SIDDHARTH JAIN

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EDUCATION

Arizona State University   Tempe, AZ
Master of Science, Robotics and Autonomous Systems - Thesis   May 2024
Focus: Embedded Systems, Reinforcement Learning, Deep Learning, Multi-Robot Systems, Optimal Control

D. J. Sanghvi College of Engineering   Mumbai, IN
Bachelor of Engineering, Mechanical   May 2022

TECHNICAL SKILLS

Languages	Python, C++, Embedded C, MATLAB, SQL, Bash, Terraform
Software	Docker, ROS2, Gazebo, Rviz, Solidworks, Arduino IDE, Altium Designer, Jira, CI/CD, Git
Frameworks	PyTorch, FreeRTOS, FastAPI, OpenCV, Tesseract OCR, OpenGL, Tensorflow
Hardware	Raspberry Pi, SX12xx, NVIDIA Jetson, ESP32, Atmega 328, ARM Cortex-M
Protocol	NRF BLE, CAN Bus, ZigBee, LoRa, MQTT, Ethernet, Wi-Fi, SPI, I2C, LoRaWAN, UART, TCP, UDP
AWS	IoT Core, Lambda, Sagemaker, OpenSearch, DynamoDB, S3, EC2, API Gateway

WORK EXPERIENCE

Enterprise Technology   Oct 2022 - Present
Embedded Systems Engineer   Tempe, AZ
- **Implemented AES-128 Encryption** to enhance security of custom **UHF mesh** networks using **MQTT** on an edge device.
- Engineered a **BLE LoRa mesh** network on **ESP32 for SOS** alerts, significantly **improving emergency response** efficiency.
- **Optimized** the **MPU9250 sensor** in IoT trackers, **extending battery life** to 1 year by enabling deep sleep mode.
- Developed a **PCB board** using an ESP32 to collect **weather data** on grafana for research purposes.
- Created a LoRa and **LoRaWAN mesh** network with **25 nodes** to track golf carts on campus via **MQTT on AWS**.

Bio-Inspired Robotics, Technology and Healthcare Lab   Dec 2022 - Present
Graduate Student Researcher - Thesis   Tempe, AZ
- Automated **friction analysis of PDMS** pads on curved surfaces, leading 180 experiments for thesis research.
- Designed the 3-axis testing apparatus with a **6-axis load cell** and a **PID controller**, achieving robust control.
- Controlled **UR-16e 6 axis robotic arm** for load carrying tasks and designed a spacemouse **controller in ROS**.

DJS Kronos India   Mar 2019 - May 2021
Vice Captain   Mumbai, IN
- Led the design of a 4WD ATV on **Simulink**, achieving a **17% increase in operational efficiency**. 2nd Best 4WD Team.
- Built a **DAQ system** using the GSM SIM 900 Module on a **Raspberry Pi Zero** via ThingSpeak Communication.
- Used **Peltier modules** to convert **exhaust heat to electricity (0.6A)** with step-up circuits, enhancing **battery recharging**.

PROJECTS

Dexterous Manipulation with a Robotic Hand | Reinforcement Learning, Actor Critic, Python, ROS
- Advantage Weighted Actor Critic algorithm to enhance the performance of a 6-DoF robotic hand.
- Achieving up to a 20% improvement in dexterous manipulation success rates.

Multi Robot Search & Rescue | ROS2, RTAB, OpenCV, RVIZ
- Developed a decentralized quadcopter swarm with Potential-Field and Frontier Exploration algorithms for 3D mapping.
- Validated the swarm's ability to produce 100x100 grid maps in Gazebo, simultaneously avoiding local minima.

Custom LoRa & Ethernet Communication Board | ESP32 S3, PCB Design, FreeRTOS, Embedded C
- Designed a 4-layer PCB with ESP32 S3, focusing on LoRa and Ethernet integration using FreeRTOS, using dual core.
- Employed Xtensa LX7, RFM95W LoRa, and LAN8720 Ethernet, integrating 50-ohm impedance control for RF integrity.

Smart Campus Project | ESP32 Metro, FreeRTOS, Embedded C
- Utilized ESP32 metro with PIDs to create a water leaking sensor using flow meters and trash level detector using ultrasonic sensors. This enabled us to save water and empty the trash bags only when 70% filled.

PATENTS

- Steering Knuckle Joint - Patent No. 378832-001: 4WD ATVs design using r-zeppa joint and steering for better linkages.
- Single Stage Open Differential - Patent No. 378831-001: Mechanism for smoother turns and efficient power distribution.