Sudhansh Peddabomma

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Education

2023 - 2025 **University of California San Diego** **GPA 4.00/4.00**
Master of Science in Computer Science and Engineering

2019 - 2023 **Indian Institute of Technology Bombay** **CPI 9.66/10**
Bachelor of Technology with **Honors** in Computer Science and Engineering, Minor in **Entrepreneurship**

Publications

- **S. Peddabomma**, S. Banerjee, R. Srivastava, A. Rajwade, **A likelihood based method for compressive signal recovery under Gaussian and saturation noise** in Signal Processing 2024 DOI : 10.1016/j.sigpro.2023.109349
- M. Betcke, A. Hauptmann, W. Hong, E. Macneil, **S. Peddabomma**, K. Rullan, **"Learned Stochastic Primal Dual for large scale and fully 3D tomographic reconstruction"** *Special Issue IOP 2023 (Manuscript under preparation)*

Research Projects

3D Perception for Home Robots
September 2023 - Present

Supervised by Prof. Henrik Christensen, University of California San Diego

- Developing a robust object mesh-completion algorithm for bounding box estimation during manipulation of items
- Implementing dense-SLAM with **Neural Radiance Fields** and **Gaussian Splatting** for real-time scene reconstruction

3D Tomography with Neural Networks
May 2021 - Jun 2023

Supervised by Prof. Marta Betcke, University College London

- Developed a stochastic version of **Learned Primal-Dual** algorithm for the reconstruction of tomographic sinograms
- Created a Python framework to conduct experiments on **cone-vector Tomography** for **3D volume reconstructions**
- Achieved remarkable results, including up to **99.6% structural similarity**, under challenging **Low-Dose conditions**

Likelihood Maximisation for Saturated Compressed Sensing
Jul 2021 - May 2023

Supervised by Prof. Ajit Rajwade, IIT Bombay, [Report] Bachelor Thesis Project

- Proposed a novel likelihood-based approach to reconstruct **signals, image and audio** from saturated measurements
- Utilized advanced statistical modeling techniques to guarantee performance and conducted extensive experiments
- Obtained **15% lower RMSE** as compared to state of the art methods even with high saturation levels

Permutation Noise in Compressed Sensing
Jul 2022 - May 2023

Supervised by Prof. Ajit Rajwade, IIT Bombay Research and Development

- Developed a noise model for **mislabelled measurements** in compressed sensing and formulated its theory
- Conducted tests using hypothesis testing on **debiased LASSO** estimate to detect and correct the permutation errors
- Designed a correction algorithm that rectified upto **15%** mislabeled measurements in the presence of Gaussian noise

Experience

May 2022 - Jul 2022 **Data and Applied Scientist Intern, Microsoft**

- Developed a **Decision Tree ranker** for suggesting email entities on **Outlook**, without user input
- Prepared a model with **feature vectors** and context signals from data logs employing **Scope** scripts
- Optimized the Outlook email preference ranker by enhancing the existing hierarchical feature set

Jan 2022 - Apr 2022 **Software Engineer Intern, FinIQ**

- Developed a **comprehensive grammar** for pricing quotes in emails to reduce transaction rejection rates
- Created a **markup language** with variable declarations, conditions, and table formatting for emails
- Implemented a parser for **segmenting scripts** with interleaved code from multiple languages

Nov 2021 - Dec 2021 **Software Engineer Intern, FinIQ**

- Implemented the **Heston Stochastic Local Volatility** model for a volatility surface back-solver
- Designed and executed **Monte Carlo simulations** for vanilla options, barrier options, and target redemption forwards, enhancing risk assessment

Key Projects

NaviCane - Smart cane for the visually disabled Jan 2023 - Apr 2023

Proof of Concept Advanced, Entrepreneurship

- Innovated a smart cane for the visually impaired with obstacle detection and real-time **navigational guidance**
- Demonstrated a **working prototype (MVP)** powered by **Raspberry Pi** that delivers haptic and audio based alerts
- Interacted with visually impaired individuals to identify challenges and incorporated their feedback in the design

Augmented Reality Sudoku Solver Jan 2023 - Apr 2023

- Created a real-time **Augmented Reality** Sudoku Solver application in Python, leveraging Keras and **OpenCV**
- Optimized **Alexnet** for efficiency and ensured robust performance under various lighting conditions

