Rik Williamson

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Education

University of Sheffield — Master of General Engineering (Mech)   Predicted: First   July 2024

- Studied all major Engineering disciplines in Years 1 and 2, including Electrical, Civil, Mechanical, Process and Chemical, allowing for integration with any of the main degree courses in years 3 and 4
- Developed Interdisciplinary knowledge, allowing for more efficient collaboration with all engineering disciplines, and giving a wider appreciation for contribution of all disciplines in the success of a project

City of Norwich School — A-Levels: AAAB - Maths, Physics, EPQ, Chemistry   June 2019

Projects

Thin-film Process Control and Optimisation with Reinforcement Machine Learning   Oct 2023 – Present

- Developed a Deep Learning Neural Network to model a slot-die thin-film manufacturing process and applied Reinforcement Learning for control and optimisation

Design and prototyping of Fighting Robot to Compete in a National Tournament   June 2023

- Designed a high torque, high resolution robot drive system using BLDC motors and belt driven gear reduction, whilst remaining within strict packing constraints and ensuring ease of disassembly
- Designed custom performance testing setups for stall torque and velocity reversal to fine-tune ESC programming, ensure component suitability and evaluate situation specific performance
- Created a report detailing overall robot design, legal and standardisation concerns, data management, quality management, marketing and sustainability
- Led group meetings, delegating tasks to sub-group members whilst setting up frameworks for effective collaboration and avoiding duplicate work through time-efficient, focused meetings

Open-source hardware Habit Reminder   Nov 2023 – Present

- Independently developed custom PCB using KiCad based on a bare ESP32 C3 module alongside studies
- Specified components using data sheet attributes, taking into account availability, cost and performance
- Created firmware in C++ using Object Oriented Programming; integrating external ToDoist APIs, an NTP Client, Webserver, OLED display, NeoPixel LEDs 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
- Developed mesh refinement studies to determine most computationally efficient areas of geometry to refine whilst retaining sufficient model accuracy
- Validated results against experimental DIC, discussing reasons for discrepancies and limitations of FEA models as well as experimental uncertainty arising from Imaging techniques
- Proposed design recommendations based on results, taking into account manufacturing and budgetary constraints, as well as changing material properties due to age

Autonomous MAV Aerofoil Specification and Optimisation   Nov 2022

- Proposed an optimal aerofoil profile and aspect ratio for an electric Autonomous MAV, given a design specification detailing speed, mass and wing area using XFoil and verifying with analytical techniques
- Compared Lift and Drag with Angle of Attack for varying NACA profiles and made recommendations balancing conflicting requirements for stability, maneuverability and aircraft range
- 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 through raw experimental data and produce all required figures, allowing for rapid model development without figure re-formatting and insertion

Experience

Web Development Intern, Rent4Sure − Norwich   July 2016
- Developed and published a News section for the main production site with PHP and SQL without prior knowledge of either language, solving problems through research of language fundamentals
- Worked effectively in a team, taking into account requirements of designers, management and marketers

Sales Assistant, Evans Cycles − Norwich   Sep 2017 – April 2019
- Advised customers on the purchase of high-end road and mountain bikes tailored to individual use cases
- Developed efficient communication skills, approaching customers and developing rapport quickly

Skills

Design Tools: Fusion 360, KiCad
Simulation and Analysis: Ansys Fluent, Ansys Mechanical, XFoil
Languages: Python, C++, MATLAB, Java, PHP, SQL

Hobbies/Interests

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: Built, flew and crashed various form factor FPV drones, learning PID tuning, BLDC motor drive optimisation and battery specification depending on thrust requirements