KARTHEEK MUKKAVILLI

Austin, TX | +1 832-752-3951 | kartheek.mukkavilli@gmail.com | U.S. Citizen
linkedin.com/in/kartheek-mukkavilli | github.com/mkskart

Education

University of Texas at Austin — Austin, TX
Bachelor of Engineering in Electrical and Computer Engineering, GPA: 3.95/4.0 — *Expected May 2028*

- **Relevant Coursework:** Embedded Systems, Digital Logic Design, Digital Signal Processing, Software Design and Implementation, Circuit Theory, Discrete Mathematics, Linear Algebra
- Elements of Computing Certificate (CS) | Business Foundations Minor

Technical Skills

- **Languages:** C, C++, Python, Java, JavaScript/TypeScript, SQL, Assembly, Verilog
- **Embedded:** Zephyr RTOS, nRF Connect SDK, LTE-M, LoRa, GNSS, MQTT, TLS, I2C, UART, PWM, RTT/SWD debugging
- **Tools:** KiCad, Saleae Logic, Git, Docker, AWS IoT Core
- **Frameworks:** React, Node.js, Spring Boot, FastAPI, PyTorch, scikit-learn
- **Hardware:** nRF9160, ESP32, Raspberry Pi, Arduino, MPU-6050
- **Certifications:** PCAP (Python Associate), PCEP (Python Entry), Amazon Junior Software Developer

Experience

Human Centered Robotics Laboratory — Austin, TX
Research Assistant, University of Texas at Austin — *Jan 2026 – Present*

- Built a Transformer-based sequence model in PyTorch to map glove telemetry to joint commands for a 16-DOF bionic arm (per-finger and thumb articulation, wrist, and elbow), running inference on an MCU for end-to-end teleoperation.
- Improved per-joint tracking accuracy by tuning the model and motor-control pipeline to correctly identify which joint the operator intended to move and replicate the motion in real time.
- Implemented PID control loops across 16 independent joints with pressure and tension feedback, working toward fine-grained grasp control suitable for fragile-object manipulation.

National Oilwell Varco — Houston, TX
Embedded Systems Intern — *Jun 2025 – Aug 2025*

- Wrote Zephyr RTOS firmware in C for an nRF9160-based IoT monitoring board, replacing a $20K-per-site PLC Modbus master/slave installation with a $250 plug-and-play unit (50 units deployed and field-validated).
- Designed an LTE-M reconnection protocol with graceful shutdown handshakes to prevent carrier-side blocking on power cycles, keeping the cellular link warm and ensuring continuous telemetry uplink to AWS IoT Core.
- Built a LoRa mesh between a parent board and per-machine sensor nodes for site-level data aggregation, with permission-scoped routing so each manager received only their authorized data streams.
- Automated TLS certificate provisioning by flashing AWS-issued certs to all boards in parallel, cutting per-board onboarding from several hours of manual configuration to under a minute.
- Owned the firmware lifecycle from architecture through field deployment, delivering a production prototype on a $5K R&D budget.

J.P. Morgan Chase — Houston, TX
Software Engineering Intern — *Jun 2022 – Jul 2022*

- Built a Spring Boot microservice on Cassandra with dynamic partitioning for time-series analytics, reducing query latency from ∼200ms to ∼50ms on the test dataset.
- Co-developed a React dashboard for metadata visualization, deployed for a 200-engineer internal analytics team. Served as project manager / scrum master coordinating the intern team.

University of Houston — Houston, TX
Computer Science Research Intern — *Jun 2023 – Aug 2023*

- Built Python data-visualization tools to render multi-gigabyte CFD vortex datasets, including a 3D volumetric view of vortex structures, hierarchical tree views, scatterplots for cluster analysis, and time-series line graphs for tracking individual vortices, supporting a graduate research team on coherent-structure extraction; credited on the NSF Multi-scale Coherent Structure Extraction project webpage.

Projects

Autonomous Algorithmic Trading Agent — *Python, PyTorch, Groq API, Flask*

- Built two architectures for autonomous equities trading on paper accounts: a genetic-algorithm system that breeds 50 candidate bots over 50 generations of backtested fitness selection to pick a daily strategy, and an LLM-driven agent using the Groq API to make trade decisions under hard risk rules.

- Backtested GA-selected strategies on 5-minute candles over 12 months of historical data, achieving a 70% win rate across 250 trades; LLM agent live in paper trading at +$160 on an $800 starting balance (∼20% return in under one month).
- Deployed an Isolation Forest module for real-time anomaly detection to halt trading during abnormal volatility, with a Flask dashboard for live position monitoring and signal visualization.

LiteWing Drone *C++, ESP32, FreeRTOS*

- Wrote a C++ flight controller on ESP32 running a 1.0ms PID attitude loop, **measured at 45μs of jitter using GPIO toggling captured on a Saleae logic analyzer**.
- Implemented an I2C sensor pipeline reading the MPU-6050 IMU and driving four motors via 400Hz PWM, achieving stable hover within ±2.5° attitude error over 60-second flight tests.
- Built a custom ESP-NOW telemetry layer for low-overhead controller-to-drone communication.

J.A.R.V.I.S. — Personal AI Assistant *Python, FastAPI, RAG*

- Built a voice-controlled assistant with a Retrieval-Augmented Generation pipeline over personal context for task memory, with a modular command engine routing voice intents to API actions and smart-home controls.
- Integrated YouTube Music, Google Calendar, and Google Smart Device Management APIs for cross-device control across macOS, iOS, and Linux.

Smart Scheduler *Python, SQLAlchemy, React, TypeScript, Docker*

- Built a RESTful Python/SQLAlchemy backend with a scheduling engine validated by 120+ Pytest unit tests, integrated with Google OAuth 2.0 in a Docker Compose microservice stack.
- Built a type-safe React + TypeScript frontend implementing the scheduling UI.

Obstacle Avoidance Robot *Arduino, Raspberry Pi, C++*

- Built an autonomous navigation stack on a hybrid Arduino/Raspberry Pi platform fusing time-of-flight and ultrasonic sensors, with checksum-validated packet delivery between the two boards.
- Implemented Dijkstra-based pathfinding tested on a custom wood-plank obstacle course on tile, demonstrating reliable obstacle avoidance and replanning in a controlled indoor environment.

Leadership and Awards

- **UT IEEE Robotics and Automation Society:** Engineering autonomous systems for regional robotics competitions
- **TSA Co-Founder:** Coached 20+ members to Nationals 3× in App Development and Drone Design
- 4× Gold PVSA Medalist | SAMPADA Violin Certified | ABRSM Violin Grade 5