SAI KIRAN ATHALURI

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EDUCATION

Northeastern University Boston, MA
Master of Science in Robotics (ECE) Dec 2026
Coursework: Robotics Sensing Navigation, Mobile Robotics, Robot Mechanics, Control Systems Engineering, Mechatronic Systems

SRM University Delhi, India
Bachelor of Engineering in Robotics and Automation June 2023
Coursework: Computer Architecture, Manufacturing Technology, Robotics Engineering and Application, Kinematics and Dynamics of Robot, Mechatronic systems, Artificial Intelligence and Expect Systems

TECHNICAL SKILLS

- Programming Languages: C++, C, Python, MATLAB, Arduino
- Software: Webots, SLAM, Fusion 360, Ansys, IoT, ROS, Gazebo
- Systems: Robotics control, PLCs, N-M/E Systems, IoT-based automation, Data Acquisition & Processing

EXPERIENCE

Breaking Inc., Cambridge, MA
Mechatronics Engineer Jan 2026- Aug 2026

- Designed and prototyped portable OD600 readers, executing full-cycle development from initial CAD design through firmware development, hardware validation, and testing
- Developed programmable thermal chambers by performing custom circuit integration, rapid prototyping, and calibration to deliver precise environmental controls for laboratory operations
- Engineered methane monitoring systems utilizing Arduino and NodeMCU microcontrollers, seamlessly integrating them into automated bioreactor setups for active biological tracking
- Modified and upgraded thermal control architecture of a Fynch Bio evolver bioreactor system, implementing hardware and calibration changes to safely achieve and sustain operational temperatures exceeding 75°C for a variety of biological setups
- Developed firmware and utilized R programming to create data visualization models (such as tracking longitudinal pH variations), while producing comprehensive engineering documentation and debugging protocols for lab deployment

Maxbyte Technology Coimbatore, India
Robotics Engineer Intern June 2023 – Dec 2023

- Designed and developed PLC systems for automation applications in the manufacturing sector, optimized efficiency by 23% by implementing a prediction algorithm that forecasted equipment performance and reduced downtime.
- Streamlined robotic design iterations by 20% by creating and integrating a URDF file for a 3D model in Fusion 360, improving simulation accuracy and reducing testing time in Gazebo software
- Developed technical documentation and troubleshooting guides for robotic deployment, while assisting in the design and assembly of a Jumbo Trolley project
- Identified and resolved issues in PLC-controlled robotic systems, implementing real-time solutions to optimize workflow efficiency and resource handling in the manufacturing environment

DCS, Delhi, India
Network IoT Engineer Intern June 2020 – Aug 2020

- Engineered IoT layouts to develop a Smart Water Supply system for commercial buildings, optimizing resource management and improving operational efficiency
- Designed and implemented dedicated systems for continuous and batch-oriented manufacturing processes across multiple industries, enhancing production efficiency and process control
- Designed and implemented a Mobile application for controlling flow and tracking the parameters like volume, temperature and pH in real-time and store data in cloud for an analysis

PROJECTS

Programmable **Thermal Chamber** for Accelerated Material Testing May 2026 – July 2026

- Designed and built a bench-top programmable thermal chamber capable of maintaining temperatures between 20–80°C for accelerated laboratory testing of polymer degradation and biological samples.
- Developed embedded firmware on an Arduino Nano 33 IoT to monitor temperature using a PT100 RTD with a MAX31865 amplifier and control heating elements through relay-based closed-loop temperature regulation.
- Designed an interactive 2.8-inch TFT touchscreen user interface featuring a real-time temperature dial, adjustable temperature setpoint, heater status, and lighting controls for intuitive operation.
- Integrated dual-channel CCT LED lighting with PWM-controlled brightness and adjustable warm/cool color temperature using MOSFET drivers to provide uniform illumination for imaging experiments.
- Engineered the chamber to support a 4K camera imaging system for continuous monitoring and time-lapse recording of material degradation during long-duration experiments.
- Designed and assembled the complete electrical system, including power distribution, relay switching, MOSFET driver circuits, sensor integration, user controls, and safety features for reliable continuous operation.
- Validated thermal stability through extended testing and implemented software over-temperature protection, heater shutdown logic, and responsive touchscreen controls to improve operational safety and reliability

