

# RUBAN VISHNU PANDIAN VENKATASUBRAMANIAN

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## EDUCATION

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University of Texas at Austin

*PhD in Electrical and Computer Engineering; CGPA: 4.0/4.0*

Austin, United States

Aug 2025 - Present

Indian Institute of Technology Madras

*B.Tech (Honours) + M.Tech, Electrical Engineering; CGPA: 9.38/10*

Chennai, India

Aug 2019 - May 2024

## PUBLICATIONS

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1. **Ruban Vishnu Pandian**, Abhiram Rao Gorle, Karthick Krishna M, Nambi Seshadri, R. David Koilpillai:  
Compgen: Synthesis and Generation of Faces From Edgemaps, *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2025*

## AWARDS & ACHIEVEMENTS

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- Ranked **1st in the Department of Electrical Engineering** within the dual degree program in IIT Madras.
- Awarded the **Philips India Prize** for having the best academic record in the dual degree program in Electrical Engineering.
- Awarded **Institute Merit Prize** for scoring the highest CGPA in the fourth year of the dual degree program in Electrical Engineering.
- Awarded branch change from the former branch of **Biological Sciences to Electrical Engineering** for securing a rank within the top 10 % of the freshman batch.

## RESEARCH EXPERIENCE

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### Enhancing Self-Consistency using Soft-Averaging

*Guided by: Prof. Hyeji Kim, ECE, UT Austin*

Aug 2025 - May 2026

- Developed a theoretically motivated, inference-time method improving over **Self-Consistency** using **Soft-Decision conditional probability vectors**.
- Achieved consistent performance improvement of 1-2% over the Self-Consistency, Self-Certainty and the Majority of the Bests baselines on **instruction-tuned LLM models**.

### Image generation using Edgemap-aided Compressive Framework

*Master's thesis, Co-Guided by: Prof. Nambirajan Seshadri, ECE, UC San Diego & Prof. David Koilpillai, EE Department, IIT Madras*

Nov 2023 - Jun 2024

- Designed image generative models with inspiration obtained from **classic information theory** and the **latent diffusion model**.
- Successfully demonstrated the **reconstructive and generative abilities** of our model to create **face images from edgemap inputs**.
- Work got published in the ICASSP 2025 conference.

### Information-theoretic limits for crowdsourcing

*Co-Guided by: Prof. Andrew Thangaraj & Prof. Avhishek Chatterjee, EE Department, IIT Madras*

Nov 2023 - Mar 2024

- Worked on developing information-theoretic bounds for linear codes with **column sparsity constraints on their generator matrices**.
- Applications include labelling of large machine learning datasets using crowdsourcing.

### Project member - 5G Testbed, IIT Madras

*Guided by: Prof. Radha Krishna Ganti, EE Department, IIT Madras*

Jun 2022 - May 2023

- Developed an **efficient channel equalizer model** for the MIMO transceiver, minimizing compute hardware required.
- Worked on the Tx analog frontend and performed MATLAB simulations of techniques such as **WOLA, DPD and CFR<sup>1</sup>**.
- Analyzed DPD and its implementation on hardware, conducted fixed-point simulations to study the performance of CFR.

## PROFESSIONAL EXPERIENCE

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### Systems Engineer - Texas Instruments (India) Pvt. Ltd.

Aug 2024 - Aug 2025

- Worked as a systems engineer in Texas Instruments India with my work focused on testing and validation of **signal processing algorithms using MATLAB simulations**.
- Studied various **clock data recovery (CDR) methods** and their performance metrics for wired communication based products.

### Signal Processing Intern - Texas Instruments (India) Pvt. Ltd.

May 2022 - Jul 2022

- Designed digital filters, implemented them on firmware and explored different **mathematical algorithms to reduce the design complexity**.
- Explored different matrix inversion algorithms and **independently discovered a method** present in literature to invert a particularly structured matrix.
- Conducted performance analysis and comparison checks of the developed solution against standard implementations.

