William Powell

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EDUCATION

Imperial College London *October 2023 - Present*

Applied Machine Learning MSc

- Modules taken as present: Machine Learning, Self-Organising Multi-Agent Systems, Topics in Large Dimensional Data Processing, Digital Image Processing, Laboratory in Applied Machine Learning, Topics in Control Systems, Deep Learning, Advanced Deep Learning, Computer Vision and Pattern Recognition.
- Final Year Project: Closed Loop Brain Stimulation with Stress Detection using Reinforcement Learning.

University of Bath

Integrated Mechanical and Electrical Engineering BEng (Hons) *September 2019 – June 2023*

- First Class Honours with 75% overall. Transcript available here.
- Final Year Project: Design and Implementation of a Single-Lead Chest Strap ECG Recorder for Stress Classification using Lightweight Machine Learning Methods. Available here.

Sevenoaks School

International Baccalaureate Diploma *August 2012 – May 2019*

- HL Maths, HL Physics, HL Biology, SL Russian, SL Psychology, SL English.

WORK EXPERIENCE

Product Development Contractor at BrainPatch, Neural Interface Company *January 2021 – Present*

- Assembled and tested a prototype PCB that will be used for vestibular stimulation.
- Designed a wireless EEG/ECG recording device. Wrote firmware in C++ to remotely record and stream data to a server and web-app written in HTML with a Python and JS back-end.
- Developed the electronics and PCB for the device.
- Applied Supervised Machine Learning to detect stress using the device.

Software Engineer Intern at AB Dynamics *September 2021 – August 2022*

- Embedded lead for a new MISRA compliant product using CAN and writing drivers, in C++, for the various peripherals of the STM32 microcontroller.
- Identified the vast potential for using vestibular stimulation on the static driving simulator that could emulate dynamic motion.
- Integrated BrainPatch's stimulator device with the physics of the driving simulator to create the sensation of rotational forces (roll, pitch, yaw). Worked closely with the embedded team, writing C++ for both the stimulator's firmware and the server software.
- This research project is still being investigated at AB Dynamics in collaboration with BrainPatch.

Founder and CEO of PhoneCave (phonecave.co.uk**)** *November 2019 – September 2020*

- Frustrated with my friends' (and my own) obsession with smartphones, I created a start-up, PhoneCave, that aims to get people off their phones.
- Greatly improved my programming, CAD skills, electronics, and PCB design. 3d printing manufacturing, web design and marketing.
- Shipped PhoneCaves to over 10 countries worldwide, held a promotional campaign on Kickstarter and seeked investors. This start-up is on hold, as it requires significant funding for injection moulding.

ENGINEERING PROJECTS

COVID Volunteering - 3d printing PPE for National Health Service

- Collaborated in a 3d printing community to print PPE for NHS staff in our region, where an immediate production of face shields was required in April and May 2020.
- Worked in the slicer team whereby we managed to reduce the print time from 4 hours to 1, by experimenting with slicing variables until the time was minimised.
- An estimated 20,000 additional face shields were created due to our optimisation.

Design of a Self-Organising Multi-Agent System Code Available Here

- Collaborated with over 40 students to co-lead the infrastructure team, where our focus was on designing an environment in Go for a Self-Organizing Multi-Agent system to operate within.
- Designed the base platform architecture, and lead others to contribute onto the platform and implement agents.
- The codebase exceeded 19 thousand lines, demonstrating its robustness and capability to facilitate experiments and yield valuable findings.

Performance and Optimisation of a Closed Loop Fan Controller Code Available Here / Design Doc Available Here

- Built a fan controller controlled through both PID and LQR control methods.
- Utilised the artifact of coil whine to play music through the fan, using an SD card to read music and data log the fan speed, particularly useful for PID tuning.
- Designed for the STM32, using MBED-OS and its RTOS to run tasks concurrently.

Modelling the Thickness of Heat Resistant Tiles During Atmospheric Re-Entry Technical Report Available Here

- Calculating the minimum tile thickness of a heat resistant tile during re-entry to earth's atmosphere.
- Grew mathematical skills by investigating numerical approximation methods derived from Partial Differential Equations.
- Modelling and GUI written in MATLAB.

Programming a Chess Engine with Artificial Intelligence Code Available Here

- Decided to combine my love for chess and programme a chess game environment and engine.
- Implemented Minimax Recursion, Negamax and Alpha Beta Pruning, with variable search depth.
- Optimised using transposition tables through Zobrist hashing and move prioritisations algorithms.

ADDITIONAL SKILLS

Languages: English (native), Russian (B1), French (B1)

Programming languages: C, C++, Python, Go, MATLAB, Julia, JS, ReactJS, Bash, System Verilog (HDL), VBA

Computer Skills: Git, Linux, Docker, PCB Design (Altium, Eagle), CAD (Autodesk Inventor, Solidworks, NX, Fusion 360), Circuit Simulation (Orcad PSpice, LTSpice), Multiphysics Simulation (Simulink, Comsol, ModelSim)

ACTIVITIES AND INTERESTS

- Neural interfaces – from restoration of spinal cord diseases, treating neurodegeneration or cognitive enhancement, the potential of BCI's have intrigued me.
- Triathlon – represent Bath University at BUCS level, ran 2 marathons, several half marathons, competed in an olympic distance triathlon and aim to complete an Iron Man.
- Skiing – skied with French locals for 5 years, achieved 'Or' in GSs, and freeride skiing with Thibuad Duchosal.
- Sailing – helmed at RS Feva Nationals, Assistant Dinghy Instructor, Flotilla Lead Boat Crew, RYA Day Skipper.
- Completed Bronze, Silver and Gold DofE, 2 Marines and 2 Army cadet camps.
- Other interests include golf, chess, photography, investing, and philosophy, particularly Stoicism and Existentialism.