

Riley S. Lewis

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Education

University of Southampton – Master of Engineering (MEng), Mechatronics Engineering
First Class Honours

June 2025

Projects

Wireless Magnetically Driven Electronic Capsule Robot (Python, MATLAB, ROS, URX, COMSOL, scikit-learn)

- Achieved $1\text{cm} \pm 0.3\text{cm}$ precision for magnetic capsule manipulation through GI phantom by developing Python control system with inverse kinematics and coordinate transformations
- Implemented FEA-validated motion planning to prevent magnetic interference between UR10e actuator and localization Hall effect sensor array, maintaining actuation force while protecting sensors from damage
- Built complete robotic control system as sole controls engineer in 6-person team, integrating UR10e kinematics with localization feedback API for closed-loop capsule navigation

Autonomous Forest Rover (C++, LTspice, Signal Processing)

- Built DIY LIDAR using time-of-flight sensor and servo motors for £17, creating distance point cloud mapping for obstacle detection in forest environments
- Implemented closed-loop PI controller in C++ fusing DIY LIDAR and IMU data for real-time navigation and path following through unstructured terrain
- Validated rover performance through systematic field testing in 3 forest environments as technical lead of 5-person team, debugging sensor interference and control parameters

PPG Blood Pressure Monitoring System with Deep Learning (C++, Python, SciPy, TensorFlow, EAGLE)

- Designed a £4 PPG biosensor PCB with high signal quality using Autodesk Eagle, adopted by a research team for replacing £100+ dev kits
- Developed CNN-LSTM models with designed features, achieving ± 7 mmHg BP estimation and 90% signal quality classification
- Reduced artifact-heavy hospital PPG with Chebyshev-II and Savitzky-Golay filtering for feature extraction

Experience

System Engineer IndustryApps – Remote, Singapore

June 2024 – August 2024

- Developed digital twins for precise robot control and predictive maintenance
- Integrated MQTT, OPC UA, APIs for real-time robot data transmission
- Authored integration documentation, reducing customer onboarding time by 60% according to analytics

Integration Engineer IndustryApps – Remote, Singapore

July 2022 – February 2023

- Developed Python notification system for robotic manufacturing using Redis Streams, MQTT, and APIs
- Created demos and supported customers in integrating robotic systems with digital twins
- Authored developer documentation for digital twin platform, streamlining robotics integration

Full Stack Developer Freelance – Remote

October 2019 – July 2022

- Developed a SaaS platform for a restaurant chain, centralising menus, orders and inventory in one backend
- Built responsive Nuxt websites for small businesses, improved mobile load times and search visibility
- Created PostgreSQL-backed Flask/FastAPI micro-services that feed live analytics into client dashboards

Skills

Languages Python, C, C++, SQL, JavaScript

Tools MATLAB, Simulink, ROS, COMSOL, LTspice, EAGLE, PostgreSQL, Redis, Docker, Git, Flask, FaskAPI