

# FRASER LOVE

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## EDUCATION

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### University of St Andrews

MSc Artificial Intelligence; Distinction

Modules: Artificial Intelligence Principles, Artificial Intelligence Practice, Machine Learning, Constraint Programming, Signal Processing, Language and Computation, Data-Intensive Systems, Computer Graphics, Object-Oriented Programming.

St. Andrews, UK

September 2023 - Ongoing

### University of St Andrews

BSc (Hons) Mathematics; 2:1

Modules: Topology, Dynamical Systems, Graph Theory, Group Theory, Automata and Complexity, Complex Analysis, Real and Abstract Analysis, Linear and Non-Linear Waves, Rings and Fields, Differential Equations, Linear Mathematics, Multivariate Calculus, Vector Calculus.

St. Andrews, UK

September 2020 - June 2023

## PROFESSIONAL EXPERIENCE

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### Etalia Research

Founder, Director, Full-Stack Developer

London, UK

September 2024 -

- **Developed Full-Stack Architecture and Scalable Infrastructure for Etalia Platform:** Designed and implemented a Next.js web application and Neo4j graph database while deploying a scalable cloud-based infrastructure to handle large-scale academic paper indexing and enable real-time search across millions of documents.
- **Managed All Aspects of Startup Operations:** Handled company formation, financial management, and strategic planning, overseeing legal compliance, and driving product development to align with long-term business goals.

### Defence Science and Technology Laboratory (DSTL) - Ministry of Defence

Mathematician (Intern) - Counter-Terrorism and Security Division

Salisbury, UK

June 2023 - August 2023

- **Researched Neural Network Architectures for Computer Vision:** Performed research into various neural network architectures for computer vision, with an emphasis on object detection. Particularly covering convolution neural networks, spiking neural networks (neuromorphic computing) and transformers.
- **Image Classification and Object Detection:** Worked in Python with the machine learning libraries PyTorch and TensorFlow to implement convolution neural networks for image classification. Used state-of-the-art computer vision models to build an object detection application for military deployment.

### Canon Medical Research Europe

Software Engineer (Intern) - 3D Visualisation Team

Edinburgh, UK

June 2022 - August 2022

- **3D Volume Rendering for Medical Imaging Data:** Implemented Multi-Planar Reconstruction and Shaded Volume Rendering (with Blinn-Phong lighting) algorithms to construct 3D visualisations of medical imaging data. Developed using the new WebGPU JavaScript API to create a graphics pipeline, interface with clients dedicated graphics hardware and run compute shaders for volume rendering.
- **Investigated WebGPU viability for Medical Imaging.:** Considered the advantages of WebGPU over WebGL in aspects like performance, implementation and scalability. Learned WebGPU limitations specific to the current WebGPU specification. Presented findings in a detailed presentation to the entire company.

## ACADEMIC PROJECTS

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**Generative Sequence Models and Introducing GPT- $\alpha$  (MSc Artificial Intelligence Dissertation):** Explores the architectures behind generative sequence models, including RNNs, LSTMs, attention mechanisms, and the Transformer. Furthermore, it introduces GPT- $\alpha$ , a 124-million-parameter, decoder-only model trained on 40 billion tokens, achieving state-of-the-art performance for models of its scale and outperforming GPT-3 125M. (June 2024 - August 2024)

**Chaos in Discrete Dynamical Systems (BSc (Hons) Mathematics Dissertation):** Defining the notion of chaos and a discrete dynamical system. Proving results and analysing different chaotic discrete systems. Detailing how chaos arises from the simplest discrete systems. Covers Sharkovsky's Theorem, Topological Conjugacy, Chaos in the Logistic Map, Devaney Chaos, Bifurcations, Stability in Higher-dimensional Maps, Fractals and Julia Sets. (September 2022 - June 2023)

## HONORS AND AWARDS

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**School of Computer Science Award for MSc in Artificial Intelligence:** Ranked **1st** on the MSc Artificial Intelligence programme, achieving the **highest** overall GPA.

**Christopher Strachey Prize and CS2001/CS2101 Medal:** Ranked **1st** out of 150 students in the core CS2001/CS2101 Foundations of Computation (Accelerated) module, achieving the **highest** overall grade.

**Deans' List:** Awarded placement on the Deans' list for the 2023/24 and 2020/21 academic years for exceptional academic performance at the University of St Andrews.

## SKILLS, ACTIVITIES AND INTERESTS

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**Programming Languages:** C/C++, Python, Java, JavaScript / TypeScript.

**Frameworks/Libraries:** PyTorch, TensorFlow, WebGPU, OpenGL, Node.js, Next.js, Neo4j, Flask, Git.