Soham Gaonkar

Junior Undergraduate
Artificial Intelligence
IIT Gandhinagar

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ACADEMIC DETAILS

Degree	Institute	Year	CPI / %
B.Tech.	Indian Institute of Technology, Gandhinagar	2023-Present	9.45
Class XII	Pace Junior Science College	2022-2023	87.0
Class X	Pawar Public School	2012-2021	98.2%

INTERNSHIPS

- **Summer Research Internship** [May 2025 – July 2025]
  Advisor: Prof. Shanmuganathan Raman | CodeBase | Poster CVIG Lab,IIT Gandhinagar
  - Designed an end-to-end pipeline to reconstruct **3D scenes** from a **single 360° panorama image**.
  - Used **360MonoDepth** for depth prediction and fused it with RGB to generate dense, accurately aligned point clouds.
  - Implemented a synthetic view generation module using **Fibonacci**-sphere and circular sampling, featuring automated hole detection and a 2 stage **inpainting** pipeline (mask dilation, Telea inpainting, and edge-aware smoothing).
  - Trained a Gaussian Splatting on the synthesized dataset for enabling downstream inverse-rendering workflows.

PROJECTS

- **Ultrasound Segmentation of Histotripsy Ablation** [April 2025]
  Advisor: Prof. Himanshu Shekhar | CodeBase | Poster
  - Implemented a **DeepLabV3**-based segmentation method tailored for ultrasound ablation imagery, using a custom **Dice-Focal** loss that outperformed prior **state-of-the-art**, achieving **83%** Mean IoU **(↑7%)** & **97%** accuracy **(↑2%)**.
  - Collaborated with University of Chicago Radiology to utilize real-world annotated clinical ultrasound datasets.
  - Achieved **90%** predictive accuracy on challenging **early-pulse frames**, substantially surpassing prior methods **(↑40%)**, including robust performance on the first 500 pulses characterized by low contrast and ambiguity.
- **MiniTorch – A Lightweight PyTorch Clone** [June 2025]
  Independent Project | CodeBase
  - Built a minimalist deep learning framework from scratch using **NumPy**, inspired by PyTorch's design principles.
  - Implemented a custom **Tensor class** supporting elementwise operations, broadcasting, and gradient tracking.
  - Designed a **autograd engine** capable of constructing and backpropagating through computation graphs.
  - Recreated essential PyTorch components, including neural network layers, activations, loss functions & **optimizers**.
  - Integrated **Graphviz**-based visualization to render computation graphs for debugging and educational insights.
- **JPEG Compression on FPGA** [April 2025]
  Advisor: Prof. Joycee Mekie | CodeBase
  - Collaborated with a team of four to develop a complete JPEG compression pipeline using **Discrete Cosine Transform (DCT)** and top-$k \times k$ coefficient pruning, achieving **50%** compression with preserved visual quality (**PSNR > 30**).
  - Designed modular Verilog components and FSMs for BRAM access and implemented robust **UART** communication between the Basys3 FPGA board and host system.

TECHNICAL SKILLS

- **Programming Languages:** Python, C++, C, Verilog, JavaScript
- **Tools:** Git, VS Code, Hugging Face, Kaggle, FPGA, Vivado, Flask
- **Libraries:** PyTorch, OpenCV, Scikit-learn, Weights & Biases

RELEVANT COURSES

- **CSE/AI:** Computing **[A+]**, Machine Learning **[A]**, Mathematical Foundations for AI **[A]**, Software Tools and Techniques for AI **[A]**, Signals, Systems & Random Processes **[A]**, Data Structures and Algorithms I **[A-]**, Data Centric Computing **[A-]**, Theory Of Computing **[A-]** , Digital Systems **[A-]**

  Math: Ordinary Differential Equations **[A+]**, Partial Differential Equations **[A]**, Calculus of Single Variable **[A]**

ACHIEVEMENTS

- Ranked **1st** in the Artificial Intelligence department based on academic performance at IIT Gandhinagar. Details
- Awarded the **Academic Excellence Scholarship** for AY **2023–24** at IIT Gn. Award Details
- Recognized on the **Dean's List** for outstanding academic performance in **Semester 1** and **Semester 3**. Dean's List Details
- Secured **2nd Rank** in the **Best Undergraduate Research Showcase** (Semester 4) for innovative research project. Details
- Won the **Runner-Up** Award among 30+ teams at **HackRush** 2024, IIT Gandhinagar's premier hackathon. CodeBase

POSITIONS OF RESPONSIBILITY

- **Core Member, Machine Learning Club at IIT GN** [Sept 2024 – April 2025]
  Guided members in ML projects by helping with research, coding, and problem-solving.
- **Mentor, MA 103: Calculus of Single Variable and Linear Algebra** [Aug 2024 – Nov 2024]
  Mentored over 300 students by clarifying concepts and collaborating with faculty to enhance course engagement.