

Usairam Abdullah

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EDUCATION

University of Cambridge, Pembroke College

Oct '24 – Jun '28

Master of Engineering (MEng), General Engineering

Coursework includes electronics, mechanics, linear systems, structures, electrical engineering, thermodynamics, materials, and mathematics.

Bishop Vesey's Grammar School

Sep '17 – Jul '24

A levels: Mathematics A* | Further Mathematics A* | Physics A* | Chemistry A | BIO Award-winning EPQ: AI in Healthcare

GCSEs: nine grade 9s and an A in OCR FSMQ

EXPERIENCE

Control Engineering Intern

4SB Mobility | Internship | On-site

Dec '25 – Jan '26

Embedded systems, Python, C++, communication protocols, microcontrollers

- Supported development of an autonomous EV battery-swapping robot, contributing to its progression from TRL 5 to TRL 6. Built a real-time sensor pipeline on Raspberry Pi Pico using I²C with 9 Hall-effect sensors and serial diagnostics.
- Integrated CAN bus motor control via SPI, enabling reliable actuator coordination.
- Developed Python-based debugging and data-analysis tools (Matplotlib) to visualise sensor behaviour.
- Optimised embedded firmware for low latency, reduced noise, and stable multi-protocol communication.
- Connected the Pico to a Raspberry Pi 5 for higher-level system control and coordination.

Research Associate

Point Cloud Collection and Manipulation | Research Project | On-site

Dec '24 – Jan '25

C++, Revopoint SDK, PCL

- Configured a Revopoint MINI camera and captured point clouds of small tabletop objects from a bird's-eye view.
- Used PCL to process the generated point clouds, removing the underlying table surface and cleaning object edges to isolate each object.

PROJECTS

Mars Lander Simulation (C++ Full-Stack Project)

Jul '25

C++, OpenGL, Control Systems, Physics Simulation, Numerical Methods, Terrain Generation

- Built an award-winning full-stack C++ simulation of a Mars Lander mission, implementing control logic for fuel-efficient landings under varied orbital and descent conditions.
- Designed and tuned a custom autopilot system capable of handling five descent scenarios, using fundamental control-system principles for thrust optimisation and stability.
- Extended the simulation with a procedural terrain generator using randomised spherical height maps, enabling real-time terrain-aware altitude estimation and landing-site evaluation.

OpenGL-Based Real-Time Rendering Engine

Aug '25

C++, OpenGL, GLSL, Linear Algebra, GPU Rendering Pipeline

- Designed and implemented a modular real-time rendering engine using C++ and modern OpenGL, supporting textured 3D mesh rendering, interactive camera controls, and basic lighting.
- Developed GLSL vertex and fragment shaders and implemented the OpenGL pipeline using VAOs/VBOs, applying matrix-based linear algebra for transformations.

Integrated Design Project — Miniature Delivery AGV

Oct '25

MicroPython, Raspberry Pi Pico, IR Sensors, QR-Code Scanner, Embedded Control Systems, Project Management (Gantt)

- Designed, built, and tested a physical AGV using a Raspberry Pi Pico, implementing embedded control logic in MicroPython and integrating IR and QR sensors for navigation.
- Coordinated team delivery using Gantt planning and stand-ups, and validated system reliability through end-to-end integration and verification testing across hardware and software subsystems.

Personal Server Storage System (Self-Hosted Infrastructure Project)

Jul '24

Linux Systems, Python Automation, Docker, Networking, TrueNAS

- Deployed a Linux-based home server for secure data storage and remote retrieval, accessible remotely through a custom domain (storage.usairam.co.uk) using Cloudflare Tunnel.
- Containerised services using Docker, enabling modular deployment and easy maintenance of on-premises applications.
- Implemented Python scripts to interface with the Ring IP Camera API, streaming video feeds over the local network and automatically saving recordings to shared storage.

Image Classification Using a CNN

Sep '23

Python, TensorFlow, Self-labelled Dataset, Machine Learning, CNN

- Participated in a robotics summer school at the University of Southampton and extended the experience through a hands-on computer vision project.
- Developed and iteratively refined a CNN classifier to identify cans on a track using a custom self-labelled image dataset, achieving 75% validation accuracy through data augmentation and model tuning.