

# SUDHANSH PEDDABOMMA

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## EDUCATION

- University of California San Diego** Sep 2023 - Jun 2025  
Master of Science in Computer Science and Engineering GPA 4.00/4.00
- Indian Institute of Technology Bombay** Jul 2019 - Jul 2023  
Bachelor of Technology with Honors in Computer Science and Engineering, Minor in Entrepreneurship CPI 9.66/10

## 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  
Graduate Student Researcher, Supervised by Prof. Henrik Christensen
- > Implemented dense SLAM algorithms with NeRFs and Gaussian Splatting for real-time 3D scene reconstruction
  - > Developed real-time object segmentation and point cloud mapping methods for precise grasp pose estimation
- 3D TOMOGRAPHY WITH PRIMAL-DUAL NEURAL NETWORKS** MAY 2021 - JUN 2023  
Supervised by Prof. Marta Betcke, University College London
- > Developed a stochastic neural-network architecture of primal-dual algorithm for online reconstruction of 3D volumes from tomographic scans and obtained 99.6% structural similarity in challenging low-dosage conditions
  - > Built a Python library with custom network layers in Tensorflow for reconstruction using cone-vector tomography
- IMAGE RECONSTRUCTION IN SATURATED COMPRESSED SENSING** JUL 2021 - MAY 2023  
Supervised by Prof. Ajit Rajwade, IIT Bombay, [REPORT] Bachelor Thesis Project
- > Proposed a novel likelihood maximization technique to recover signals, images, and audio from compressed measurements and obtained 20% lower RMSE over the state of the art methods even with high saturation effects
  - > Established robust performance guarantees with statistical methods and published a journal paper on this work
- 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 group testing of Covid-19 and 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 Outlook to suggest emails to users based on their past interactions
  - > Engineered a dataset using user-dependent email attributes extracted from a large-scale data pipeline
  - > Demonstrated an optimized ranking model using hierarchical feature sets, resulting in higher recall
- JAN 2022 - APR 2022 **Software Engineer Intern, FINIQ**
- > Designed a parser to verify the format in email transactions, lowering the trade-discard rate up to 15%
  - > Created a markup language with variable declarations, conditions, and table formatting for emails
  - > Implemented a parser using Lex and Yacc for segmenting scripts with interleaved code from multiple languages, to develop programs with different scripts in a single file
- NOV 2021 - DEC 2021 **Software Engineer Intern, FINIQ**
- > Enhanced the firm's trading platform by deploying pricing models for options and target redemption forwards, such as Black-Scholes and Heston Local Stochasticity models with Monte Carlo simulations

## KEY PROJECTS

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### 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 FLAG - 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

### VIRTUAL KEYBOARD WITH COMPUTER VISION

MAY 2020 - JUL 2020

Seasons of Code, WnCC IIT Bombay

- > Developed an **Augmented Reality** Keyboard application that captures the user input from a camera using **OpenCV**
- > Employed techniques like thresholding and edge detection to extract keys and pointer location in real-time

## OTHER PROJECTS

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### COMPILER FOR C LIKE LANGUAGE

JAN 2022 - APR 2022

Supervised by Prof. Uday Khedkar

- > Developed a compiler for a subset of C that supports **semantic analysis**, scope levels and **control sequences**
- > Explored concepts in compiler optimization and register allocation algorithms - **Chaitin-Briggs** and **Sethi-Ullman**

### EDGE DETECTION USING SKELLAM DISTRIBUTION

MAR 2021 - APR 2021

Supervised by Prof. Ajit Rajwade

- > Explored Skellam distribution to model noise in images, enabling robust **edge detection** and **background removal**
- > Leveraged statistical techniques, including hypothesis testing to robustly identify edges in real-world data

### LOGIC ENCODING USING Z3PY

JAN 2021 - APR 2021

Supervised by Prof. Ashutosh Gupta

- > Encoded a **robust Mastermind agent** to play against an unreliable opponent using first-order logic clauses
- > Developed a solver for extracting the **minimal set of edges** required to disconnect any two given vertices of a graph

### STOCK MARKET ANALYSIS

MAY 2020 - JUL 2020

Maths and Physics Club, IIT Bombay

- > Authored a detailed report on Stock Markets, covering topics ranging from **Technical Analysis** to **Options Trading**
- > Acquired in-depth understanding of financial concepts such as Option Greeks, Dow Theory and Candlestick Patterns

### XV6 OPERATING SYSTEM

SEP 2020 - DEC 2020

Supervised by Prof. Mythili Vutukuru

- > Built a Linux shell in C with support for parallel, background execution of processes, signal handling and system calls
- > Incrementally enhanced xv6 OS to facilitate **process and memory management** with custom system calls, along with **file system operations** to create, edit and delete files on an emulated disk

## SCHOLARSHIPS AND AWARDS

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- 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

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### Teaching Assistantships

- > Theory of Computing, UC San Diego APR 2024 - PRESENT
- > Quantum Cryptography, UC San Diego JAN 2024 - MAR 2024
- > Physical Chemistry, IIT Bombay MAR 2022 - MAY 2022

### MAR 2022 - APR 2023 | Team Leader, ExoFLY - Tech Team at IITB

- > Led a **40-member team** to design a safe and compact **manned eVTOL aerial vehicle** for short flights
- > Successfully secured funding by presenting goals and strategic plan, enabling team's development
- > Designed a controller on **Simulink**, including fail-safes and **sensor fusion** with **Extended Kalman Filter**

### 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

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<b>ARTIFICIAL INTELLIGENCE</b>	Recommender Systems and Data Mining, Computer Vision, Intelligent and Learning Agents, Artificial Intelligence and Machine Learning
<b>COMPUTER SCIENCE</b>	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
<b>MATHEMATICS &amp; STATISTICS</b>	Convex Optimization, Numerical Analysis, Calculus, Linear Algebra, Discrete Structures, Data Analysis and Interpretation

## SKILLS

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<b>Programming</b>	C++, C, Python, MATLAB, Java, Bash, VHDL, MIPS
<b>Tools &amp; Software</b>	PyTorch, ROS, OpenCV, TensorFlow, CUDA, Pandas, Matplotlib, scikit-learn, Git, $\LaTeX$
<b>Development</b>	HTML5, JavaScript, Angular, Django, Heroku, SQL, Kivy, Android Studio, Arduino
<b>Expertise in</b>	Computer Vision, Artificial Intelligence, Algorithms, Statistical Modeling, Image Processing

## EXTRACURRICULARS

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- 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