William Powell

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EDUCATION

University of Bath

Integrated Mechanical and Electrical Engineering MEng (Hons) *Course commenced: September 2019*

- Currently on a 1st, or GPA 4.0 equivalent, with 85% in Mathematics, 77% in Solid Mechanics, 85% in Digital Electronics, 75% Robotics Design, 73% in Robotics & Mechatronic Systems, 88% in Signals, Systems & Communication, 73% in Electronic Devices & Circuits, 73% in Power Electronics, 73% in Fluid Mechanics, 73% in Modelling Techniques

Sevenoaks School *August 2012 - May2019*

International Baccalaureate Diploma

- 37 points with HL Maths (5), HL Physics (6), HL Biology (6), SL Russian (6), SL Psychology (6), SL Literature and performance (6)
- Extended Essay: How does the Frequency of Photons, and thus Energy, Absorbed by the Solar Cell Influence the Power Output of the Cell? Available here

IGCSE's *June 2017*

- 11 A*'s, including Maths, English, Additional Maths, Russian and French

WORK EXPERIENCE

Intern at BrainPatch, Neural Interface Company *Commenced January 2021*

Working with the CEO of BrainPatch at Central Research Laboratory, I assembled and tested prototype headsets that stimulated the vestibular using wet ECG. Dependent on frequency, duty cycle and current amplitude, this stimulation resulted in a relaxing sensation, control of coordination and motion, digital drunkenness and many other applications. I soldered SMT components onto the prototype PCBs, tested the board by simulating an impedance (resembling the scalp) and diagnosed and fixed the board's inevitable malfunctions. I have suggested to use consigned SMT assembly for mass manufacturing for increased reliability and to replace Arduino with a different microcontroller and BLE module to cut costs. I will be continuing to work at BrainPatch as an intern in prototype design in the upcoming months.

AB Dynamics Summer Internship (Postponed due to COVID-19) *June 2020*

Founder and CEO of PhoneCave (phonecave.co.uk) *Commenced November 2019*

After being frustrated with my friends' (and my own) obsession with smartphones, I created a start-up company, PhoneCave, that aims to get people off their phones. I wanted to design a gadget that can be used for social situations, to have conversations without distractions, to improve productivity and mindfulness. PhoneCave is a simple idea - a lock box for your phone, keeping it out of reach for as long as you set it.

I have learnt enormously from starting this business - greatly improving my programming in Arduino, CAD skills, electronics and PCB design, as well as learning completely new skills like 3d printing manufacturing, web design and marketing. PhoneCave has also increased my entrepreneurial grit. There were an enormous amount of problems to overcome, such as finding suppliers to cut costs from £23 to £7.20 per phonecave. Additionally, I condensed the code from 2400 lines to 900. I have learnt invaluable lessons and wiped away the previous naivety of expecting tasks to run smoothly.

Prototype Design Intern at Joseph Joseph *July 2019*

Working with the design team as an intern, designing prototypes for future products for the kitchen design company using CAD (Solidworks) and the workshop to make models. I shadowed Oliver Craig, Senior Product Design Manager, who provided insight into how ideas turn into award winning, commercial kitchen utensils. I learnt how even though they only have a small team, it is still very much possible to grow a brand name and make an impact in the market.

Head of Manufacturing at Workshop Science *January 2017- July 2019*

I worked with Ivan Avanesov, founder of Workshop Science (now VosenTech), in manufacturing VersaSliders (affordable camera sliders) and Microfoggers (wireless and portable smoke machines). We have sold over 800 products, shipping to

over 50 countries with just the two of us. We had manufacturing hell, but optimised the production from 2 hours to half an hour per Microfogger.

The manufacturing involves 3d printing, soldering components into custom PCBs, packaging and shipping. I learnt a great many practical skills as well as understanding how a business is formed from an idea. This work motivated me to start my own start up.

ENGINEERING PROJECTS

Printing Face Shields for the NHS

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

Performance and Optimisation of a PID controlled DC Actuated Levitation System

- Using PID control of an IMU sensor, a dc motor was made to hover parallel to the ground and self-correct its position, programmed in C++ (OOP).
- By creating low and high band pass filters in code, and taking a moving average, I was able to reduce noise from the sensor, thus smoothing out error correction.
- Through PID tuning the speed and accuracy of error correction greatly improved. Using a standardised error triggered by code, allowed for increased repeatability when calibrating.

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. Investigation into numerical approximation methods derived from Partial Differential Equations. Modelling and GUI written in MATLAB. Code available here.

Programming a Chess Engine with Artificial Intelligence Code available here.

- Having learnt python independently, I decided to combine my love for chess and programme a chess engine.
- I have implemented Minimax Recursion, Negamax and Alpha Beta Pruning, with variable search depth.
- I am currently optimising using transposition tables through Zobrist hashing and move prioritisations algorithms.

ADDITIONAL SKILLS

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

Programming languages: Arduino, C, C++, Python, MATLAB and System Verilog (HDL)

Computer Skills: PCB design (Eagle), Autodesk Inventor, Solidworks, Excel, Orcad PSpice, Comsol, Model Sim

ACTIVITIES & INTERESTS

- Neural interface – from restoration of spinal cord diseases, treating neurodegeneration or cognitive enhancement, the potential of BCI's have intrigued me. I have continued to learn C++ and Python, with object orientation, and plan to apply these languages to signal processing projects using OpenBCI's GUI and SDK.
- Artificial Intelligence – in addition to the wonders of machine learning and deep learning, AGI's have truly fascinated me. With the recent release of OpenAI's GPT-3, it is evident that the development of AIs will grow exponentially and result in a flood of exciting new applications. Since the singularity is proving to be imminent, I also believe in the importance of merging with AI through Brain Computer Interfaces.
- Triathlon – represent Bath at BUCS level, ran 2 marathons, competed in an olympic distance triathlon and aim to complete an Iron Man in the future.
- Skiing – skied with French locals for 5 years, achieved 'Or' in GSs, and freeride skiing with Thibuad Duchosal
- Sailing – Competed at RS Feva Nationals
- Completed Bronze, Silver and Gold DofE, 2 Marines and 2 Army cadet camps
- Other interests: golf, chess, investing, existentialism and philosophy.