Suraj Sarvesha Samaga | **190020114**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology, Bombay | **Gender: Male**
DOB: 24-03-2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	
Intermediate	CBSE	Lourdes Central School	2019	96.60%
Matriculation	CBSE	Sharada Vidyalaya	2017	10

Pursuing Minor Degree in **Artificial Intelligence and Data Science**

Scholastic Achievements

- Among **11** out of 1000+ students to be awarded **Change of Branch** to **Electrical Engineering** *(2020)*
- Achieved percentile score of **99.35** in *IIT-JEE Advanced* out of 241,000 candidates *(2019)*
- Secured **99.84** percentile score in *IIT-JEE Main* amongst 1,200,000 candidates *(2019)*
- Among the **top 1%** in **National Chemistry** and **Math** Olympiads, selected for INChO and INMO *(2018)*
- Selected for the *Kishore Vaigyanik Protsahan Yojna Fellowship* **(KVPY)** by the Govt. of India *(2018)*
- Attained **AIR 2** and scholarship of INR 30,000 in *Nationwide Education Scholarship Exam* *(2018)*

Technical Projects

Ferroelectric FETs in Non-Volatile Memory | *Research Project* *(May '21 - Present)*

Guide: Prof. Souvik Mahapatra, Department of Electric Engineering, IIT Bombay

- Exploring use of **Ferroelectric FETs** in Non-Volatile Memories to reduce **von-Neumann bottleneck**
- Analysing **polarization switching** and **charge trapping**, crucial for computing memory window for NVMs
- Studying and simulating **Preisach Model** for polarization switching for MFM, MFIM and MFIS structures
- Evaluating various design considerations to ensure optimal **memory performance** and device **reliability**

Matching Pairs Game | *Course Project* *(Apr '21)*

Guide: Prof. Saravanan Vijayakumaran, Prof. V Rajbabu | Course: Microprocessors Lab

- Programmed the memory matching card game on **Atmel AT89C51** micro-controller with an **LCD Module**
- Modelled **Linear Feedback Shift Registers** to generate and display **pseudo-random** sequence of numbers
- Coded in **Embedded C**, used **USB-UART** module and **RealTerm** to interface user inputs from keyboard

Music Tone Generator | *Course Project* *(Mar '21 - Apr '21)*

Guide: Prof. Maryam Shojaei Baghini | Course: Digital Circuits Lab

- Designed **FSM** based music synthesizer using behavioral VHDL on **Krypton CPLD** interfaced with speaker
- Performed **RTL** and **Gate Level** simulations and **scan-chain** testing on **TIVA-C** board for verification

16-bit Multi-functional ALU | *Course Project* *(Dec '20)*

Guide: Prof. Virendra Singh | Course: Digital Systems

- Developed a **signed 16-bit Arithmetic Logic Unit** using 3-fold **Structural VHDL** on Quartus Prime
- Implemented the **Kogge-Stone** fast adder for addition and validated design using **Modelsim** simulations

Graph Neural Networks - Depth | *Winter Internship* *(Dec '20 - Apr '21)*

Guide: Prof. Shanmuga R, Department of Computer Science, IIT Gandhinagar

- Studied the **performance drop** of **GNNs** with **increasing depth** through extensive literature review
- Ideated multiple approaches to overcome the problems of **oversmoothing** and **oversquashing** in GNNs
- Executed architectural and operational changes by combining **graph convolution** with optimization framework **(DropEdge)** to eliminate node convergence, obtained increased accuracy by depth with peak of **84%**

Mars Rover Team | *Image Processing Subsystem* *(Jun '20 - Jun '21)*

Technical Team that designs mission-ready rover to take part in University Rover Challenge, Utah, USA

- Worked on **AR tag** and **tennis ball** detection using OpenCV as a subtask of **University Rover Challenge**
- Part of the team that stood **4th** in the **Indian Rover Design Challenge**, an online rover design competition
- Composed a report on **Point Cloud Data Compression** for efficient data transmission as a part of **IRDC**

