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## EDUCATION

**Texas A&M University, College Station**

**August 2023**

*Doctor of Philosophy*, Mechanical Engineering

**Indian Institute of Technology, Roorkee, India**

**June 2021**

*Master of Technology (MTech)*, Systems and control

**National Institute of Technology, Tiruchirappalli, India**

**May 2019**

*Bachelor of Technology (BTech)*, Instrumentation and control

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## RELEVANT SKILLS

Programming Languages: Python, C, C++, Embedded C, MATLAB/Simulink.

Courses: Control of Mobile Robots, Aerial Robotics, Computational Motion Planning, Spacecraft Dynamics and Control, Optimal Control, Deep Learning.

Frameworks: Arduino, Raspberry Pi, AVR Studios, LABVIEW, Siemens V13 TIA, CARLA, Webots, ROS1/2, Keras, TensorFlow, Pandas.

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## RESEARCH EXPERIENCE

**Texas A&M University, College Station, USA** | Autonomous Vehicle For All

**August 2025-**

**GRA, Advisor: Dr Reza Langari**

- Designing and implementing planning and optimal trajectory generation algorithms for autonomous driving on marked and unmarked gravel roads, leveraging semantic segmentation outputs to ensure robust and safe path feasibility.
- Developing and validating steering control strategies for vehicle lateral dynamics to enhance path-tracking accuracy and stability across diverse road conditions.

**Texas A&M University, College Station, USA** | Automation in welding

**August 2024-August 2025**

**GRA, Advisor: Dr Prabhakar Pagilla**

- Developed and integrated an automated robotic welding system combining a UR10e robotic arm, Arduino-based control, and Miller MIG welder for industrial automation.
- Designed and implemented automated workpiece registration, reducing human intervention by localizing the part and aligning the weld frame automatically.
- Planned and executed optimized weld trajectories based on workpiece localization using motion planning algorithm for precise path tracking.
- Created a user-friendly graphical user interface (GUI) to enable operators to initiate, monitor, and manage high-quality weld operations.

**MIKO, Mumbai, India**

**June 2021-June 2023**

**Robotics Engineer**

- Engineered a robust dynamic control and path-planning algorithm for the Head Motion Manipulator, including system identification, stability testing, and robust controller design.
- Built and tuned robust controllers for a self-balancing robot, selecting and integrating sensors to achieve reliable balance and motion.
- Programmed joint-level controllers enabling expressive head movements, improving the robot's ability to convey lifelike interactions.
- Integrated Direction-of-Arrival (DOA) audio processing with yaw-motion control, enabling the robot to orient toward sound sources in real time.
- Designed RC-based mobile robot control as an added utility feature, extending product functionality.

**Technical University of Berlin, Germany** | Absorption Heat Transformer,

**May 2018-July 2018**

**Intern**

- Developed simulations in Siemens PLC sim and embedded PID and ON-OFF control algorithm in V13 TIA Portal.
- Configured SP7 communication between LabVIEW and PLC, enabling real-time sensor data acquisition and monitoring.

**National Institute of Industrial Engineering** | Palanquin Seat Stability System Design

**December 2017**

**Intern**

- Designed and prototyped a seat stability control system for palanquin transport using a PID controller, improving passenger comfort and safety.
- Developed a real-time heart rate monitoring system for the carriers to assess physical strain during operation.
- Utilized Arduino Uno, accelerometers, and heart-rate sensors to integrate control and physiological monitoring.

**Indian Institute of Technology, Bombay** | Simultaneous Localization and Mapping

**June 2017- July 2017**

**Intern**

- Designed and implemented a SLAM algorithm in MATLAB and deployed it on the SPARK-V robot for autonomous navigation.
- Integrated ultrasonic sensors for mapping and obstacle avoidance, and position encoders for localization accuracy.
- Applied a Kalman filter to improve state estimation and navigation control robustness.
- Programmed PID-based navigation control in Embedded C (AVR Studios), ensuring stable and precise robot motion.

**Intern**

- Gained experience of Automated Guided Vehicle which were differentiated based on sensors used in it.
- Understood the role of sensors in smart phone, its application and Biosensors.

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**PROJECTS****Linear Parameter Varying Model Predictive Control for Autonomous Vehicle** | Texas A&M University **September 2024 – November 2024**

- Designed and implemented an LPV-based Model Predictive Control framework in Python for autonomous vehicle trajectory tracking under nonlinear dynamics.
- Developed waypoint-to-trajectory generation using cubic polynomial interpolation for smooth and feasible paths.
- Validated the controller through custom simulations, demonstrating accurate path tracking, reduced error, and real-time feasibility.

**Sliding Mode Control On Platooning Problem** | Indian Institute of Technology, Roorkee**August 2020- April 2021**

- Derived a mathematical bicycle model and applied First-Order Sliding Mode Control for autonomous platooning.
- Implemented coupled sliding mode control and explored MPC and alternative reaching laws for improved stability.
- Developed higher-order sliding mode algorithms with power-rate reaching laws, enhancing robustness and reducing chattering effects in platoon dynamics.

**Needle tip prediction using Kalman filtering** | Indian Institute of Technology, Roorkee**September 2019 - December 2019**

- Applied a Kalman filter for real-time state estimation and needle-tip position prediction from ultrasound images in LabVIEW.
- Implemented image processing techniques (background subtraction, edge detection, thresholding, filtering) to track needle movement.
- Designed a 1-DOF robot model and incorporated sliding mode control for robust regulation of needle position in artificial tissue.

**Particle Swarm Optimization Algorithm For Finding The Brightest Spot in a Given Space** | NIT, Trichy**January 2019-May 2019**

- Implemented a particle swarm optimization (PSO) algorithm in MATLAB and deployed it on three NXT robots using Python, light sensors, and Bluetooth communication.
- Designed PID controllers for precise navigation, enabling robots to converge to the brightest location based on ambient light measurements.
- Integrated OpenCV with an overhead camera to track robot positions and validate swarm convergence behavior.

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**RESEARCH PUBLICATIONS AND ACHIEVEMENTS**

- Adharsh Mahesh, Ajay G Iyer, Abhinav G Athrey, Ashwin V, VG Venkatesh, "**Particle Swarm Optimization Algorithm for Finding the Brightest Spot in An Arena**", in Proceedings of the Third IEEE International Conference on Electronics, Communication and Aerospace Technology, 2019.
- **Best Paper Award:** IEEE-International Conference on Electronics, Communication and Aerospace Technology
- Ajay G Iyer, Jagannath Samantaray, Samsaptak Ghosh, Arnab Dey, Sohom Chakrabarty, "**Sliding Mode Control Using Power rate Exponential Reaching Law For Urban Platooning**", in proceedings of of the 7<sup>th</sup> International Conference on Advances in Control and Optimization of Dynamical Systems (ACODS) 2022.

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**POSITION OF RESPONSIBILITIES**

- Teaching Assistant for the course Advanced Linear Control System at IIT-Roorkee.
  - Teaching Assistant for the course Control Systems at IIT-Roorkee.
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