Portable **Methane Monitoring System** for Sealed Glass Vials April 2026

- Designed and developed a portable methane gas monitoring system for sealed laboratory glass vials using a Seeed Studio XIAO ESP32C3 microcontroller and SEN0565 methane gas sensor.
- Integrated a I²C OLED display to provide real-time methane concentration readings (PPM) directly on the device.
- Designed a custom 3D-printed vial holder in Fusion 360 that securely houses the glass vial, electronics, and front-facing display for compact laboratory use.
- Engineered the sampling setup to accommodate a rubber butyl stopper, allowing methane samples to be injected into the sealed vial using an air-sampling syringe while maintaining an airtight environment.
- Implemented embedded firmware to acquire methane sensor data, process readings, and continuously update the OLED display with real-time PPM values.
- Optimized the enclosure layout for ease of handling, sensor stability, and repeatable laboratory measurements during anaerobic gas monitoring experiments.
- Combined hardware integration, embedded programming, CAD design, and rapid prototyping into a compact, user-friendly sensing platform for laboratory research applications.

Portable OD600 Measurement Device for Microbial Growth Analysis Feb 2026 - April 2026

- Designed and developed a compact, low-cost OD600 spectrophotometer for measuring bacterial cell density in 19 mm culture tubes, providing an affordable alternative to benchtop laboratory spectrophotometers.
- Integrated a 600 nm LED light source, high-sensitivity digital light sensor, and Arduino Nano 33 IoT to acquire transmitted light intensity and calculate optical density (OD600) in real time.
- Developed embedded firmware implementing the Beer–Lambert law to convert raw light intensity into optical density values, including automatic dark measurement, blank calibration, and sample measurement workflows.
- Improved measurement accuracy by implementing a 4-parameter logistic (4PL) calibration model in Python, converting raw sensor readings into laboratory-grade OD600 values across a wide measurement range.
- Designed an intuitive capacitive TFT touchscreen interface enabling users to perform device warm-up, blank calibration, sample measurement, calibration, and data visualization without external software.
- Created a custom 3D-printed optical enclosure that precisely aligns the LED, sensor, and 19 mm culture tube while minimizing ambient light interference and improving measurement repeatability.
- Developed calibration procedures, supporting Python scripts, and engineering documentation to ensure repeatable device characterization and long-term measurement consistency.
- Combined embedded systems, optics, firmware development, CAD design, rapid prototyping, and calibration techniques into a portable instrument suitable for microbiology and biotechnology laboratory applications.

LOMI Thermal **Control Modification** for Enhanced Composting Performance Jan 2026-Feb 2026

- Modified thermal control system of a commercial LOMI composting unit to decrease its operating temperature from the factory setting to approximately 50°C for enhanced composting performance.

- Engineered a hardware-based solution by connecting precision resistors in parallel with the internal NTC thermistor, altering the controller's temperature feedback without modifying firmware.
- Conducted systematic testing using multiple resistor values (12.2 kΩ–19.3 kΩ) to characterize the relationship between equivalent resistance and thermal response, identifying non-linear controller behavior.
- Logged and analyzed temperature profiles using a DS1922T iButton temperature logger to evaluate peak temperatures, steady-state performance, and thermal overshoot during multiple composting cycles.
- Determined that a 19.3 kΩ parallel resistor achieved a stable operating temperature of approximately 49.6°C, meeting the design objective while minimizing temperature fluctuations.
- Performed PCB-level soldering, electrical measurements, and iterative hardware validation while following electrical and thermal safety procedures throughout the modification process.
- Developed a repeatable testing methodology and generated engineering documentation, including performance characterization, implementation procedure, and recommendations for future optimization toward a 55°C operating target.

