Aaron Jerry Ninan | **190100001**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology, Bombay | **Gender: Male**
DOB: 22-03-2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	9.3
Intermediate	CBSE	Delhi Public School, Bhilai	2017	10
Matriculation	CBSE	Delhi Public School, Bhilai	2019	94.80%

Pursuing Minor in **Computer Science and Engineering**

Scholastic Achievements

- Awarded **Branch Change** to Departement of Electrical Engineering for **Exemplary Academic Performance** in the first year (among 8 students to do so out of 1000+)
- Secured an **All India Rank of 599** in JEE Main and **785** in JEE Advanced among 1.2 million candidates *2019*
- Among the **Top 300** students in **Indian National Olympiads** of Physics, Chemistry, and Astronomy *2019*
- Qualified **Twice** for **Indian National Mathematics Olympiad**, conducted by the **Homi Bhabha Centre for Science Education**, the second stage to **International Mathematics Olympiad(IMO)** *2018, 2017*
- Awarded the prestigious **KVPY fellowship**, for securing **All India Rank 292**, by the **Department of Science and Technology, Govt. of India** for research career in science and technology *2017*

Research Experience

UAV Control using Gesture Recognition *May '21 - Present*
Guide: Prof. Michael Felsberg | Research Intern *Computer Vision Lab, Linköping University, Sweden*

- Worked on real-time gesture recognition using UAV camera, for efficient control of UAV in an outdoor setting
- Adapted the methods from **Temporal Pyramidal Network(CVPR 2020)** for action recognition and achieved an Top-1 accuracy of **94.29 %** , with **716.89 fps** and **latency of 0.0893** seconds, improving the current **SOTA** of **91.9 %** set by **Pose-CNN** on the **UAV-GESTURE** dataset
- Proposed a **Time-Series** based approach using key features like **Pose Coordinates**, angles, angular velocity, and distances between joints for input to an **LSTM** based architecture for gesture classification.

[**Work planned to be submitted to IEEE ICRA 2022**]

Topological Data Analysis *May '21 - Present*
Guide: Prof. Debasish Chatterjee | Summer Undergraduate Research Programme *IIT Bombay*

- Studied introductory **Group Theory** and **Algebraic Topology(Simplicial Complexes)**, for various applications in biological data, control theory and learning methods
- Read literature on applications of **Persistent Homology** in **Human Gait Analysis** for disease classification, **Consensus** on simplicial complexes, **Path Planning**, Topological Mapping using **Swarm Robots**

Key Projects

Compressive Sensing over Graph Structures *Spring '21*
Guide: Prof. Ajit Rajwade | Advanced Image Processing Course Project *IIT Bombay*

- Implemented the **DICeNod** algorithm for identifying nodes with **highest information flow** in **social networks** using **compressive sensing** without full knowledge of the network topological structure.
- Verified and elucidated the recovery guarantees of the **Sparse Centrality Vector** from the proposed **Sensing Matrix** using properties of **Lossless Bipartite Expander Graph** by writing **formal proofs**

Software Subsystem | IITB Mars Rover Team *June '20 - Present*
A cross functional team of students which designs and fabricates a semi-autonomous rover for the University Rover Challenge, an international robotics competition conducted by The Mars Society annually in Utah, USA

- Impemented various **Image Processing** algorithms to detect **AR tags** from live video feed.
- Developing an **Android Client** for receiving GPS location and various other inertial measurements sent by the Rover using **Robotic Operating System(ROS)** framework
- The team secured **4th** in the overall ranking in the **Indian Rover Design Challenge (IRDC) 2020** among 28 teams from 7 different countries

Core Developer | Devcom IITB *June '20 - June '21*
Community of developers responsible for maintaining/developing software for applications within the institute

Hostel Room Management Portal *September '20*

- Developed the **API** of a centralized portal for Hostel Coordination Unit of IITB for easy management and tracking status of hostel room allotments and students within the institute
- Deployed the backend of the portal using **Django REST framework**

Math Image to Latex Conversion *May '20*
Institute Technical Summer Project *IIT Bombay*

