Siddharth Jain

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Education

Master of Science, Robotics and Autonomous Systems **Expected May 2024**
Arizona State University, Tempe, AZ
Relevant Coursework: Reinforcement Learning, Deep Learning, Optimal Control, Multi-Robot Systems

Bachelor of Engineering, Mechanical **May 2022**
D. J. Sanghvi College of Engineering, Mumbai, India *GPA: **8.74/10***
Relevant Coursework: Structured Programming Approach, Industrial Electronics, Robotics, Machine Design

Technical Skills

Languages	Python, C++, Embedded C, MATLAB & Simulink, SQL, PowerShell
Software	Docker, ROS2, Gazebo, Solidworks, Linux, Arduino IDE, Altium, Microsoft Office
Frameworks & Libraries	Tensorflow, Scikit-Learn, PyTorch, React Native, FreeRTOS
Cloud Services	AWS IoT Core, Lambda, Timestream, DynamoDB, S3 Buckets
Hardware	Semtech SX12xx, NRF BLE, ESP32, SAMD21, Arm Cortex-M, ATmega, Raspberry Pi
Protocols & Communication	SPI, I2C, CAN Bus, UART, ZigBee, LoRa, Wi-Fi, BLE, MQTT

Professional Experience

Embedded Systems Engineer **Oct 2022 – Current**
Enterprise Technology *Tempe, Arizona*

- Engineered a self-sustained proprietary UHF off-grid full mesh protocol with AES Encryption for ASU cart tracking. Leveraged expertise in embedded C++, telemetry with protocols like LoRa, MQTT, and AWS IoT Core integration.
- Developed a Bluetooth Low Energy mesh network on ESP32, integrating SOS signals with a React-Native mobile application for both Android and iOS platforms.
- Authored AWS Lambda functions, complemented with API Gateways and Timestream, for real-time location data capture, showcasing embedded system-cloud interoperability using python and javascript.
- Optimized mpu9250 with deep sleep acceleration-based interrupt, extending battery life to 3 years for the IoT-based cart tracker.

Graduate Student Researcher **Dec 2022 – Current**
Bio-Inspired Robotics, Technology and Healthcare Lab *Tempe, Arizona*

- Engineered an advanced 3-axis linear cartesian robot, integrating a 6-axis load cell with a closed-loop controller. Developed primarily in python for embedded Linux environments, ensuring high precision testing results.
- Designed and fabricated gripper pads with curved textured surfaces using a Polydimethylsiloxane (PDMS) polymer to enable the LTI robot to perform friction-based mobility on curved surfaces irrespective of the material and surface texture.

Vice Captain **Mar 2019 – May 2021**
DJS Kronos India *Mumbai, India*

- Headed and co-founded the electric ATV team, also simulated the vehicle using Simulink, achieving a 17% increased efficiency.
- Engineered a DAQ system using GSM SIM 900 Module with Raspberry Pi Zero, transmitting sensor data efficiently through the ThingSpeak Communication Library, emphasizing cloud interoperability and embedded C++ proficiency.

Academic Projects

Dexterous Manipulation with a Robotic Hand | ***Reinforcement Learning, Actor Critic*** **Aug 2022 – Oct 2022**

- Analyzed on-policy methods like DAPG, Monte-Carlo return methods such as AWR, leading to a 20% increase in success with the Advantage Weighted Actor Critic for dexterous robotic manipulation by merging prior offline data with online tuning.
- Employed reinforcement learning and Python within a Linux environment, optimizing robotic skill acquisition.

Self Balancing Platform | ***MATLAB & Simulink*** **Sep 2022 – Dec 2022**

- Engineered a closed-loop PID controller for the Stewart platform's linear actuators, optimizing linkage positions for ball motion stability, and significantly reduced the Steady State Error through integral value adjustments.
- Leveraged Simulink for control system design, showcasing expertise in real-time control and ensuring system stability.

UAV Line Follower Drone | ***MATLAB, Simulink, Edge Detection*** **Mar 2023 – May 2023**

- Developed a Line Follower function for the Parrot Mambo Mini-Drone, employing edge detection techniques to calculate the nearest edge and identifying specific HSV values of the track using MATLAB and Simulink.
- Deployed the refined function to the drone via an access point and Bluetooth.

Machine Learning for Fraud Detection | ***Deep Learning, RNN*** **Jan 2023 – Mar 2023**

- Conducted an exhaustive analysis of machine learning algorithms for bank transaction fraud detection, employing preprocessing strategies like one-hot encoding and SMOTE in Python.
- Carried out feature importance assessment and statistical evaluations to validate the significance of model performance variations.

Publications and Patents

Design Of Single Stage Open Differential - Pending **Feb 2023**
378831-001

- Designed an open differential for smooth vehicle turns, adjusting wheel speeds, reducing gearbox rotations, changing the power's rotation axis by 90°, and efficiently distributing power to rear driving axles during straight or turning movements.

Steering Knuckle Joint for Double A-arm Suspension System **Feb 2023**
378832-001

- Designed a steering knuckle joint for a four-wheel-drive all-terrain vehicle, linking suspension arms, steering tie rod, and wheel assembly, incorporating an active r-zeppa joint, with shocks on the upper A-arm and an integrated steering arm.