

# JASKIRAT SINGH MASKEEN

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## EDUCATION

**Indian Institute of Technology, Gandhinagar** | Bachelors of Technology [2023 - 2027]

**Major:** Computer Science and Engineering

**Minor:** Electrical Engineering

**CPI/CGPA:** 9.88/10 (**INSTITUTE RANK 1**)

## SCHOLASTIC ACHIEVEMENTS AND AWARDS

- Awarded **SAMSUNG FELLOWSHIP IN GRADE-I CATEGORY** for being one of the top candidates participating in India Semiconductor Workforce Development Program (ISWDP).
- Awarded **SCHOLARSHIP FOR ACADEMIC EXCELLENCE** for being institute rank #1 in the batch for academic year 2023-24.
- Selected in the **DEAN'S LIST** of Semester-1, Semester-2, and Semester-3 for exhibiting excellent academic performance.
- Awarded **CERTIFICATION IN TEACHING** during Semester-2, 2024.
- Ranked in the top **1.05 %** among **0.2 million** candidates in **JEE ADVANCED 2023**.
- Ranked in the top **0.182 %** among **1.7 million** candidates in **JEE MAINS 2023**.
- Awarded the **POTENTIAL TO BE A BUDDING RAMANUJAN** award by Mathematical Sciences Foundation in Jan 2019.

## PUBLICATIONS

- Jaskirat Singh Maskeen, Sandip Lashkare, *A Unified Platform to Evaluate STDP Learning Rule and Synapse Model using Pattern Recognition in a Spiking Neural Network*, **accepted** at ICANN 2025, preprint arXiv.
- Harshvardhan Singh, Nirmal Solanki, Jaskirat Singh Maskeen, Sandip Lashkare, *Asynchronous Real-Time Learning in Spiking Neural Network using 3-Terminal Resistance Random Access Memory*, **preprint** on TechRxiv.

## RESEARCH EXPERIENCE

**EMERGING DEVICES AND SYSTEMS LAB, IIT GANDHINAGAR** under Prof. Sandip Lashkare

1) **Evaluation of STDP & Synapse Models in Spiking Neural Networks** | [GitHub](#) [Dec '24 - Apr '25]

SUPERVISOR: Prof. Sandip Lashkare

- Developed a unified benchmarking setup to systematically evaluate different combinations of synaptic models and STDP (Spike-Timing Dependent Plasticity) learning rules in Spiking Neural Networks (SNNs), which was previously lacking in the literature.
- Focused on both hardware-inspired synapse models (like conductance-based synapses) and biologically inspired plasticity rules, assessing their impact on learning performance.
- Published a custom Python library called **nervos** (PyPI), specifically designed for building, simulating, and evaluating Spiking Neural Networks (SNNs).

**VERTECS<sup>2</sup> RESEARCH GROUP, IIT DELHI**

1) **Nondeterministic Finite Automaton Minimisation** [May '25 - Ongoing]

SUPERVISOR: Prof. Vaishnavi Sundararajan

- Studied about Myhill Nerode equivalence classes. Worked to simplify proofs listed required for Kameda and Weiner's Nondeterministic Finite Automaton (NFA) minimization algorithm.
- Working on a language theoretic way of obtaining a minimum NFA for a given language.

## ACADEMIC SERVICE & TEACHING

- Academic Discussion Hour Mentor, MA103 - Calculus of Single Variable and Linear Algebra, IIT Gandhinagar**, taken by  $\approx 400$  undergraduates. Solved doubts, and explained concepts in an intuitive way.

## TECHNICAL SKILLS

- Programming:** C, C++, Python, Javascript (basic), HTML, CSS, L<sup>A</sup>T<sub>E</sub>X.
- Libraries:** Google API client, Numpy, Pandas, Flask.
- Tools:** Git, Github, Linux (Ubuntu).
- Cloud/Databases:** MongoDB, SQL.

## SELECTED PROJECTS

• **SA-DRIVE** | Command Line Project [May '24 - Jun '24]

Documentation | [Project Link](#)

Google offers service accounts, which on their own have 15 GB of storage. Combining 110 service accounts gives 1.5 TB of storage. Developed a CLI application to upload/download files/folders, VFS mounting, and managing the drive. It has **more than 100 stars on GitHub**. Used SQLite3 for the database and Google-APIClient for communication with Drive.

