

# Ben Hull

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A results-driven Software Developer and Security Consultant with expertise in machine learning, API development, and cybersecurity. Combines strong development experience in Python with deep expertise in transformer architectures and neural networks. A published researcher with experience implementing robust machine learning solutions, from financial fraud detection to large language model security. Brings a unique analytical perspective from a Mathematics and Physics background, with a proven ability to transform complex theoretical concepts into practical solutions.

## Education and Qualifications

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### 2017 – 2022 Mathematics and Physics, Durham University, MSci 1st Class

- I have developed a rigorous, systematic approach to solving problems through detailed analysis of demanding and intellectually stimulating subject matter.
- Using Mathematics, I can model the behaviour and evolution of complex physical phenomena.

### Publications

- *Using residual heat maps to visualise Benford's multi-digit law*, Benjamin Hull et al 2022 *Eur. J. Phys.* 43 015803, <https://doi.org/10.1088/1361-6404/ac3671>: Analysed house price data to determine tax reduction strategies in response to different tax bracket thresholds.

### Professional Qualifications

- June 2023 Crest Registered Penetration Tester (CRT)
- January 2022 Microsoft Azure Administrative Associate
- March 2020 Offensive Security Certified Professional (OSCP)

## Employment and Experience

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### June 2024 – Onwards, API Developer, CrowdComms

A backend developer specialising in Python web frameworks and API development. Developing and maintaining robust, scalable API solutions while managing multiple projects independently. Experienced in creating third-party integrations with the company's platform:

- Developed and maintained REST APIs using Django and FastAPI, ensuring the implementations were robust and efficient.
- Designed and implemented a Zapier integration with our public API, expanding the platform's connectivity and driving adoption of the company's product.
- Managed project work independently and consistently delivered effective solutions within the specified timelines and requirements.

### June 2021 – June 2024, Associate Security Consultant, WithSecure (formerly F-Secure)

An Associate Security Consultant with experience and expertise in delivering a wide range of security consulting projects across Web Applications, Infrastructure, and Mainframes. I have developed excellent written verbal communication skills which allows me to effectively engage with clients to meet their needs. During the role I have:

- Expanded my knowledge of penetration testing and consulting, particularly in the areas of Mainframe and Network security.
- Worked with a wider range of clients on challenging and diverse projects to meet their security needs.
- Conducted specialised research into novel attack detection techniques using machine learning with Pytorch, Mainframe security auditing tool development in Python, data analysis and visualisation techniques, and developed automated vulnerability reporting frameworks in Python.

## Relevant Projects and Publications

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My research demonstrates my expertise across machine and deep learning architectures, financial analysis and cyber security. Key areas of focus include transformer-based architectures, fraud detection, machine learning for financial markets and mathematical research. All my research projects are available at <https://bluehood.github.io>.

- **Domain-specific prompt injection detection (WithSecure Labs, April 2024)**: Led research on prompt injection detection in LLMs, developing novel approaches for machine learning-based detection of adversarial prompts using

the BERT architecture - <https://labs.withsecure.com/publications/detecting-prompt-injection-bert-based-classifier>.

- **Financial Fraud Detection Research (2021):** Led a research project at Durham University analysing the application of Benford's law to financial fraud detection, focusing on house price data and SEC filings to develop novel detection methodologies. Analysed the mathematical framework of Benford's law and proved novel results to enable the analysis of smaller constrained datasets.
- **Language Translation Transformer (2024):** Implemented an English-to-French translation model using the Transformer architecture in PyTorch, focusing on creating an accessible implementation of the "Attention is All You Need" paper's concepts.
- **GPT Implementation Research (2024):** Developed a from-scratch implementation of the GPT architecture using PyTorch, demonstrating a deep understanding of transformer architecture and language modelling principles.
- **Investment Strategy Analysis (2024):** Created a machine learning model achieving 68% accuracy in identifying buying and selling conditions for the S&P500 index using technical indicators, with a particular focus on addressing overfitting through systematic optimisation.
- **Network Intrusion Detection System (2024):** Developed neural network-based models for binary classification of network traffic patterns, implementing preprocessing pipelines and hyperparameter optimisation to enhance detection accuracy.

### Additional Interests

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- Competitive chess player who participates in online tournaments.
- As an enthusiastic athlete, I have represented my county in Cricket and Hockey. I also regularly compete in long-distance running races.
- Previously mentored and tutored students from disadvantaged backgrounds in Mathematics and Physics, whilst helping them prepare for University applications.