SIDDHARTH JAIN

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SUMMARY

Master's student in Robotics and Autonomous Systems, focusing on Bio-Inspired Robotics. Expertise in embedded systems, ROS, and AI pipeline development. I am adept at crafting innovative solutions for complex challenges in robotics, AI, and autonomous systems.

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
Software & Tools	Docker, ROS2, Gazebo, Rviz, Solidworks, Arduino IDE, Altium
Frameworks	PyTorch, FreeRTOS, FastAPI, OpenCV, Tesseract OCR, OpenGL
Hardware & Protocols	Raspberry Pi, SX12xx, NRF BLE, CAN Bus, ZigBee, LoRa, MQTT, Ethernet, Wi-Fi
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 Encryption** to enhance security of custom **UHF mesh** networks. Leveraging extensive experience in **device driver development**, security practices (**Encryption, Decryption**), and interfacing (**MQTT**) within an Embedded/IoT environment.
- Deployed a **BLE LoRa mesh** network on **ESP32 for SOS** alerts, significantly **improving emergency response** efficiency. Experience with **wireless protocol** implementation, experience with **LoRaWan**, and proficiency in embedded systems programming (**C/C++**).
- **Enhanced data handling** with AWS Lambda and Timestream, achieving a **30% improvement in retrieval** efficiency.
- **Optimized** the **MPU9250 sensor** in IoT trackers, **extending battery life** to 1 year and reducing maintenance costs.

ML Ops and AI Development Engineer — Tempe, AZ

- Engineered a **fine-tuned LLM** endpoint for a **Model as a Service** framework.
- **Optimized data retrieval** and scalability using AWS **OpenSearch**, **DynamoDB**, and various Vector DBs.
- Deployed scalable **LLMs on AWS Lambda** (CPU), enhancing enterprise **AI platform efficiency** and cost-effectiveness.

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.

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.
- Designed a **DAQ system** using the GSM SIM 900 Module on a **Raspberry Pi Zero** via ThingSpeak Communication.
- Provided **real time data** on the 2G cellular network, enhancing **failure prediction** and data collection.
- Used **Peltier modules** to convert **exhaust heat to electricity** with step-up circuits, enhancing **battery recharging**.

PROJECTS

Dexterous Manipulation with a Robotic Hand | Reinforcement Learning, Actor Critic, Python, Linux

- Led the implementation of the Advantage Weighted Actor Critic (AWAC) algorithm to significantly enhance the performance of a 6-DoF robotic hand in dexterous manipulation tasks. Achieving up to a 20% improvement in manipulation success rates.
- Increased efficiency by combining offline datasets and online reinforcement learning using constrained actor updates.

Multi Robot Search & Rescue | ROS2, RTAB, OpenCV

- Developed a decentralized quadcopter swarm with Potential-Field and Frontier Exploration algorithms for dynamic 3D mapping.
- Enhanced exploration efficiency with a leader-trooper strategy, navigating through complex terrains and avoiding local minima.
- Conducted ROS and Gazebo simulations, validating the swarm's ability to produce detailed maps and critical visual data.

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, leveraging the S3's dual core.
- Employed Xtensa LX7, RFM95W LoRa, and LAN8720 Ethernet, integrating 50-ohm impedance control for RF integrity.

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.