

# Sanjay Thakur



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04/02/1995



Kolkata, India



## PERFORMANCE PROFILE:

- **Result-oriented** model-based developer with 5 years specialization in **design and development of the control techniques for vibration reduction and trajectory tracking of Flexible link manipulator** with experience in **experimental design, Validation design, data analysis, equipment troubleshooting, safety & hazard analysis, project supervision and mentorship.**
- **Focused multitasker** with **high research productivity (5+publications)**, both working **independently** and **collaborating** with colleagues. Previous experience includes **MATLAB & Simulink modelling, M-Script, Solid works, Scilab, Simscape, Arduino, V-rep, C/C++ and Raspberry Pi.**
- Project experience includes **design and development of the Four wheeled mobile robot using Raspberry Pi for obstacle avoidance using ultrasonic sensor (wired and wireless), design and development of Single Link Flexible Manipulator by interfacing Arduino with Matlab.**
- Excellent **communication, leadership, and strong organizational skills** as evidenced by selection as “**National Doctoral Fellow**” by government of India.

## CORE SKILLS:

<b>System modelling</b>	Rigid link manipulator, Solid works design, single and double link flexible manipulator, <b>Simscape, M-Script, M-I-L, S-I-L.</b>
<b>Control Schemes</b>	Lyapunov based control, PID controller, Sliding mode control, Optimal robust control, Optimization-based schemes
<b>Analysis and Modeling</b>	MATLAB, Simulink, S-function, C language, motor encoder and sensors interfacing with MATLAB.
<b>Professional Skills</b>	Teamwork, Determination, Communication, Problem Solving, Articulate, Attention to Detail.

## KEY ACHIEVEMENT:

- Successfully developed obstacle avoidance robot with Raspberry Pi.
- Successfully developed low cost and light weight single link flexible manipulator.
- Introduced new algorithms for vibration reduction of the flexible links and for link position tracking.
- Presented research findings at IEEE international conferences including the National Conference.
- Successfully published work in renowned National and International Journals.

## EDUCATION:

<b>2019–2024 (Expected)</b>	<b>JADAVPUR UNIVERSITY</b> Ph. D. in Electrical Engineering   PERCENTAGE: 84.5%	<b>Kolkata, W.B, India</b>
<b>2017–2019</b>	<b>National Institute of Technology, Sikkim</b> M.Tech. in Electrical Engineering   PERCENTAGE: 86.9%	<b>Ravangla, Sikkim, India</b>
<b>2012–2016</b>	<b>Adamas Institute of technology (AIT)</b> B. Tech. in Electrical Engineering   PERCENTAGE: 77.8%	<b>Barasat, Kolkata, India</b>

## WORK EXPERIENCE:

<b>August 2019–Present</b>	<b>Control System Lab (CSL), Jadavpur University</b>	<b>Kolkata, India</b>
<b>Model Based Developer</b>		
<b>Project:</b>	Design and development of the control techniques for vibration reduction and trajectory tracking of Flexible link manipulator.	
<b>Supervisor:</b>	Prof. (Dr.) Ranjit Kumar Barai	
<b>Project Details:</b>	<ul style="list-style-type: none"><li>• Single link and two link flexible manipulators have been modelled using lumped parameter method and assumed mode method.</li><li>• Different control techniques have been developed for trajectory tracking and vibration reduction of the two link flexible link manipulator.</li></ul>	

- Optimization techniques has also been developed for tuning the gain parameters used in the design of the controllers.

<b>August 2019–October 2022</b> <b>Model Based Developer</b> <b>Project:</b> <b>Supervisor:</b> <b>Project Details:</b>	<b>Mechatronics Lab (ML), Jadavpur University</b>  Low-cost hardware development of Single link flexible manipulator by interfacing Arduino with Matlab.  Prof. (Dr.) Ranjit Kumar Barai <ul style="list-style-type: none"> <li>• DC motor with encoder, motor driver and an accelerometer sensor have been used and interfaced with MATLAB. The physical model has been developed from scratch. The sensors have been calibrated in matlab.</li> <li>• The encoder measures the angular position and speed of rotation. Accelerometer has been used to measure the link deflection.</li> <li>• The controller logics has been developed in the Matlab <b>M-Script</b> and uploaded to Arduino.</li> </ul>	<b>Kolkata, India</b>
<b>July 2018–June 2019</b> <b>Masters research project</b> <b>Project:</b> <b>Supervisor:</b> <b>Project Details:</b>	<b>National Institute of Technology</b>  Quadrotor Trajectory Tracking and Control Dr. Anjan Kumar Ray <ul style="list-style-type: none"> <li>• Lyapunov based controller has been developed for the trajectory tracking of Quadrotor.</li> <li>• The three dimensional desire trajectories have been considered as: Set-point trajectory; Spiral trajectory; Circular trajectory at the horizontal plane at certain height from the ground; Tilted Circular trajectory.</li> <li>• The whole operation has been performed in <b>Scilab</b> software.</li> </ul>	<b>Sikkim, India</b>
<b>July 2018–June 2019</b> <b>Masters research project</b> <b>Project:</b> <b>Supervisor:</b> <b>Project Details:</b>	<b>Control system Lab, National Institute of Technology</b>  Development of a Four wheeled controlled mobile robot using Raspberry Pi for avoiding Static obstacles. Dr. Anjan Kumar Ray <ul style="list-style-type: none"> <li>• Ultrasonic sensors, motor drivers and four dc motors have been used to developed the hardware. <b>Python</b> programming language has been used to write the control logic.</li> <li>• The wired connection between the Raspberry Pi and PC has been established using Putty software.</li> <li>• For the wireless connection, Wi-Fi adapter has been placed in the Raspberry Pi and VNC viewer has been installed in PC.</li> </ul>	<b>Sikkim, India</b>
<b>January 2015–January 2016</b> <b>Bachelor Thesis Project</b> <b>Project:</b> <b>Supervisor:</b> <b>Project Details:</b>	<b>Adamas Institute of technology</b>  Obstacle Avoiding Robot Prof. Suchibrata Pradhan <ul style="list-style-type: none"> <li>• Infrared sensor, voltage regulator, two dc motors, NOT gate, motor driver and Voltage regulator have been used to developed the hardware.</li> <li>• Two infrared sensors have been placed at the front in such a way that it will protect the front and the corners of the robot vehicle from the static and moving obstacles.</li> </ul>	<b>Kolkata, India</b>

## SELECTED PUBLICATIONS:

- **Sanjay Thakur** and Ranjit Kumar Barai. “Joint Trajectory Tracking of Two-link Flexible Manipulator in Presence of Matched Uncertainty.” In *International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER)*, pp. 151-154. **IEEE**, 2021.
- **Sanjay Thakur** and Ranjit Kumar Barai. “Sliding mode control of two-link flexible manipulator for reduced vibration in the presence of unmatched uncertainty and time-varying external disturbance.” *International Journal of Automation and Control*, 18(2), 2023, pp.161-183.
- **Sanjay Thakur** et al. “Lyapunov based Trajectory Tracking Controller for a Quadrotor UAV with Nonholonomic Constraints.” *e-Prime-Advances in Electrical Engineering, Electronics and Energy*, 8, 2024.

For more publications: Google Scholar link: <https://scholar.google.com/citations?user=pS8VCuMAAAAJ&hl=en&authuser=2>

## OTHER DETAILS:

- One of the 223 members overall India selected for national doctoral fellowship, AICTE, 2019.
- GATE 2017 Qualified.
- **Languages Known:** Hindi, English, and Bengali.
- **Additional Interests:** Singing, Cooking and Travelling.