Nikhil Laxminarayana

+91 8527743909 | ece21136@iiitkalyani.ac.in | Website

n1x | rogue-nix | Scholar

Education

- **Indian Institute of Information Technology, Kalyani** *December 2021 - July 2025*
  B.Tech, Electronics and Communication Engineering Kalyani, IN
  - **CGPA**: 9.45/10.00, till Semester VII.
  - **Department Rank 2**, till Semester VII

- **Apeejay School, NOIDA** *April 2020*
  AISSCE, Class XII NOIDA, IN
  - **Grade**: 95.6%

Experience

- **Summer Research Intern [🌐]** *May 2024 - July 2024*
  IIT Delhi New Delhi, IN
  - Studying secrecy throughput enhancement under channel knowledge and cophasing in a wireless backscatter link, under the supervision of Prof. Shankar Prakriya, Deptt. of Electrical Engineering.

- **Summer Research Intern [🌐]** *May 2023 - July 2023*
  IIT Jodhpur Remote
  - Performed a case-wise characterisation of microscopic traffic flow models, under the supervision of Prof. Ranju Mohan, Deptt. of Civil Engineering.

Projects

- **epsilon: A general purpose low-power RISC-V core** *Under Progress*
  Tools: C++, Verilog, SystemVerilog, AMD Vitis
  - Design of a high performance RISC-V core for edge computing in upcoming IoT use cases. RTL to GDSII flow to be undertaken following the RTL design, following the VLSI design principles.

- **pathfinder: A Universal Switch Set for Legacy Switch Encapsulation** *January 2025*
  Tools: C++, P4, cmake, Shell [🐙]
  - A SDN switch designed to encapsulate a system of interconnected legacy switches to provide ease of upgradation to state-of-art secure transmission over compromised links.

- **A High Transconductance Three Current Mirror MOS OTA Design** *Sep 2024*
  Tools: LTSpice, Analog VLSI Design Principles, Current Mirrors, Differential Pair
  - Design of a single-ended high transconductance operational transconductance amplifier, undertaken as part of the course for the VLSI Engineering course.

- **RFLNA: Optimisations for a low noise RF amplifier design** *March 2024*
  Tools: MATLAB, EasyEDA, ADS 2016 [🐙]
  - Parameter optimisation for low-noise amplifier design using curve fitting and data enrichment, achieving within 80% of the design specification noise temperature.

- **spack: A Simple Pipeline for Audio Classification using KAPRE** *April 2024*
  Tools: Python 3.10, KAPRE, Tensorflow, Scikit-learn [🐙]
  - Developed a pipeline for frequency domain feature extraction for 0.4% better pattern recognition over audio data.

- **QARTIM: A QUantum Resistant TImely Mail Client** *March 2024*
  Tools: Python 3.10, simulaqron, cryptography, cqc [🐙]
  - Developed a library to implement BB84 from scratch, followed by a novel mail encryption policy to implement digital signatures. Achieved 20% of the commercial-scale throughput over a test link.

Research Publications

J=Journal, U=Under Review, I=In Progress, T=Thesis

[J.1] Laxminarayana, Nikhil et al. (2024). **Quantum-Assisted Activation for Supervised Learning in Healthcare-Based Intrusion Detection Systems**. *IEEE Transactions in Artificial Intelligence*, Vol. 5, Issue 3, pp. 977-984. DOI: 10.1109/TAI.2022.3187676

[I.1] Laxminarayana, Nikhil et al. (2024). **Secrecy throughput speedup under CSI knowledge over cooperative cognitive networks**

[I.1] Laxminarayana, Nikhil et al. (2024). **Throughput analysis of Backscatter Systems under CSI knowledge.**

[U.1] Laxminarayana, Nikhil et al. (2023). **Quantum machine learning algorithms for COVID-19 prediction - A comparative analysis.**

Leadership Experience

- **Founding Member** *March 2024 - Present*
  IEEE Student Branch, IIIT Kalyani
  ◦ Oversaw the formation of reading groups in core research areas to boost academic interest on campus.
- **Secretary, StatusCode 0** *July 2023*
  IIIT Kalyani
  ◦ Led the Organising Team to organise the hackathon's inaugral edition.
- **Secretary, S.E.A.L Robotics Club** *November 2022 - November 2023*
  Gymkhana, IIIT Kalyani
  ◦ Built a conducive environment for discussion of relevant technologies not limited to Robotics, but towards building hardware solutions at large.
- **Tech and Management Lead** *August 2022 - July 2023*
  Google Developers Student Club, IIIT Kalyani
  ◦ Helped drive the club's technical operations with a 70% rise in the number of active members, organising the Institute's biggest hackathon, Winter of Code 3.0

Research Interests

- **Signal Processing:** Spectrally Efficient Communication, CSI-assisted Optimisations
- **Machine Learning:** Probabilistic and Statistical Learning, Deep Learning, Natural Language Processing
- **Electronics and Hardware Security:** Secure Micro-architectures, Side-channel analysis, Physically Unclonable Functions, In-memory Computing, ML applications to layout design

Additional Information

- **Honors:** Represented IIIT Kalyani at **SIH 2024 Grand Finals**. Designed a scalable network switch interface for encrypted network payload over legacy network devices.
- **Courses Undertaken:** Linear Algebra, Probability and Statistics, Real and Complex Analysis, Electromagnetic Field Theory, Semiconductor Devices, Wireless Communications, Digital and Analog CMOS VLSI Design, Control Systems, Machine Learning, Deep Learning
- **Languages and Tools:** C, C++, Python, MATLAB, Verilog, SystemVerilog, RISC-V, EDA, MySQL, Flutter, Arduino, Raspberry Pi, Docker, Kubernetes