Guntas Singh Saran

B.Tech Honours in Computer Science & Engineering

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Education

Indian Institute of Technology Gandhinagar — CGPA: **9.77**/10
B.Tech in Computer Science and Engineering (Honours) **[Transcript]** — 2022 - 2026

Dr. Kitchlu Public School, Moga — Score: **99.4%**
Class XII, Central Board for Secondary Education — 2021 - 2022

Sacred Heart School, Moga — Score: **98.6%**
Class X, Indian Certificate of Secondary Education — 2019 - 2020

Scholastic Achievements & Awards

- Institute Rank **2 of 287** with a CGPA: `9.77/10` at the end of Semester VII.
- Presented with the Award for Academic Excellence for the highest CPI in the entire batch for the **AY 2022–23**.
- Recepient of the Dean's List in **5 semesters** – *Semesters I, II, IV, V, VI* and Academic Citation in *Semester VII*.
- Awarded with 2 Institute Donor Scholarships for **AY 2024–25** and **AY 2025–26**.
- Selected among ∼**100 students worldwide** (*one of only 5 from India*) to attend the Cornell, Maryland, Max-Planck, Pre-Doc. Research School in Computer Science (**CMMRS 2025**) for a **fully-funded** program at the **Max Planck Institute for Software Systems (MPI-SWS)**, Saarbrücken, Germany.
- Secured **2nd Position** in the Machine Learning challenge at HackRush 2023.
- Recognised as a Kishore Vaigyanik Protsahan Yojana (**KVPY**) scholar, with an All India Rank **1402**.
- Ranked as the CBSE Punjab State Science-Stream Topper with **99.4%** in Class XII.
- Secured JEE Advanced AIR **1297** and JEE Main AIR **598**.

Work Experience

Data Science Intern & Upcoming Data Scientist I – Skan AI

Supervisor: *Dr. J. C. Bose (Chief Data Scientist)* — **[May 2025 – Present]**

- Secured Day-0 internship offer, converted to a full-time PPO after 3 months of summer internship; got offered extended remote internship based on impactful contributions to the core product.
- Designing a complete Agentic workflow for end-to-end process mining, task discovery, and decision analysis.
- Developed a custom algorithm for Label-Value Extraction from native desktop application forms, leveraging spatial arrangement of OCR text-boxes, document layout understanding, and NER + corpus-search-based field identification.
- Built scalable decision mining, process discovery, and DFG simplification pipelines using greedy heuristics, Edmonds' algorithm, and entropy-based filtering to generate interpretable directly-follows graphs.

Summer Research Intern, CVIG Lab, IIT Gandhinagar

Supervisor: *Prof. Shanmuganathan Raman* | Project Link | Report — **[May 2024 - July 2024]**

- Researched Variational Autoencoders, Vector-Quantized VAEs, GANs, and Diffusion Probabilistic Methods.
- Implemented unconditional Latent Diffusion Model on CelebAHQ-Mask dataset and performed Image Inpainting tasks using the trained LDM and implemented Deep Convolutional GAN on MNIST and CelebA datasets.

Selected Projects

Fast Multi-Precision Integer Division using Intel AVX-512IFMA: A Vectorised 3-by-2 Division Kernel

Supervisor: *Subhrajit Das, Prof. Abhishek Bichhawat* | Poster Link — **[Jan 2026 – Apr 2026]**

- Designed and implemented a vectorized multi-precision integer division kernel using Intel AVX-512IFMA, processing 8×52-bit limbs per SIMD lane and achieving up to 1.8× speedup over GMP's generic C baseline on inputs up to 2048 limbs.
- Engineered a fused 8×8 schoolbook multiplier with shared $64 \rightarrow 52$-bit lane conversions.

