Saqib Azim | **150070031**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Male**
DOB: 04/11/1996

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2019	8.37
Intermediate/+2	Central Board of Secondary Education	kendriya Vidyalaya No. 2, Ishapore	2014	92.60
Matriculation	West Bengal Board of Secondary Education	Vidya Vikash High School	2012	87.57

Pursuing **Minor** in Computer Science and Engineering at IIT Bombay

Internship

Airwriting Handwriting Recognition using Samsung Gear Watch [May '18 - Jul '18]
Guide: Dr. Shankar M Venkatesan *Samsung Research Institute Bangalore*

- Employed **Adaptive Threshold Algorithm** on sensor data for watch position estimation using integration approach
- Used **Kalman filter** and **Spectral Subtraction** for removing static bias and mitigate noise from sensor signal
- Segmented watch data and position coordinates of handwritten characters from vacom tablet based on timestamps
- Implemented **Support Vector Machine** and **Linear Regression** for Spotting (separating handwriting and non hand-writing data) and projecting sensor data to writing plane respectively

Research And Technical Projects

Zero Shot Learning for Object Recognition [May '17 - Aug '17]
Guide: Prof. Subhasis Chaudhury *Electrical Engineering, IIT Bombay*

- Implemented a semi-supervised **VGG** based model in **Tensorflow** to predict labels of classes unseen during training
- Investigated and provided a solution to the projection **Domain Adaptation** problem in zero-shot-learning
- **Improved** accuracy from **58.7%** to **65.3%** on AwA unseen classes using **Deep Visual-Semantic Embedding Model**

Indoor Positioning System using WiFi [Jan '17 - Dec '17]
Supervised Research Exposition under Prof. S Srikant *Systems and Controls, IIT Bombay*

- **QuarterFinalist(Top 500/15k teams)** of **India Innovation Challenge** conducted by IIM Banglore & Texas Instruments
- Designed and Developed a system to locate a specific wifi node on a wifi network in indoor environment
- Implemented **Multi-Array Antenna** model to estimate angle of receiver w.r.t the transmitting node
- Built an **LSTM** network with inputs as received signal strength, path loss exponent and time difference of arrival (TDoA) to estimate distance of object from the reference node and achieved **3.71 cm accuracy** on scale of **2.16 m**

Driverless Car - SeDriCa [Sep '17 - Mar '18]
Mahindra Rise Driverless Car Challenge *Innovation Cell, IIT Bombay*

- Studied the problem of **mitigating shadow effect** on roads/lanes for road detection using Image Processing
- Developed a proof-of-concept with Neural Network trained on Indian Road Dataset for road and obstacle detection

Hand Gesture Recognition System [May '16 - Jun '16]
Institute Technical Summer Project *Electronics Club, IIT Bombay*

- Designed gloves that transliterate **Sign Language** into **Text and Speech** to help differently abled people communicate
- Developed an Android App using Java based **Android Studio** to interpret the data and convert it to speech

Open Source Contribution : Kivy - Python Library [Dec '16 - Mar '17]

- Merged **9 Pull Request** to Kivy and **2 Pull Request** to Kivent - an entity based game engine for Kivy
- Introduced **new feature** in Kivent to get tile index for orthogonal, isometric and hexagonal game maps

Institute Summer of Code [Jul '16 - Oct '16]

- Built a **Command Line** and **GUI Application** for maintaining the database of students and teachers in the institute
- Designed and Implemented a scientific calculator in Python using **PyQt** library

Bare Metal Programming to interface Raspberry Pi and Linux Host [May '16 - Jul '16]
Summer Undergraduate Research Project under Prof. M Chandorkar *IIT Bombay*

- Successfully transmitted data between R-Pi Host and Linux Host using **UART** Communication Protocol
- Implemented a kernel in **Assembly Language** for Broadcomm Processor to draw different shapes and color patterns

Krushimitra (The Farmers Friend) [Jun '16 - Jul '16]
Student Technical Activities Body *IIT Bombay*

- Designed and Implemented an easy to use, **Automatic Field Watering System** for farmers which delivers the optimal water requirement after considering inputs such as soil moisture content and temperature

Academic Projects

Optimization of Sensing and Representation Matrix in Compressive Sensing [Feb '18 - Apr '18]
Advanced Image Processing under Prof. Ajit Rajwade

- Implemented a framework for joint design and optimization of sensing matrix and non-parametric dictionary
- **Improved** reconstruction accuracy on image patches using **Coupled-KSVD** and **OMP Algorithm** compared to using gaussian random sensing matrix and overcomplete dictionary learned using standard KSVD

Photoplethysmogram (PPG) Signal Acquisition Module [Jan '18 - Apr '18]
Electronics Design Lab under Prof. P C Pandey

- Designed and Built a **Hardware Module** for faithful acquisition of PPG signal with low noise and minimal filtering
- Implemented baseline restoration and auto-LED intensity control to account for varying skin color, shapes & pressure
- Provided bluetooth based connectivity to display the processed signal on smartphone and laptop

Image Registration using FFT [Jan '18 - Apr '18]
Digital Signal Processing under Prof. V M Gadre (Selected in Top 5/40 projects)

- Built a FFT based tool for registering and mosaicing images captured from different view-points and scales
- Used **Phase Correlation** in log polar coordinates for rotational alignment, impulse location for translation alignment
- Presented this project at **MHRD-TEQIP-KITE** Resource Creation Workshop under initiative of MHRD, Govt. of India

Music Information Retrieval from EEG signals [Sep '17 - Nov '17]
Probability and Random Processes under Prof. G Kasbekar

- Applied **Onset Detection Techniques** on EEG recordings to extract the tempo of the corresponding stimulus
- Implemented **Tempogram Estimation** using autocorrelation technique assuming EEG as the novelty curve
- Achieved a difference of 1 bpm in actual tempo and calculated tempo from the EEG data

Processor Design and Testing [Aug '17 - Nov '17]
Microprocessor under Prof. Virendra Singh

- Designed and Implemented a six-stage **Pipelined** RISC processor and a **Multicycle** RISC processor in VHDL
- Implemented **Data Forwarding** and **Branch Control** to prevent structural and control hazards

Scholastic Achievements

- Secured **All India Rank 1133** in JEE Advanced among 150,000 candidates [2015]
- Awarded for participating and **Qualifying** in Stage I and II of PTSE successfully [2011]

Software & Programming Skills

Languages: C/C++, Python, VHDL, Java (Android), Assembly, LaTeX

Tools & Softwares: MATLAB, TensorFlow, Git, Numpy, OpenCV, Quartus, Scilab, Arduino

Relevant Courses

- **Computer Science:** Data Structures and Algorithms, Advanced Image Processing, Introducing to Machine Learning, Operating Systems, Computer Networks
- **Electrical Engineering:** Digital Signal Processing, Digital Communication, Communication Systems, Microprocessors, Digital Systems, Control Systems, Network Theory, Supervised Research Exposition
- **Mathematics & Statistics:** Optimization Techniques*, Estimation and Identification*, Probability and Random Processes, Data Analysis and Interpretation, Differential Equations II, Complex Analysis, Linear Algebra

  * *To be completed by November '18*

ExtraCurriculars

- Mentored **four** freshmen teams in **XLR8 '16** and **ITSP '17** to help them ideate and build their projects
- Presented Indoor Positioning System at **Tech & Rnd Exposition**, IIT Bombay [2017]
- Completed **one** year teaching Maths and Science to NGO students under **National Service Scheme**, IITB [2015-16]
- **Interests:** Vision, Robotics, Signal and Image Processing, Machine Learning, Enthusiastic Programmer, Football