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<sup>1</sup>Windowed overlap and add, Digital pre-distortion and Crest factor reduction respectively

## COURSE PROJECTS

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### EE6112: Topics in Random Processes and Concentrations

Apr 2024

Guided by: Prof. Avhishek Chatterjee, EE Department, IIT Madras

- Problem statement: To compare the distributions involved when sampling items from a bag with and without replacement.
- My work involved studying both the distributions, conducting literature survey and developing fundamental bounds on the Kullback-Liebler (KL) divergence measure between these distributions.

### EE5121: Convex Optimization [Poster]

Nov 2023

Guided by: Prof. Uday Khankhoje, EE Department, IIT Madras

- Presented a poster on *Signal Decomposition via Quadratic-Separable Optimization* (QSS) and performed experiments to verify quality of signal decomposed using this toolbox against the well-known CVXPY solver.
- Tested and validated it on non-convex loss functions and NERL's soiling data, achieved accurate signal recovery with just 20% of the known input signal.

### EE5179: Deep Learning for Imaging [Report]

Nov 2023

Guided by: Prof. Kaushik Mitra, EE Department, IIT Madras

- Presented about the paper titled *Neural Collapse: A Review on Modelling Principles and Generalization*, studied how hierarchical classification using DL models works, and understood how neural collapse might affect hierarchical classifiers.

### EE5143: Information theory [Report]

May 2023

Guided by: Prof. Andrew Thangaraj, EE Department, IIT Madras

- Presented a review of the paper titled *Compressed Sensing*, understood how sparse signal recovery and certain algorithms such as *Basis pursuit* work.

### EE6110: Adaptive Signal Processing [Report]

Nov 2022

Guided by: Prof. Arun Pachai Kannu, EE Department, IIT Madras

- Presented a review of the paper titled *A Family of Robust M-Shaped Error Weighted Least Mean Square Algorithms: Performance Analysis and Echo Cancellation Application*.
- Experimented with the proposed model in MATLAB and demonstrated performance gains provided compared to the standard LMS algorithm for a system tracking problem.

## TEACHING EXPERIENCE

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### ECE 351K: Probability/Random Processes - UT Austin

Jan 2026 - May 2026

Prepared problem sets on a weekly basis, conducted office hours to facilitate discussion outside class hours, and evaluated the midterms and final exams.

### EE5143: Information Theory - IIT Madras

Jan 2024 - May 2024

Prepared tutorials and solutions, conducted tutorial sessions, evaluated presentations done by students, and taught a lecture on the topic of Hypothesis testing.

### EE3110: Probability Foundations for Electrical Engineers - IIT Madras

Aug 2023 - Nov 2023

Prepared tutorials on a biweekly basis, conducted tutorial sessions, evaluated assignments and quiz submissions, and actively engaged in discussions with students regarding their doubts outside class hours.

## RELEVANT COURSEWORK

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**UT Austin:** Probability and Stochastic Processes, Convex Optimization, Statistical Machine Learning

**IIT Madras:** Deep Learning for Imaging, Image Signal Processing, Information theory, Estimation theory, Error Control Coding, Advanced topics in Communication, Probability and Linear Algebra.

## POSITIONS OF RESPONSIBILITY

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### Strategist - Electronics Club, Centre for innovation, IIT Madras

Apr 2021 - Apr 2022

- Mentored a project undertaken by the club, conducted periodic sessions and curated resources for the same.
- Organized and contributed to the summer school sessions conducted for the freshman batch students.

### Coordinator - Electronics Club, Centre for innovation, IIT Madras

Apr 2020 - Apr 2021

- Worked on a club project titled **Digital pen**, explored feasible ideas and contributed to design decisions.
- Curated resources, prepared presentations and conducted club sessions for the freshman batch students.
- Explored the domains of **Deep learning** and **Digital design** and worked on various mini-projects related to the said domains.

## EXTRACURRICULARS

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### • Shaastra workshop - Introduction to FPGA:

Jan 2021

Conducted the workshop and contributed by teaching **Digital electronics and Verilog basics** in the institute's annual technical fest **Shaastra**.

### • Associate Executive - Development and Association, E-Cell, IIT Madras

Oct 2019 - Jan 2020

Worked as an associate executive in the Development and Association vertical of the institute Entrepreneurship Cell, assisted in organizing and managing sessions in the institute entrepreneurship summit (E-summit) 2020.