A Distributed Fault-tolerant Prime-finding Application using Distributed AFS

Supervisor: *Prof. Yuvraj Patel, Prof. Abhishek Bichhawat* | Project Link **[Mar 2026 – Apr 2026]**

- Built a distributed file system from scratch with whole-file client-side caching, custom TCP RPC layer, and Raft consensus replication across N servers.
- Implemented a fault-tolerant distributed prime-finding on top of this AFS with coordinator-worker architecture that scales with the number of workers.

DNS Stub Resolver using AF_XDP

Supervisor: *Prof. Sameer G Kulkarni* | Project Link | Video Link **[Jan 2025 - Apr 2025]**

- Developed a user-space DNS resolver leveraging **AF_XDP** sockets and **eBPF** to bypass the Linux kernel network stack.
- Implemented **XDP packet filter** to intercept UDP port 53 traffic, redirecting it to custom **AF_XDP** socket in user space.
- Integrated a filesystem-based caching mechanism and evaluated performance using **dnsperf**, validated query handling with **dig** and Wireshark, and ensured compliance with **RFC 1035**.

Bytecode-generated compiler for an unambiguous language - `osl`.

Supervisor: *Prof. Balagopal Komarath* | Project Link | Documentation **[Jan 2025 - Apr 2025]**

- Implemented functions as first-class objects and the support of lexical scoping, closures using custom environment object in the resolver to generate the Abstract Binding Tree (ABT).
- Designed an unambiguous grammar for our custom language and implemented it using a recursive descent parser.
- Generated bytecode from the ABT in our assembly and designed virtual machine to execute the same.

Adapt-HIPIE: Open-Vocabulary Image Segmentation with Adapters

Supervisor: *Prof. Shanmuganathan Raman* | Project Link | Poster Link **[Aug 2024 - Nov 2024]**

- Investigated hierarchical and decoupled approaches for segmenting *"things"* and *"stuff"*, optimizing representation learning for distinct visual-textual features using the **HIPIE**: **HI**erarchical, o**P**en-vocabulary, and un**I**v**E**rsal segmentation model.
- Introduced a **parallel adapter** after the Text-Image fusion module, achieving a state-of-the-art performance on **RefCOCO** *(oIoU: 86.62, P@0.5: 93.88)* and **RefCOCO+** *(oIoU: 78.02, P@0.5: 86.2)* with a ResNet-50 backbone.
- Explored several unified object detection and segmentation frameworks like the DETR (**DE**tection **TR**ansformer) and DINO (**D**ETR with **I**mproved de**N**oising anch**O**r boxes), evaluating their performance for segmentation tasks.

Full FPGA Implementation of 32-bit FSM-based Multi-State MIPS Processor

Supervisor: *Prof. Sameer G Kulkarni* | Project Link **[Aug 2024 - Nov 2024]**

- Designed an expanded ISA by formulating a new data-path capable of supporting recursive functions and high-level MIPS assembly code, implemented on FPGA Block RAM (BRAM) with memory-mapped I/O integration.
- Progressed through multiple development versions, culminating in a stable multi-state processor achieving Fibonacci, Factorial, GCD computations demonstrated on a Basys3 FPGA board.
- Developed and implemented a Finite State Machine (FSM) architecture to handle each stage of the 32-bit MIPS processor pipeline by breaking them down into states.

Sparsifying Networks while Preserving Communities

Supervisor: *Prof. Anirban Dasgupta* | Project Link **[Mar 2024 - Apr 2024]**

- Leveraged NetworkX and CDLib to extract community structures from sparsified graphs and compared them with baseline sampling techniques like random edge sampling and edge betweenness based sampling.
- Implemented graph sparsifying techniques by edge sampling (clustering coefficients, effective resistance) especially Local Jaccard Similarity based (L-Spar) to achieve an average Normalised Mutual Information (NMI) score of 80%.

