Kelvin Simatwo

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Summary

Quantitative PhD Candidate specializing in AI, signal processing and edge computing. Proven experience developing real-time machine learning models on resource-constrained hardware. Seeking to apply a rigorous engineering and research-driven approach to solve complex, real-world problems in data science and AI.

Skills

AI & Signal Processing	Python, MATLAB, PyTorch, Scikit-learn, Transformers (BERT), Wavelet Analysis
Edge Compute & Hardware	Raspberry Pi, Arduino, Real-time Systems, Edge Algorithms
Software Engineering	Git (Version Control), SQL, Jupyter
Core Competencies	Quantitative Research, Algorithm Optimization, Statistical Modeling, Project Management, Problem Solving, Multidisciplinary Collaboration

Education

Jan 2023 - Jun 2026	PhD (AI in Assistive Speech Technologies) | Loughborough University
Oct 2021 - Oct 2022	MSc Data Science | Loughborough University Grade: Distinction
Sep 2018 - Jun 2021	BEng Electrical and Electronic Engineering | The University of Sheffield Grade: First Class Honours

Experience

PhD Researcher | Loughborough University Jan 2023 - present

- Architecting a computationally efficient, real-time breath pattern recognition system for assistive speech, deploying models on resource-constrained hardware (Raspberry Pi).
- Developed and benchmarked high-performance classification models to serve as efficient, real-time alternatives to a slow 1NN-DTW baseline.
- Contrasted two hybrid feature engineering pipelines: a deep learning approach (GoogLeNet on CWT scalograms) and a classical approach combining wavelet and statistical features.
- Optimized core algorithms for low-latency processing, achieving sub-second prediction times to enable genuine real-time communication.
- Supervised and mentored an undergraduate student on the project's hardware track, guiding the development of an STM32-based microphone interface and ensuring its seamless integration with the core prediction algorithms.

Data Science and AI Intern | Turing Internship Network Jan 2024 - Jul 2024

- Developed a semantic similarity metric using BERT embeddings and cosine similarity, providing a more context-aware and accurate alternative to the traditional word error rate metric.
- Researched and validated a suite of non-reference audio quality metrics, delivering a technical recommendation that was adopted by a partner team to benchmark their audio enhancement pipeline.
- Applied unsupervised clustering models to a large corpus of speech files to automatically identify distinct acoustic patterns, delivering actionable insights on data composition and previously unknown subgroups.

Research Intern | Insigneo Institute for in silico Medicine Jun 2021 - Aug 2021

- Engineered a unified control and measurement system for a complex flow phantom by integrating an encoder, Doppler probe, and custom-built laser circuitry into a single workflow, managed by an Arduino-based structure.
- Developed a high-precision laser velocity sensor from scratch, including circuit design and construction, achieving 98% measurement accuracy for complex ring-vortex flows.
- Delivered a complete, user-friendly experimental apparatus by optimizing the MATLAB analysis code, designing and 3D-printing custom casings, and creating a simplified user interface.

Projects & Technical Initiatives

Data Study Group | The Alan Turing Institute May 2023

- Collaborated in a team of 10 doctoral researchers and industry partners from The Environmental Investigation Agency to classify tigers based on their unique stripe patterns.
- Executed exploratory data analysis on a large-scale, imbalanced dataset, recommending synthetic data generation to improve model performance and mitigate classification bias.
- Validated a PyTorch-based machine learning pipeline, comparing model results with and without masking to enhance predictive accuracy.

Microsoft Embrace Hackathon | Loughborough University April 2022

- Won first place in a 2-day competitive hackathon by leading a 4-person team to develop and deploy a cloud-based sentiment analysis application on Microsoft Azure.
- Engineered the tool to perform real-time analysis of Twitter data, later refining the logic to specialize in hate speech detection.

Innovation and Technology | Enactus Sheffield Feb 2019 - Feb 2021

- Served as a technical consultant for multiple student-led project teams, providing support on software implementation and developing technical training materials.
- Designed and published the official Enactus Sheffield website and created sustainability checklists to guide the commercial project portfolio.

Selected Presentations & Publications

[Oral Presentation] Speaking Without Speaking: Fast Communication Through Breath, Three Minute Thesis (3MT) Competition runner-up, Wolfson School, Loughborough University, June 2025.

[Poster Presentation] Simatwo, K., et al. (July 2025). Efficient Breath Pattern Recognition for Real-time Assistive Communication. IEEE EMBC 2025, Copenhagen, Denmark.

Simatwo, K., et al. A Rapidly Retrainable Classifier for Personalisation of Breath-based AAC. *Elsevier BSPC* (Under Review).

Matthews, A.S., Simatwo, K., et al. (2023). Quality Assuring a Ring Vortex Flow Phantom in Real-Time. *Open Journal of Medical Imaging*. DOI: 10.4236/ojmi.2023.131002

Data Study Group Team. (2023). Environmental Investigation Agency (EIA) Identifying Tiger Stripes with Machine Learning. *The Alan Turing Institute*. DOI: 10.5281/zenodo.10033690