

Rishi Nandha Vanchinathan

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EDUCATION

Indian Institute of Technology, Madras (IIT Madras)

Jun 2026 (expected)

Integrated Masters (B.Tech + M.Tech) in Electrical Engineering

CGPA: 8.93/10 (As of 23 Nov 2025)

Thesis: CMOS RF Front-End for Wide-band Same-Channel Full-Duplex at 7 GHz

Courses: Devices for AI and Neuromorphic Computing, Digital IC Design, Analog IC Design, RF IC Design

Tools: · Circuit Design: Cadence Virtuoso, EMX, Genus, Innovus

· System Design: Cadence Allegro, OrCAD, Ansys HFSS · Deep Learning: PyTorch, HuggingFace, LangChain

CONFERENCE PRESENTATIONS & CHIP TAPE-OUTS

- [1] "Wide-band Full-Duplex Transceiver at 7 GHz in CMOS 65nm" – expected MPW submission for tape-out in Early Feb 2026 (Dec. 2024 - ongoing)
- [2] "Multi-channel TeraHertz System", exhibited at *Indian Mobile Congress (IMC) 2024*, New Delhi, India, Oct. 2024.

RESEARCH EXPERIENCE

Wide-Band Same-Channel Full-Duplex Transceiver Chip at 7GHz

Dec 2024 - Ongoing

Supervisor: Prof. Sankaran Aniruddhan

ICS Group, IIT Madras

- Demonstrating single-antenna full-duplex at 7 GHz with 300 MHz (single-sided) bandwidth by extending the approach of Kumar et al. (TCAS-I, Oct-2018), originally reported at 2.4 GHz with 10 MHz bandwidth.
- Responsible for complete design flow including schematic, layout, synthesis, place-and-route and testing
- Designing a network to mimic an antenna's spiral Z-smith profile; projected wideband isolation of 42 dB

High Speed Clock Distribution Boards for 5G-NR & 6G Research

May 2023 – Nov 2024

Supervisor: Prof. Radha Krishna Ganti

5G Testbed, IIT Madras

- Contributed as the RF clock boards designer for supporting 5G/6G research activities in the lab
- Designed multi-PLL clock trees for physical-layer data protocols in the group's 5G-NR and 5G+ RRHs
- Designed and assembled an RF board to provide reference clocks for TeraHertz Systems; supplied clocks at 100s of MHz for the lab's demonstration of a 270 GHz P2P Wireless Link at Indian Mobile Congress 2024.

TEACHING EXPERIENCE

Teaching Assistant: Devices for AI & Neuromorphic Computing

Aug - Nov 2025

EE6347 Course Instructor: Prof. Bhawar Chakrabarti

IIT Madras

- Delivered supplementary lectures on designing and simulating silicon neurons such as the Adaptive Low-Power Integrate-and-Fire (Indiveri, 2003) and the Tau Cell Neuron (van Schaik et al., 2010).
- Conducted tutorials on compact modeling and simulation of FeFET, RRAM, and FeCAP devices
- Demonstrated simulation of synapses made of 1T-1R cells and DenRAM (Payvand et al., 2024) cells.

TECHNICAL PROJECTS

Quantization-aware Neural Network for Inference with Passive RRAM Synaptic Array

Aug - Oct 2024

EE6347 Course Instructor: Prof. Bhawar Chakrabarti

IIT Madras

- Extended the course project on using passive RRAM arrays for inference of a neural network, by replacing the post-training quantization with training a quantization-aware neural network using sigmoid weights

Physical Design Automation of a VLSI Delta-Sigma ADC in CMOS 180nm

Nov - Dec 2025

Inter IIT Tech 2025, Problem Statement promoted by ISRO (Indian Space Research Organisation)

IIT Madras

- Synthesis, Place-and-Route and Static Time Analysis of a Decimator for an 20-bit ADC sampling at 1 Msps

- Design of a Noise Transfer Function for an single-bit quantizer with a continuous-time delta-sigma loop

8-Bit Carry-Save Multiplier With Pipelining in CMOS 22nm

EE5311 Course Instructor: Prof. Janakiraman Viraraghavan

Sep - Nov 2023

IIT Madras

- Designed custom transistor-level layout for a multiplier operating at 2.8 GHz with 0.32 ns critical delay
- Implemented pipelining using C2MOS D flip-flops, improving maximum frequency by 67%

Fully Differential OpAmp with Common-Mode Feedback in CMOS 130nm

EE5320 Course Instructor: Prof. Nagendra Krishnapura

Feb - Apr 2024

IIT Madras

- Designed a 2-stage Miller op-amp in 130nm CMOS with a phase margin of 72 degrees
- Designed a common-mode feedback with 14 MHz bandwidth and 80 degrees phase margin

Retrieval-Augmented Chatbot Assistant with a Locally Hosted LLM

AI Club, Centre For Innovation (Student-Run Innovation Centre, IIT Madras)

Nov - Dec 2024

IIT Madras

- Built a QA assistant bot that retrieves context through semantic search with BERT embeddings
- Utilized a zero-shot classification of user task, KV token caching and generation with a local T5 LLM

AWARDS, HONOURS & FUNDING

Research supported by Ministry of Electronics & IT (MeitY), India

Master's Thesis tapeout, supervised by Prof. Sankaran Aniruddhan (PI).

Fall 2025

Lab Group supported by Department of Telecommunications (DoT), India

Undergraduate research at the IITM 5G Testbed, supervised by Prof. Radha Krishna Ganti (PI).

Fall 2024

Institute Day Certificate of Merit, IIT Madras

Awarded for securing All India Rank 332 in IIT-JEE Advanced 2021.

Apr 2022

Gold Medal, Online Physics Olympiad (OPhO)

For placing 6th globally among international participants

Jun 2021

INDUSTRY EXPERIENCE

Software Engineering Internship

Microsoft [Windows + Devices]

May - Jul 2025

Hyderabad, India

- Developed an MCP server enabling Agentic AI workflows to interface with legacy software components.
- Contributed to the open-source MCP TypeScript SDK, focusing on automation of engineering tasks

Open-Source Contribution to IBM Qiskit

Supervisors: Dr. Dhinakaran Vinayagamurthy (IBM), Prof. Chandrashekhar Lakshmi Narayanan (IITM)

Feb - Apr 2025

- Contributed a quantum dataset for benchmarking Variational Fast-Forwarding (Model introduced in 2020)
- Exhibited fast-forwarding of molecular hamiltonians with a Jordan–Wigner mapping on NISQ run-times

LEADERSHIP & VOLUNTEERING

Executive Head & Technical Lead

Apr 2023 - Mar 2024

Sahaay - Social Innovation Club, IIT Madras

- Directed five student projects in animal welfare, assistive technology, and agricultural technology.
- Mentored student teams on edge inference of neural networks such as YOLO and CNNs for assistive tech
- Conducted workshops for 54 freshmen on transfer learning, data augmentation, and model evaluation.

Department Committee Representative

Nov 2021 - Jun 2025

Electrical Engineering Department, IIT Madras

- Assisted the Head of Department with curriculum rearrangement; Represented undergrads at town halls
- Assisted the Dean of Students of IIT Madras on measures & initiatives for women's safety in campus

Mobile Application for Animal Distress Call Response

Aug 2024 - Present

- Collaborating with members from Animal Welfare Board of India and Blue Cross of India for developing a full-stack application for decentralizing animal distress call response