SIDDHARTH JAIN

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SUMMARY

Masters student with a thesis in Bio-Inspired robotics, expertise in embedded systems, ML & AI pipelines and autonomous technologies. ability to develop innovative solutions for complex challenges. Eager to contribute to enterprises at the forefront of robotics and AI.

EDUCATION

ARIZONA STATE UNIVERSITY — Tempe, AZ
Master of Science, Robotics and Autonomous Systems - Thesis — May 2024
Relevant Coursework: 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, Typescript
Software & Tools	Docker, ROS, Gazebo, Solidworks, Arduino IDE, Altium, MS Office
Frameworks & Cloud Services	PyTorch, React Native, FreeRTOS, FastAPI, OpenCV, Tesseract OCR, PyQt, OpenGL
Hardware & Protocols	Raspberry Pi, PCB Design, SX12xx, NRF BLE, CAN Bus, ZigBee, LoRa, MQTT, Ethernet, Wi-Fi
AWS	IoT Core, Lambda, Sagemaker, OpenSearch, DynamoDB, S3, EC2, API Gateway, Cloudwatch

WORK EXPERIENCE

ENTERPRISE TECHNOLOGY — Tempe, AZ
ML Ops and AI Development Engineer — Aug 2023 – Present

- Developed a fine tuned Mistral endpoint for MaaS (Model as a Service) model, achieved 98.5% real-time face detection accuracy with integrated TTS. Built on Raspberry Pi, features celebrity matching and DALLE-3 image generation within a portable robot head.
- Leveraged AWS OpenSearch with Llama index and V4 authentication for security. Developed an OpenSearch client paired with DynamoDB storage, optimizing system scalability. Worked on Milvus, Cohere re ranker and other vector DBs.
- Deployed LLM models on AWS Lambda using CPUs for cheaper and scalable inference for an enterprise wide AI platform giving the user an option to pick their own model, database and embeddings.

Embedded Systems Engineer — Oct 2022 – Jul 2023

- Implemented AES Encryption to a UHF mesh protocol for ASU cart tracking using C++, LoRa, MQTT, and AWS IoT Core.
- Introduced a BLE mesh on ESP32 for SOS alerts, integrated with React-Native on Android and iOS, boosting emergency responses.
- Developed AWS Lambda functions paired with API Gateways and Timestream, enhancing data accuracy and expediting retrieval by 30% using Python. Optimized the mpu9250 sensor in IoT trackers, achieving a 1-year battery life and reducing maintenance costs.

BIO-INSPIRED ROBOTICS, TECHNOLOGY AND HEALTHCARE LAB — Tempe, AZ
Graduate Student Researcher - Thesis — Dec 2022 – Present

- Designed a 3-axis testing apparatus integrated with a precision 6-axis load cell and a PID controller, specifically to automate and measure the frictional properties of a PDMS pad interacting with curved surfaces, both rusted and non-rusted.
- Currently leading a rigorous research initiative, I've planned and executed 180 controlled experiments for my thesis, with the primary objective being a detailed evaluation of the frictional dynamics exhibited by the PDMS pads under varying loads.

DJS KRONOS INDIA — Mumbai, IN
Vice Captain — Mar 2019 – May 2021

- Led the design and fine-tuning of an all-terrain electric vehicle through Simulink, achieving a 17% increase in operational efficiency.
- Designed a DAQ system using the GSM SIM 900 Module with Raspberry Pi Zero via ThingSpeak Communication Library.
- Designed a system to convert exhaust heat to electricity using peltier modules with step up circuits to amplify and recharge batteries.

ACADEMIC PROJECTS

DEXTEROUS MANIPULATION WITH A ROBOTIC HAND | Reinforcement Learning, Actor Critic, Python, Linux

- Examined on-policy and Monte-Carlo methods, achieving 20% success enhancement with Advantage Weighted Actor Critic.
- Harmonized offline/online tuning to refine a 6 DoF robotic hand using reinforcement learning in Linux.

MULTI ROBOT SEARCH & RESCUE | ROS, RTAB, OpenCV

- Designed a Potential-Field Based Control algorithm in conjunction with a Frontier Exploration Algorithm for decentralized mapping of unknown areas using quadcopter swarms. By mapping with a front-facing RGB depth camera, obstacle detection was implemented.

MINUTES OF MEETING (MoM) BOT | Speaker Diarization, vLLM, Streaming LLM, Whisper, TTS

- Developed a Minutes of Meeting Bot that seamlessly records, diarizes using PyAnnote, and transcribes meetings using OpenAI Whisper, then queries a custom Mistral endpoint with VLLM, for context-rich responses within 3.5 seconds.

DYNAMIC PATH FINDING IN COMPLEX ENVIRONMENT | Python, C++, Algorithm Design, Dynamic Programming

- Developed and compared advanced pathfinding algorithms (A*, Dijkstra's, DFS, BFS) using Python. Adapted them to real-world scenarios with moving obstacles, achieving path lengths of 24-25 steps and times ranging from 0.0011 to 3.288 seconds.

CUSTOM LoRa AND ETHERNET COMMUNICATION BOARD | ESP32 S3, PCB Design, FreeRTOS, Embedded C

- Designed a 4-layer PCB with Xtensa LX7, RFM95W LoRa, and LAN8720 Ethernet, integrating 50-ohm impedance control for RF integrity. Utilized C and FreeRTOS for concurrent tasks and power management, enhancing efficiency and reliability.

PATENTS

- Steering Knuckle Joint - Patent No. 378832-001: 4WD ATVs design using r-zeppa joint and integrated steering for efficient linkage.
- Single Stage Open Differential - Patent No. 378831-001: A pivotal mechanism in automobiles to ensure smooth turns and power distribution, transforming gearbox rotations for rear axles and adjusting the power's axis by 90°.