Ajay Ganesan Iyer

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EDUCATION

Indian Institute of Technology, Roorkee   **June 2021**
Master of Technology (MTech), Systems and control

National Institute of Technology, Tiruchirappalli   **May 2019**
Bachelor of Technology (BTech), Instrumentation and control

TECHNICAL SKILLS

Computer languages: C, Embedded C, Python

Software Packages: MATLAB and Simulink, Xilinx, Arduino, AVR Studios, LABVIEW, Siemens V13 TIA, CARLA, Webots.

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

PROFESSIONAL EXPERIENCE

Texas A&M University, College Station, USA | Automation in welding   **August 2024-**
GRA, Advaisor: 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 advanced motion planning algorithms 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

- Worked in team of 2 to implement a robust Dynamic Control and Path planning Algorithm for the Head Motion manipulator which involves identification of dynamic system, testing the stability of the dynamics derived, Planning of robust controllers.
- Involved in achieving a self-balancing robot through planning of robust controller methods, Identifying the Model of the system and sensors to be used.
- Implemented a control algorithm for each joint control for the Head motion Manipulator. We also focused on controlling Methods for achieving different Head Motion Expressions to make it more genuine for the users.
- Implemented Direction of Arrival for the audio(DOA) stream and a robust control algorithm to perform a yaw motion according to DOA input.
- Implemented a control algorithm for RC control of mobile robot and added it as an utility feature for MIKO.

Technical University of Berlin, Germany| Absorption Heat Transformer,   **May 2018-July 2018**
Intern

- Developed simulation in Siemens PLC sim and embedded PID and ON-OFF control algorithm in V13 TIA Portal.
- Implemented SP7 to enable communication between LAB VIEW and PLC for acquiring measurement from sensors through LAB VIEW.

National Institute of Industrial Engineering | Palanquin Seat Stability System Design   **December 2017**
Intern

- Designed a prototype of seat stability system for passengers travelling in palanquin using PID controller.
- Developed heart rate measurement system for the people carrying the palanquin.
- Technologies used: Arduino Uno, Accelerometer and heart-rate sensor.

Indian Institute of Technology, Bombay | Simultaneous Localization and Mapping   **June 2017- July 2017**
Intern

- Developed SLAM in MATLAB and Implemented it in SPARK V robot.
- Used Ultrasonic sensors to Map the arena and also for obstacle avoidance. Used position encoders for localization of the robot.
- Implemented Kalman filter for the estimation and controlling the navigation of SPARK-V.
- Implemented PID control Algorithm for the navigation of SPARK-V robot using Embedded C in AVR- studios Platform.

National Institute of Industrial Engineering | Working of AGV and Sensors in Smart phones   **December 2016- January 2017**
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.

PROJECTS

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

- Worked on Deriving a Mathematical Model for bicycle Model and First Order Sliding Mode Control for autonomous platooning.
- Implemented coupled sliding mode control and worked on implementing MPC, different sliding mode control reaching laws.
- Implemented Sliding Mode Control with Power rate reaching Law and developed Higher order Sliding Mode control algorithm for robustness in reducing the influence of chattering effects and for improving the performance of the platoon.

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

- Implemented Kalman filter for state estimation and prediction of position of needle tip using Ultrasound Image, LABVIEW.
- Used image processing algorithms like Background Subtraction, edge detection, thresholding, filtration to measure the position of the needle in LABVIEW.
- Incorporated Sliding mode control Algorithm for a robust control of needle position in artificial tissue by deriving the Mathematical model of 1-DOF robot.

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

- Worked on the implementation of particle swarm optimization in MATLAB and three NXT Robots using python, light sensor and Bluetooth Communication to find the brightest spot in the given arena.
  - Implemented PID controller for accurate navigation of the robot to reach its goal position on each iteration. Ambient light sensors were used to measure the magnitude of brightness continuously during the navigation of the robot.
- An overhead camera was placed for Implementation of open-cv for acquiring the accurate position of the robot in arena.

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 7th International Conference on Advances in Control and Optimization of Dynamical Systems (ACODS) 2022.

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.