar Saha**
  Professor,
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  Indian Institute of Technology Delhi
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- **Dr. Virendra Kumar**
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- **Dr. Niladri Sekhar Tripathy**
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