Pranav Acharya

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Profile

Accomplished **Nanoelectronic Engineering PhD** and **Masters in Theoretical Physics**, with experience in **quantum transport modelling** and **device physics**. Published **4 first author papers** [1–4] **leveraging Non-Equilibrium Green's Function (NEGF)** to quantify the impact of device variation on **Resonant Tunneling Diodes (RTDs)**. This variation was shown to be able to encode information, hence RTDs can compose **Physical Uncloneable Functions (PUFs)**. Seeking a **Research Scientist** role to apply physics theory in the development of **next-generation quantum and nano-electronic devices**.

Skills

Nanoelectronic Device Modelling

- Modelled impact of device variation on quantum tunnelling based devices (RTDs) using Non-Equilibrium Green's Function (NEGF) formalism [1–6], delivering **4 first-author research projects** [1–4]
- **Diverse modelling expertise**, including **RTDs** [1–6], **nanosheet transistors** [5, 6], and **quantum dots** (for MPhys)

Computational Physics and Programming

- Extended the device variation capability [1–4] of custom **TCAD** software written in **C++**, and utilised **Python** (Numpy, Scipy, Matplotlib) and Matlab for complex numerical analysis and data post-processing
- Collaborated externally to accelerate NEGF simulations with **Diffusion-based ML models** [5]

Research Communication and Engagement

- Communicated research effectively, presenting at **EuroSOI-ULIS 2024** [1] and for his MPhys Masters Project
- Team player with a strong research presence [1–4], who coauthored further peer reviewed research papers [5, 6]

Education

PhD, Nanoelectronic Engineering, **University of Glasgow** 2021-2025

- Simulation of Resonant Tunnelling Diodes with the Non-Equilibrium Green's Function Formalism

MPhys, Theoretical Physics, **First class honours**, **Lancaster University** 2017-2021

- Thesis project: Quantum Monte Carlo simulations of 3D type 2 Quantum Dots

Publications

[1] Pranav Acharya and Vihar Georgiev. "Interface roughness in resonant tunnelling diodes for physically unclonable functions". In: *Solid-State Electronics* (2025), p. 109131. ISSN: 0038-1101. DOI: https://doi.org/10.1016/j.sse.2025.109131.

[2] Pranav Acharya et al. "Analysis of Random Discrete Dopants Embedded Nanowire Resonant Tunnelling Diodes for Generation of Physically Unclonable Functions". In: *IEEE Transactions on Nanotechnology* 23 (2024), pp. 815–821. ISSN: 1941-0085. DOI: http://doi.org/10.1109/TNANO.2024.3504963.

[3] Pranav Acharya et al. "Impact of interface roughness correlation on resonant tunnelling diode variation". In: *Scientific Reports* 15.1 (2025), p. 26815. ISSN: 2045-2322. DOI: https://doi.org/10.1038/s41598-025-07720-0.

[4] Pranav Acharya et al. "Sensitivity of resonant tunneling diodes to barrier variation and quantum well variation: A NEGF study". In: *Micro and Nanostructures* 207 (2025), p. 208264. ISSN: 2773-0123. DOI: https://doi.org/10.1016/j.micrna.2025.208264.

[5] P. Aleksandrov, P. Acharya, and V. Georgiev. "Diffusion-Based Machine Learning Method for Accelerating Quantum Transport Simulations in Nanowire Transistors". In: *2024 International Conference on Simulation of Semiconductor Processes and Devices (SISPAD)*. 2024, pp. 1–4. DOI: https://doi.org/10.1109/SISPAD62626.2024.10733041.

[6] Tongfei Liu et al. "The study of electron mobility on ultra-scaled silicon nanosheet FET". In: *Physica Scripta* 99.7 (2024), p. 075410. ISSN: 1402-4896 0031-8949. DOI: https://dx.doi.org/10.1088/1402-4896/ad56d9.