- Designed and Developed an application which **solves definite integrals** from handwritten camera images
- Implemented End-to-End **Sequence Models** with a **CNN based Encoder** and an **RNN based Decoder** to predict LaTeX sequences of math expressions from its handwritten camera image
- Proposed a **Parsing Algorithm** for extracting syntax information from relative coordinates of expressions
- Deployed the **API** for the application using **Flask** micro web framework on **cloud**

Conversational Chatbots *May '20*
Seasons Of Code, 2020 *Web and Coding Club, IIT Bombay*

- Developed an **Android** application in **Java** capable of doing natural language conversations with the user
- Trained a **Sequence model** with **Attention Mechanism** on the Cornell Movie-Dialogue Dataset
- Deployed the backend **API** for model inference on **Amazon Web Services (AWS)** EC2 instance

Video from a Single Exposure Coded Snapshot *Spring '21*
Advanced Image Processing Assignment *IIT Bombay*

- Implemented a **MATLAB** solution for **coded aperture compressive temporal** imaging to recover a sequence of frames from a single coded-snapshot to achieve temporal gains in video acquisition
- Did an overlapping patch-wise reconstruction using **OMP** algorithm assuming sparsity in **2D-DCT** basis

Quantum Computing Reading Project *May '20*
Maths and Physics Club *IIT Bombay*

- Studied various quantum computing algorithms like Teleportation, Deutsch Josza algorithm, BB84 Protocol, Grovers Algorithm, and Quantum Fourier Transform and their applications.
- Implemented the algorithms using **Qiskit** notebooks on **IBM Quantum Experience** cloud platform.

Aerial Robotics *May '20*
Aeromodelling Club *IIT Bombay*

- Studied and Analyzed Mechanics of flight and the design of **Quadrotor Flying Robots** to develop dynamic models, derive controllers, and synthesize planners for operating in 3D environments
- Simulated the control of Quadrator in 3 dimensional environment using **MATLAB**

Decentralized Social Media *October '19*
Bitgrit Blockchain Hackathon *IIT Bombay*

- Wrote a **Smart Contract** in **Solidity** for simulation of interpersonal relationships using **Blockchain** eliminating third party interference and bagged **4th** position in the hackathon with a **special mention**

Positions of Responsibility

Department Academic Mentor *May '21 - Present*
Department Academic Mentorship Programme *IIT Bombay*

- Part of 35-member team, selected from **86 applicants** on the basis of **interview** and extensive **peer review**
- Mentoring **4 sophomores** to help them with academic issues, time management and extra-curricular endeavours
- Functioning as the **First Point of Contact**, aiding the communication between students and faculty

Technical Skills

Languages	C/C++, Python, MATLAB, VHDL, MIPS Assembly
Softwares/Packages	Pytorch, Tensorflow, Android, Django, Arduino IDE, LaTeX, ROS, OpenCV, AWS

Key Courses Undertaken

EE	Analog Circuits, Digital Systems, Signal Processing, Probability and Random Processes, Microprocessors, Electronic Devices, Control Systems, Communication Systems*
CSE	Advanced Image Processing, Data Structures and Algorithms, Computer Networks, Foundations of Intelligent and Learning Agents*, Machine Learning for Remote Sensing*, Learning with Graphs*
Mathematics	Calculus, Differential Equations, Linear Algebra, Complex Analysis

**to be completed by Dec '21*

Extracurriculars

- Volunteered as a one-to-one **mentor** to school students during the **COVID-19 pandemic crisis**
- Participated in **FOSS Hackathon 2020** and developed an email manager with tracker as part of it
- Completed one year long course in **National Sports Organisation in Football, 2019-2020**
- Stood **4th** in **Football General Championship 2020** representing Hostel 16,IITB
- **1st Dan Black Belt** in **Karate**, with 5+ years of professional training in **Shito-Ryu** form
- Received **2 Silver Medals** in **All India Seiko Kai Karate Do Championship** in Kumite and Kata events
- Professionally trained **Pianist** in **Western Classical Music**
- Secured **1st** position in state in ALOHA Abacus and Mental Arithmetic Competition