Movie Genre Prediction from Posters | *Course Project* *(Apr '21 - May '21)*

Guide: Prof. Abir De | Course: Introduction to Machine Learning

- Performed **multi-class** and **single-class** classification on 7867 movie posters to map to respective genre(s)
- Employed **transfer-learning** on **Tensorflow** to fine-tune pre-trained models, achieved precision of **74%**
- Investigated utility of transfer-learning by comparing performance with **custom Deep CNN** architectures

Football Result Prediction | *Course Project* *(Nov '20 - Dec '20)*

Guide: Prof. Amit Sethi | Course: Programming for Data Science

- Analysed statistical information on **25000+** matches and **10000+** players spread over 11 national leagues and 9 years from the **European Soccer Database** and developed ML models for predicting match results
- Used **SQLite3** and **BeautifulSoup** for data extraction, **Seaborn** and **Scikit-learn** for data visualization
- Trained, tuned and compared **3** classes of **ML Models**, achieving accuracy comparable to betting agencies

UnStructured | *Seasons of Code* *(April '20 - May '20)*

Web and Coding Club, IIT Bombay

- Developed **Deep Learning** models capable of detecting and recognizing text from **natural scene images**
- Worked on the **Google Street View Text** dataset containing just **350** images for training and validation
- Implemented **YOLOv2** algorithm for text detection from scratch and trained model using **transfer-learning**
- Executed a custom **CNN** to classify text in region of interest word-by-word from a dictionary of **5000** words

Positions Of Responsibility

Department Academic Mentor | *Department of Electrical Engineering* *(Apr '21 - Present)*

Selected from 86 undergrad applicants based on a 3-tier procedure including extensive peer reviews and interview

- Mentoring **8** sophomores on managing academic and co-curricular pursuits and helping with general concerns
- Involved in writing **course-reviews** and organizing **tutorial sessions** for challenging department courses

Instructor - Tinkering Bootcamp | *Learners' Space, Technical Summer School* *(Jun '21)*

Summer course organized by IITB students to increase familiarity with basic electronics for DIY projects

- Conducted sessions for **150+** students on the use of **NodeMCU** development board along with live demos
- Integrated NodeMCU with **Blynk App** for IOT applications and with **Google Assistant** for voice control

Technical Skills

Computer Languages	Embedded C, C++, VHDL, Assembly, Python, MATLAB, Julia
Softwares	LaTeX, Quartus, Keil µVision, Xyce, Arduino, AutoCAD
Python Packages	NumPy, Pandas, OpenCV, Matplotlib, TensorFlow, PyTorch

Key Courses

Electrical Engineering	Microprocessors, Digital Systems, Analog Circuits, Electronic Devices, Nanoelectronics, Communication Systems*, EM Waves*, Control Systems, Signal Processing
Lab Courses	Microprocessors Lab, Digital Circuits Lab, Analog Lab*, Communications Lab*, Control Systems Lab*, Power Engineering Lab, Physics Lab, Engineering Drawing
Computer Science	Introduction to Machine Learning, Programming for Data Science, Computer Programming and Visualization, Deep Learning Specialization**

**Courses to be completed by Nov '21, **MOOC*

Extracurricular Activities

- An avid cyclist, earned the title of **Randonneur** under the banner of **Audax Club Parisien** for completeing a **200km** cycling ride well within the stipulated 13.5 hours *(2015)*
- Conferred with gold medal and **Best Outgoing Student** award at **Sharada Vidyalaya**, Mangalore *(2017)*
- Active member of IITB Aquatics team, selected for annual sports fest **Aavhan** and **Inter-IIT** camp *(2019)*
- Participated and led high school swimming team in various **district** and **state level** swimming meets *(2016)*
- Organized 14-day crash course on **Pre-College Mathematics** for competitive exams at CFAL-India *(2019)*
- Competed and excelled in various **inter-school Quiz Competitions** like Thomas Cook Travel Quest, **Red FM Battle of Brains**, Inquisitive-NITK, Technospark-17, The Hindu Quiz *(2016)*