GPS and IMU Sensor Fusion for Automotive Dead Reckoning (github.com/athaluri.s/eece5554) Nov 2024- Dec 2024

- Acquired and processed data from GPS and IMU modules mounted on a vehicle through ROS, utilizing self-written device drivers to ensure seamless communication and accurate data retrieval
- Analyzed and calibrated IMU data by applying Allan Variance to characterize noise, correcting hard and soft iron distortions in magnetometer, implementing error compensation techniques for improved heading and velocity estimation in reckoning

Humanoid Robot March 2023 - May 2023

- Engineered a 17 DOF (degree of freedom) humanoid robot, enhancing robotic motion capabilities for advanced interaction and implemented rigid movement mechanics to ensure precise and stable movement
- Integrated Bluetooth and Wi-Fi connectivity for remote control via smartphone and PS2 joystick, offering flexible control options for user interaction

Autonomous Guided Vehicle (AGV) Dec 2022 – March 2023

- Designed and developed a detailed CAD model for an Automated Guided Vehicle (AGV), ensuring precision in the assembly and functionality of all components
- Developed and implemented a power-saving mode for the AGV, reducing power consumption by 12% while maintaining operational performance and reliability
- Optimized the vehicle's energy efficiency by designing innovative power management strategies, which contributed to a more sustainable and cost-effective system for industrial applications

FUMES: Autonomous Gas Leak Detection Robot

- Designed and developed a mobile robotic platform (FUMES) for inspecting oil and gas infrastructure, integrating gas sensors and a thermal imaging camera for remote leak detection
- Engineered the system to remotely identify and isolate hazardous gas leaks, enhancing site safety and reducing the need for high-risk manual inspections in industrial environments
- Utilized a combination of stationary sensors and mobile robot-mounted detectors to create a comprehensive safety monitoring solution for large-scale facilities

NodeMCU-Based Smart Home Automation

- Engineered a smart automation system using a NodeMCU microcontroller and relay modules to remotely control lab appliances
- Developed a mobile application using MIT App Inventor, providing an intuitive interface for users to manage and monitor connected devices
- Designed and implemented a smart lighting system that optimized energy consumption, contributing to improved electricity efficiency in the lab environment

Smart Library RC Car Assistant

- Engineered a Wi-Fi-controlled RC car using a NodeMCU, integrating a barcode scanner to automate book identification within a library setting
- Developed a system to scan book barcodes, process the data, and query a (mock) library database to retrieve the correct shelving location

- Implemented a user-facing display mechanism that clearly indicates the precise shelf and row where the book should be placed, streamlining the sorting process in the hub for better visibility

Raspberry Pi-Based Automated Sample Monitoring System

- Engineered a benchtop automation system using a Raspberry Pi to monitor lab experiments and mimicking processes in a biotech environment
- Developed Python scripts to capture and log data from multiple sensors (temperature, pH), and control actuators (small pumps) for basic process automation
- Designed and 3D-printed custom enclosures and sensor mounts in Fusion 360 to integrate all hardware into a single, compact unit
- Integrated an Arduino as a subordinate processor, handling real-time sensor readings and motor control, which communicated back to the main Python script on the Raspberry Pi

Achievements:

Incubation Center (CIIE) Leadership & Mentorship

- Spearheaded and instructed university-wide workshops on embedded systems based on Arduino, NodeMCU and drone technology as a Core Member of the Incubation Center (CIIE)
- Mentored students in developing hands-on robotics projects, including IR sensor-based line-followers, ultrasonic obstacle-avoiders, and drone stability flight
- Organized and executed a university-level hackathon, challenging participants to build solutions using custom-developed models to evaluate their effectiveness

Industrial Energy Challenge

- Selected to compete in an **All-India Hackathon**, focusing on creating high-impact energy-saving solutions for industrial applications for material handling and transport
- Proposed and designed an optimized material handling system using AGVs, demonstrating how to leverage basic infrastructure in ports to drastically cut electricity waste from inefficient transport