

# SIDDHARTH JAIN

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## EDUCATION

### Arizona State University, Tempe, USA

Expected May 2024

Master of Science, Robotics and Autonomous Systems

GPA: 3.78/4

**Relevant Coursework:** Reinforcement Learning, Deep Learning, Optimal Control, Multi-Robot Systems

### D. J. Sanghvi College of Engineering, Mumbai, India

May 2022

Bachelor of Engineering, Mechanical

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	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	SPI, I2C, CAN Bus, UART, ZigBee, LoRa, Wi-Fi, BLE, MQTT

## WORK EXPERIENCE

### Embedded Systems Engineer

Oct 2022 – Present

*Enterprise Technology*

Tempe, AZ

- Engineered a UHF full mesh protocol with AES Encryption for ASU cart tracking using embedded C++, LoRa, MQTT, and AWS IoT Core. Developed a BLE mesh network on ESP32 for SOS signals with React-Native on Android and iOS.
- Authored AWS Lambda functions with API Gateways and Timestream for real-time location capture, demonstrating system-cloud interoperability using Python and JavaScript.
- Optimized mpu9250 with deep sleep acceleration-based interrupt, extending IoT-based cart tracker battery life to 3 years.

### Graduate Student Researcher

Dec 2022 – Present

*Bio-Inspired Robotics, Technology and Healthcare Lab*

Tempe, AZ

- 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, ROS, Python

- 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, Inverse Kinematics, PID Tuning

- Engineered a closed-loop PID controller for the Stewart platform's linear actuators using Simulink, optimizing ball motion stability by reducing the Steady State Error through integral value, and demonstrating expertise in real-time control system design.

### UAV Line Follower Drone | MATLAB, Simulink, Edge Detection

- 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 to the drone via Bluetooth.

### Machine Learning for Fraud Detection | Python, TensorFlow, LSTM, Deep Learning, RNN, CUDA

- Conducted analysis of machine learning algorithms for bank transaction fraud detection using preprocessing strategies like one-hot encoding in Python. Assessed feature importance and performed statistical evaluations to validate model performance variations.

### Dynamic Pathfinding in Complex Environments | Python, Matplotlib, Algorithm Design, Dynamic Programming

- Developed dynamic pathfinding algorithms including A\*, Dijkstra's, DFS, BFS, and Greedy Best-First Search using Python and Matplotlib, enabling navigation in environments with moving obstacles.
- Analyzed algorithm performance in real-time scenarios, utilizing visualization to understand behavior and efficiency.

### Custom LoRa and Ethernet Communication Board | ESP32 S3, PCB Design, Embedded C, FreeRTOS

- Developed a board with Xtensa LX7 (32-bit, 240 MHz), RFM95W LoRa (915 MHz, 15 km range), and LAN8720 Ethernet.
- Designed a 4-layer PCB with 50-ohm impedance control for RF signal integrity and implemented firmware in Embedded C with FreeRTOS for concurrent communication tasks, OTA updates, and power management.

## PATENTS

Steering Knuckle Joint for Double A-arm Suspension System — 378832-001

Design Of Single Stage Open Differential - Pending — 378831-001