- **JPEG COMPRESSION** | FPGA Project [Feb '24 - Apr '24]  
*Advisor: Prof. Joycee M. Mekie, IIT Gandhinagar* | Project Link | Project Video  
 JPEG Compression Algorithm (DCT and Quantization) implemented on the Basys3 FPGA board. Used Verilog coding with Vivado Software
- **ELECTORAL BOND ANALYSIS** | Web Development Project [Jan '24 - Apr '24]  
*Advisor: Prof. Mayank Singh, IIT Gandhinagar* | Project Link  
 Data Handling & Database Integration: Processed electoral bond details from PDFs to CSV and integrated with MySQL. Designed an interactive Flask website with search, filtering, and dynamic visualizations using ChartJS.
- **LOST AND FOUND SYSTEM** | Web Development Project [Dec '23]  
*Metis Dev Club, IIT Gandhinagar* | Project Link  
 Developed a platform for reporting and claiming lost items on campus, utilizing Google authentication and OTP verification for security.
- **IMAGE PROCESSING & DATA NARRATIVES** | Course Project [Jan '24 - Apr '24]  
*Advisor: Prof. Shanmughanathan Raman, IIT Gandhinagar* | Project Link  
 Applied Otsu's binarization and histogram equalization for contrast enhancement; conducted statistical analysis on ATP tennis datasets to extract insights.

## RELEVANT COURSES AND COURSEWORK

### CORE COMPUTER SCIENCE AND ELECTRICAL ENGINEERING COURSES

**Computing** [A<sup>†</sup>], **Data Centric Computing** [A, 95/100], **Data Structures and Algorithms I** [A-, 97.75/100], **Electronic Devices** [A], **Principles and Applications of Electrical Engineering** [A], **Theory of Computing** [B], **Digital Systems** [A], **Introduction to Data Science** [A], **Data Structures and Algorithms II** [A]

### MATHEMATICS, STATISTICS AND PHYSICS

**Linear Algebra and Calculus** [A], **Ordinary Differential Equations** [A], **Calculus of Several Variables** [A-], **Probability Statistics and Data Visualization** [A-], **Discrete Mathematics** [A-], **Introduction to Quantum Physics** [A], **Biology for Engineers** [A<sup>†</sup>], **Foundation and Applications of Spectroscopy** [A<sup>†</sup>], **Numerical Analysis** [A]

¶ indicates courses for the upcoming semester

† indicates A+ or 11/10 grade which is awarded for outstanding performance and ranking #1 in the batch

## POSITIONS OF RESPONSIBILITIES

- **MEMBER, TECHNICAL COUNCIL IITGN** [Aug '24 - May '25]  
 Organized and managed monthly hackathons and oversaw inter-club activities. Found exploits in Mess Portal at IITGN (which enables anyone to get access to any of the three mess facilities).
- **CORE MEMBER, ODYSSEY - THE ASTRONOMY CLUB, IITGN** [Dec '23 - May '25]  
 Conducted periodic night sky observation sessions with over 200 attendees.  
 Participated in talks about astrobiology and extremophiles.  
 Processed images obtained from Unistellar eVscope 2.
- **EVENT LEAD, AMALTHEA, IITGN** [May '24 - Nov '24]  
 Organized and prepared questions across logical reasoning and mathematics for a two-round quiz competition across schools for grades 9th - 12th. Handled over 150 Round 1 participants and over 70 Round 2 participants.  
 Designed and implemented a dynamic Code Golfing website, challenging users to solve coding problems with the shortest possible solutions, with a portal for submitting their code and displaying a leaderboard.
- **STUDENT GUIDE, IITGN** [Aug '24 - Apr '25]  
 Guiding and mentoring a batch of ten students throughout their first year.  
 One of the forty selected student guides from the entire undergraduate population at IIT Gandhinagar.

## OTHER ACHIEVEMENTS & EXTRA-CURRICULAR ACTIVITIES

- Selected for InterIIT Volleyball probables.
- Inter school badminton player.