Ratneshwaran Maheswaran

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LinkedIn Github

Education

University College London (UCL), UK 2024–Present

MSc Artificial Intelligence for Biomedicine and Healthcare

Current Average: Distinction

The University of Nottingham, UK 2021-2024

BEng (Hons) Electronic and Computer Engineering

Grade: 2.1.

Experience

Secrier Lab, UCL Genetics Institute 2025–Present

Computational Genomics Researcher

- Built scalable ML pipeline (PyTorch, scvi-tools, Scanpy) for analysing millions of single-cell RNA-seq datapoints across multiple cancer types.
- Applied and benchmarked foundation models (scBERT, scGPT, Geneformer, LangCell) for classification and state prediction, achieving strong performance on Accuracy, F1, AUROC, and AUPRC.
- Developed novel zero-shot annotation techniques and improved cross-dataset generalisation under batch effects using dimensionality reduction (UMAP).
- Produced actionable insights into data-driven cancer classification, with a reproducible framework and pre-print planned for 2026.

Open-Source Assistive Devices (OPAD), University of Nottingham 2022–2024

President, Faculty of Engineering Society

- Directed 12+ student-led projects developing assistive and medical devices, combining hardware, software, and data pipelines.
- Applied machine learning to optimise device performance and automate data collection, with applications aligned to NHS needs.
- Oversaw technical operations (circuit design, embedded systems, analytics) while coordinating cross-disciplinary student teams.
- Secured £1500 in grant funding to expand development and support community-focused engineering impact.

40seconds.org (Ratneshwaran Foundation) 2020-2022

Founder & CEO (Non-profit)

- Founded global non-profit promoting mental health awareness and human rights among youth.
- Directed 5+ initiatives, 30+ articles, 1 research project, and led 120+ volunteers across 19 countries.
- Raised £2000 for Covid-19 relief; currently sustained by core team during academic commitments.

Research Interests

Efficient Machine Learning, Foundation Models, Natural Language Processing (NLP), Large-Scale Data Analytics, High-Performance Computing

Skills

Programming: Python, SQL, C/C++, MATLAB, Java
Frameworks & Libraries: PyTorch, TensorFlow, scikit-learn, NumPy, Pandas, Matplotlib, Seaborn, Scanpy, LangChain, OpenAI APIs
Tools & Platforms: Git, Docker, FastAPI, PostgreSQL, Node.js, React, LaTeX, CUDA
Hardware & Embedded: STM32, ESP32, Arduino, Raspberry Pi; I^2C/SPI; PID control; ADC & analog circuit design (BJT, MOSFET)

Publications & Open-source Projects

AI Agent for Literature Review (LitAgent)   2025

- LangGraph-driven multi-agent system automating literature reviews across *arXiv* and *PubMed*, with metadata enrichment from Crossref.
- Integrated agents (*SearchAgent*, *SummarizerAgent*, *CriticAgent*, *ComparatorAgent*) enabling structured synthesis, gap analysis, and future work identification.
- Supports multiple output formats including Markdown, JSON, and CSV for paper metadata.
- Provides both CLI and REST API access, alongside a React/Vite/Tailwind frontend for interactive exploration.
- Incorporates user-configurable search filters and accountability checks via CriticAgent to flag overclaims and weak reproducibility.

Enhancing Aspect-Based Sentiment Analysis and Review Reading Comprehension with Adversarial Training and Hierarchical Aggregation in BERT-based Models   2025

- Improved BERT for Aspect Extraction, Sentiment Classification, and Review Comprehension.
- Combined adversarial training with P-SUM/H-SUM, surpassing prior state-of-the-art in domain-specific NLP.
- Demonstrated efficiency of fine-tuned BERT over LLMs for targeted, low-resource tasks.
- Pre-print submission targeted for November 2025.

Zero-Shot Cell Annotation with Foundation Models   2025

- Implemented zero-shot pipelines for single-cell RNA-seq analysis, enabling malignant vs. normal classification and multi-class cell state prediction across ovarian, prostate, kidney, and pancreas cancer datasets.
- Built preprocessing workflows for diverse data formats and integrated evaluation with Accuracy, F1, AUROC, and AUPRC.
- Developed visualization tools (UMAP, performance plots) to assess model generalisation and batch effects.
- **LangCell GitHub | Geneformer GitHub**

AI College Assistance App   2025

- Built an AI-powered counselling platform to support students applying abroad (UK, US, Australia).
- Implemented essay feedback using GPT-4, application timelines, portfolio builder, and AI chatbot for personalised guidance.
- Full-stack development with React (TypeScript), FastAPI (Python), PostgreSQL, Firebase, and OpenAI API.
- Designed scalable architecture with separate frontend, backend, and shared utilities.

Eva - Empathetic AI Assistant   2025

- Developed an AI-driven emotional support app featuring a built-in chatbot designed to help users explore their thoughts, with additional features such as breathing exercises, a crisis helpline, and customizable themes.
- Currently in development, this open-source project aims to provide accessible mental health support.
- **GitHub, App link**

Python Simplified   2020

- Authored a book on Python Programming, distributed over 30,000 copies to uplift underprivileged students.

- **Apple Books:** Click Here, **Python Simplified (Direct Link):** Click here

Honours

- **Vice-Chancellor's Medal (Top 0.1%), University of Nottingham** – Highest award for exceptional contributions as author, philanthropist, and student leader 2024
- **EEE Undergraduate Studies Award, UoN** – Recognised for academic and departmental contributions 2024
- **Nottingham Advantage Awards, UoN** – Student Leader (2024); OPAD & Peer Mentor (2023)
- **Union Prize & Student Representative of the Year, UoN** – Outstanding contributions to student life 2022
- **Top 6 Teen Heroes, India** – Recognised nationally for social impact and philanthropic leadership 2021
- **Speaker Invitations** – Invited speaker at World Summit AI, TEDx, and university conferences on AI and healthcare innovation