Rik Williamson

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Experience

Embedded Software Engineer, Lotus Cars — Hethel, Norfolk July 2024 – Present

- Developed and maintained MISRA-compliant ECU software in C for high-end performance vehicles, meeting stringent safety requirements and optimising 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 a short time-frame.
- Created and maintained Python and Rust 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, Rust, 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

University of Sheffield — Master of General Engineering (Mechanical) 1st Class July 2024

- Studied Mechanical, Aerospace, Electrical, Systems & Control, Civil, Software engineering, providing a foundation for cross-functional collaboration and holistic problem-solving
- Combined breadth of exposure, 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 Nov 2023 – Present

- 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 Nov 2023

- 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 Nov 2022

- 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 May 2023

- 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