Arashdeep Singh

Roll No.:M23IRM003
Autonomous Mobile Robots
Robotics and Mobility Systems
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Education

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
M.Tech. (RMS)	Indian Institute of Technology, Jodhpur	8.02 (Current)	2023-Present
B.Tech. (ME)	Guru Nanak Dev Engineering College, Ludhiana	7.58	2016-2020
Senior Secondary	PSEB Board	90.00%	2015
Secondary	PSEB Board	91.84%	2013

Projects

- **M.Tech Thesis: Development of Multi-Agent Control for Surface and Underwater Vehicles** *May 2024* Github YouTube
  - This project focuses on developing a control and decision-making framework for autonomous amphibious vehicles, integrating multi-agent coordination for task allocation, role switching, and obstacle avoidance to enhance mission efficiency.
  - **Tools & Technologies**: Matlab, Solidworks, ROS, Arduino, Sensor Integration,Python,C++
- **ROS2-based Bin-Picking System: Integrating RGB and Point Cloud Data for Object Detection, Pose Estimation, and Grasp Planning** Github YouTube
  - This project presents an integrated robotic bin- picking system that uses advanced computer vision techniques and ROS2 for real-time object detection, pose estimation, and grasp planning.
  - **Skills**:Motion Planning,ROS2,CV,Camera Calibration,Kinematics and Dynamics
  - **Tools**:YOLO,GPD,PCL,Gazebo,RViz
- **Leader-Follower Formation Control of Non-Holonomic Mobile Robots** Github YouTube
  - Modeled leader-follower formation of differential drive WMRs, designed Lyapunov-based controllers, and simulated formations.
  - **Skills**: Robotic Kinematics, Formation Control, Lyapunov Stability, Matlab Simulation
- **2D Admittance Control: From Concept to Hardware Implementation** Github YouTube
  - Designed and implemented a complete 2D admittance control system, spanning theoretical modeling, simulation in Gazebo, and hardware integration.
  - **Skills**: Robotic Kinematics, Formation Control, Lyapunov Stability, Matlab Simulation
- **Multi-Vehicle Simulation Environment for AUVs and ASVs** Github YouTube
  an integrated simulation platform enabling simultaneous testing and interaction of Autonomous Underwater Vehicles (AUVs) and Autonomous Surface Vehicles (ASVs) to enhance multi-agent coordination.**Skills**: Robotic Kinematics, Formation Control, Lyapunov Stability, Matlab Simulation
- **Turtlebot Control Using Motor Cortex Signals (BCI Hackathon)** Github YouTube
  Led a BCI hackathon project in which a Turtlebot was controlled using motor cortex signals acquired via an OpenBCI device, demonstrating novel integration of brain signals and robotic control.**Skills**: Robotic Kinematics, Formation Control, Lyapunov Stability, Matlab Simulation
- **Voice-Controlled Smart Home Automation System with Sensor Integration** Github YouTube
  - Developed a voice-controlled smart home system using Arduino Nano 33 BLE Sense, integrating environmental sensors and machine learning models.
  - **Skills**: Hardware-Software Integration, Voice Recognition, ML Integration, Sensor Integration, Embedded System Design
- **Designing a Lightweight Neural Network for Crop Disease Detection** Github YouTube
  - In this project, we focus on designing a lightweight Neural Network model capable of running on edge devices to assist in detecting crop diseases on-site.
  - **Skills**:PyTorch,CNN,MobileNet,Python

Key Courses Taken

- Introduction to Robotics, Mobile Robots, Artificial Intelligence, Computer Vision, Autonomous Systems, Embedded System Design, Fundamentals of Machine Learning, Robot Operating System, Introduction to Medical Robotics

Technical Skills

- **Programming:** C,C++,Python,Matlab, Shell Scripting
- **Tools & OS:** Git, Jupyter Notebook,Google Colab, Linux, Windows,ROS,Docker,Solidworks
- **Libraries/Frameworks:** Pandas, Numpy, scikit-learn, Open-CV,Matplotlib,TensorFlow,PyTorch
- **Sensors Hardware :** IMU, Depth Camera, Lidar, Load Cell, Common Motors, Micro- controllers, Basic Motor Control

Certifications

- MathWorks Certification on Matlab Fundamentals,Linear Algebra, ODE
- SWCAD1.0: SOLIDWORKS CAD Fundamentals
- CS50 Introduction to Programming Using Python Certification
- LinkedIn : Additive Manufacturing Optimizing 3D Prints
- LinkedIn : Numpy,Matplotlib,Pandas,Bash Scripting