# **Rik Williamson**

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July 2024 - Present

#### Experience

Embedded Software Engineer, Lotus Cars – Hethel, Norfolk

- Developed and maintained MISRA-compliant ECU software in C for high-end performance vehicles, meeting stringent safety requirements and optimizing code reliability
- Improved wheel speed sensor signal processing drivers, leveraging external microprocessor package modules and raw TTL signal processing to reduce traction control latency by 50%
- Led cross-disciplinary collaboration (SW & Calibration) to architect and validate OBD-II diagnostics for a twin-turbo V8 + hybrid system—achieving regulatory compliance within 3-month schedule.
- Created and maintained Python-based automation and analysis tools to enhance calibration workflows, support software engineers, and improve overall software quality

Machine Learning Intern, Aegis Engineering Systems – Derby June 2024 – July 2024

- Recruited to conduct a short-term generative-AI research project following a Hackathon hosted by Aegis at the University of Sheffield
- Built a prototype multi-agent LLM pipeline, along with a research report detailing a bespoke output quality evaluation framework and recommendations for company-wide system rollout

#### Skills

Languages: C, Python, C++, MATLAB, Java, Go Automotive Tools: CANalyzer, Vector CANape, Vector CANoe, ECT, INCA, MATLAB Simulink Design Tools: Fusion 360, KiCad, SolidWorks, OnShape Simulation and Analysis: Ansys Fluent, Ansys Mechanical, XFoil

### Education

<b>University of Sheffield</b> – Master of General Engineering (Mechanical)	1st Class	July 2024
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- Studied Mechanical, Electrical, Systems & Control, Civil, Software and Aerospace engineering, providing a foundation for cross-functional collaboration and holistic problem-solving
- Combined breadth with a mechanical engineering specialisation (Years 3 & 4), developing strong technical skills for in-depth problem-solving while retaining the flexibility to pursue interests across diverse engineering fields.

City of Norwich School – A-Levels: AAAB - Maths, Physics, EPQ, Chemistry

June 2019

#### Projects

# Manufacturing Process Control and Optimisation with Reinforcement Machine Learning Oct 2023 - Sep 2024

- Developed a Deep Learning Neural Network to model a multi-variable slot-die manufacturing process and applied Reinforcement Learning for control and optimisation
- Developed proficiency with time-series LSTM Neural Network models, practically applying them to create a simulation environment for a Reinforcement Learning controller
- Gained experience training neural networks with realistic experimental data, whilst avoiding over-fitting

### Design and prototyping of Fighting Robot to Compete in a National Tournament June 2023 – Sep 2024

• Designed a high torque, high resolution robot drive system using BLDC motors and belt-driven gear reduction with CAD, whilst balancing strict packing constraints with ease of disassembly

- Developed custom performance test rigs and procedures for stall torque and velocity reversal to fine-tune electronic speed controller programming and evaluate situation specific performance
- Created a professional engineering report detailing overall robot design, legal and standardisation concerns, quality management procedures as well as marketing and sustainability considerations
- Led group meetings, delegating tasks to group members while setting up frameworks for effective collaboration by avoiding duplicate work through time-efficient, focused meetings

# Custom-PCB for embedded system Habit Reminder device

- Independently designed and prototyped a custom PCB based on the ESP32 microprocessor module alongside studies, applying electronic design fundamentals to reduce noise and ensure device stability
- Researched and selected optimal components using datasheets; balancing cost, availability and performance while improving proficiency reading technical documentation
- Created and debugged firmware in C using JTAG and FreeRTOS, leveraging low-power modes and interrupt handling, with robust unit testing and continuous integration to ensure reliability and maintainability in resource-constrained environments
- Implemented functionality including external ToDoist API consumption, an NTP client, onboard webserver, OLED display over I2C, NeoPixel LED control, and physical user input

# Non-Linear FEA Model for new and aged Engine Mounts

- Created a non-linear FEA model for a multi-material elastomer-hydraulic engine mount, incorporating a novel strategy to account for geometric changes due to aging, resulting in improved accuracy
- Validated results against experimental data, critically analysing discrepancies and limitations in both FEA and experimental techniques
- Proposed design recommendations based on results, taking into account manufacturing and budgetary constraints, as well as the impact of material aging on performance

# Autonomous MAV Aerofoil Specification and Optimisation

- Proposed an optimal aerofoil profile and aspect ratio for an electric MAV, meeting design requirements (speed, mass, wing area) through XFoil simulations and analytical validation
- Evaluated trade-offs between lift, drag, stability and maneuverability, selecting NACA profiles to achieve application specific performance goals
- Considered manufacturing constraints associated with thin and long low-drag aerofoils, researching wing spar manufacturing methods and similarly scaled air craft wing spans to determine feasibility

# **Backwards Step Numerical Simulation CFD analysis**

- Built a CFD model to accurately represent the backwards facing step experiment, choosing an appropriate turbulence model through consideration of accuracy given specific flow dynamics
- Justified use of pressure-based solver and the Coupled algorithm through consideration of simplifications to terms in the Reynolds Averaged Navier Stokes equation and computational limitations
- Developed a MATLAB program to parse raw experimental data and produce all required figures, allowing for rapid model development without figure re-formatting and insertion

# Hobbies

Cycling: Competed in Downhill Mountain biking, commute by bike and explore with a Gravel bike **Climbing:** Competed in Bouldering, placing 1st in several regional competitions. Continue to climb recreationally indoors and outdoors with frequent trips to the peak district to boulder HomeLab: Maintain a local network, with a type-1 hypervisor virtualising multiple linux servers, a docker host, and a network file share

FPV Drones: Learned to Build, fly and maintain various form-factor first person view (FPV) drones, learning PID tuning, BLDC motor drive optimisation and battery specification depending on motor load

Nov 2022

Nov 2023

#### Nov 2023 - Present

May 2023