Leadership Positions

Core Committee Member, Amalthea 2023

Design & Finance Core **[Apr 2023 – Feb 2024]**

- Directed the **Finance Department**, meticulously preparing the budget, monitoring expenditures, and ensuring the financial health of the summit, thereby achieving a balanced and transparent financial record.
- Led the **Design Team**, of 25 members, coordinating with multiple vendors, to create innovative branding materials and visual assets, enhancing the summit's aesthetic appeal and attendee engagement.
- Fostered seamless collaboration between diverse teams comprising of over **150+ undergraduate students**, ensuring the seamless planning, execution, and delivery of all event activities.

Deputy Contingent Leader, Inter IIT Tech Meet 13.0

Contingent Coordination & Representation at IIT Bombay **[Oct 2024 – Dec 2024]**

- Co-led the IIT Gandhinagar Contingent of **50+ participants** for the Inter IIT Tech Meet 13.0 held at IIT Bombay, that won **1 Silver and 1 Bronze medals**.

Student Guide & Student Guide Coordinator

Student Mentorship & Coordination **[May 2024 – Apr 2025]**

- Managed and coordinated a team of **40+ Student Guides**, overseeing induction of the incoming batch with support from the General Secretary & Convener, Student Council.
- Concurrently served as a personal Student Guide to a group of **10 freshers**, providing year-long academic, social, and wellbeing support.

Student Academic Council

Graphic Designer **[May 2024 – Apr 2025]**

- Developed design assets including visual presentations for council's social media handles.
- Led & volunteered in the design for **HackRush 2024** & **HackRush 2025**, the institute's annual hackathon.

Technical Council

General Member **[May 2023 – Apr 2024]**

- Contributed to IIT Gandhinagar's own centralized hub and interactive platform for students - **metaiitgn**.

Teaching Experience

I have served as an **Undergraduate Teaching Assistant (UGTA)** thrice for the following courses at IIT Gandhinagar:

1. **ES 335**: Machine Learning | *Prof. Nipun Batra* *Fall 2024*
2. **ES 114**: Probability, Statistics, and Data Visualizations | *Prof. Nipun Batra* *Spring 2025*
3. **ES 335**: Machine Learning | *Prof. Nipun Batra* *Fall 2025*

As a UGTA, delivered **guest lectures**, conducted tutorials, assisted the instructor with **lecture slides**, managed course websites, graded quizzes and assignments, and invigilated examinations – for classes of **200–350+ students** per semester across all three stints.

Relevant Courses

Core Computer Science Courses

`CS330`: Operating Systems [$\mathbf{A}^+$], `CS331`: Computer Networks [$\mathbf{A}^-$], `CS202`: Software Tools & Techniques [$\mathbf{A}+$], `CS327`: Compilers [$\mathbf{A}^-$], `ES215`: Computer Organization and Architecture [$\mathbf{A}$], `ES301`: Data Structures and Algorithms II (*Algorithms Design*) [$\mathbf{A}^-$]

AI/ML/Data Science Courses

`ES335`: Machine Learning [$\mathbf{A}$], `CS328`: Introduction to Data Science [$\mathbf{A}$], `CS613`: Natural Language Processing [$\mathbf{A}$], `ES666`: Computer Vision [$\mathbf{A}$], `CS329`: Foundations of AI: Multiagent Systems [$\mathbf{A}$], `CS618`: Theoretical Foundations of Machine Learning [$\mathbf{A}^-$]

Mathematics, Statistics, Electrical Courses

`ES244`: Signals, Systems, and Random Processes [$\mathbf{A}$], `ES114`: Probability, Statistics, and Data Visualization [$\mathbf{A}$], `MA205`: Calculus of Several Variables [$\mathbf{A}$], `MA103`: Calculus of Single Variable and Linear Algebra [$\mathbf{A}+$], `ES116`: Principles and Applications of Electrical Engineering [$\mathbf{A}^+$][1].

[1] $\mathbf{A}^-$ is 9/10, $\mathbf{A}$ is 10/10, and $\mathbf{A}^+$ is **11/10**, awarded in exceptional cases.