Image Colorization May 2021 - Jul 2021

Seasons of Code, WnCC IIT Bombay Web Application

- Developed and **deployed** a **Pix2Pix GAN** web-application to transform grayscale images to colored ones
- Implemented a **U-Net architecture** for the generator and utilized **patch discriminator** for effective translation

MDP Optimization with Reinforcement Learning Aug 2021 - Nov 2021

Supervised by Prof. Shivaram Kalyanakrishnan

- Explored sampling algorithms such as **KL-UCB** and **Thompson Sampling** for stochastic multi-armed bandits
- Designed a Markov Decision Process for anti tic-tac-toe with **Howard's policy iteration** for deriving the optimal policy
- Implemented **SARSA** with linear approximation and tile-coding, and simulated the results using **OpenAI Gym**

Red Plag - Plagiarism Checker Sep 2020 - Nov 2020

Supervised by Prof. Amitabha Sanyal

- Deployed a web application using **Angular** and **Django**, for verified users to conduct plagiarism checks on code files
- Employed **Latent Semantic Analysis** and **TF-IDF**, with pre-processing for in-depth script similarity analysis

Scholarships and Awards

2023	Secured the **KC Mahindra scholarship** of INR 500,000 for post-graduate studies
2019	Awarded **Gold** Medal for being in the **Top 39** students in the **Indian National Astronomy Olympiad**
2019	Secured **3rd** rank in **Statistics Olympiad** conducted by **AIMSCS** across India and Sri Lanka
2017, 19	Participated in Orientation-cum-Selection Camp (**OCSC**) for **IOAA** conducted by HBCSE
2019	Among **top 300** selected for Indian National Olympiads in Mathematics, Physics, and Chemistry
2019	Secured **All India Rank 178 in JEE Advanced** and **424 in JEE Mains** among 1.2 million candidates
2017, 18	Recipient of the prestigious Kishore Vaigyanik Protsahan Yojana (**KVPY**) Fellowship

Positions of Responsibility

Mar 2022 - Apr 2023 | **Team Leader, ExoFly - Tech Team at IITB**

- Led a **40-member team** to design a compact, lightweight decacopter **eVTOL vehicle** for short flights
- Successfully secured funding by presenting goals and strategic plans, which enabled team's development
- Designed a controller on **Simulink**, including fail-safes and **sensor fusion** with **Extended Kalman Filter**

Mar 2022 -May 2022 | **Teaching Assistant**

- Mentored **40-students** in Physical Chemistry under Prof. Amber Jain

May 2022 - May 2023 | **Senior Department Academic Mentor, Computer Science**

- Among the 11 senior mentors in a team of 34 responsible for mentoring sophomores

May 2021 -Jul 2021 | **Summer of Science Mentor, Math and Physics Club - IITB**

- Mentored 2 freshmen students in **Stock Market Analysis** by providing resources and clearing doubts

Courses Undertaken

Artificial Intelligence	Recommender Systems and Data Mining, Computer Vision, Intelligent and Learning Agents, Artificial Intelligence and Machine Learning
Computer Science	Quantum Computing, Robotics, Game Theory and Algorithmic Mechanism Design, Network Security and Cryptography, Operating Systems, Advanced Image Processing, Design and Analysis of Algorithms, Computer Networks
Mathematics & Statistics	Numerical Analysis, Calculus, Linear Algebra, Discrete Structures, Data Analysis and Interpretation

Technical Skills

Programming	C++, C, Python, MATLAB, Java, Bash, VHDL, MIPS
Tools & Software	OpenCV, TensorFlow, PyTorch, Pandas, Matplotlib, scikit-learn, Git, LaTeX
Development	HTML5, JavaScript, Angular, Django, Heroku, SQL, Kivy, Android Studio, Arduino
Expertise in	Computer Vision, Statistical Modeling, Image Processing, Compressed Sensing

Extracurriculars

2022 Secured **second position** in Department Basketball tournament conducted by CSEA
2021 Participated in the Preview Program and the **Estimathon competition** conducted by Jane Street
2020 Participated in the **cybersecurity CTF** (Capture The Flag Tournament) conducted by CSEC
2020 Aided in forming associations with outreach partners for **Eureka!**, conducted by E-Cell IIT Bombay
2020 Successfully completed a year-long course under **NSO** in keyboard in the freshman year

References

Ajit Rajwade
Associate Professor, IIT Bombay
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Marta Betcke
Associate Professor, University College London
@ m.betcke@cs.ucl.ac.uk

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