

## MAJOR PROJECT & SEMINAR

- **M.Tech Project: An efficient channel estimation scheme in TDD MIMO Systems** (May'19 - Present)

Guide: Prof. Kumar Appaiah, Electrical Engineering, IIT Bombay

### Objective:

- To design an efficient channel estimation scheme in TDD with the help of **feedback** in MIMO Communication which will reduce the effect of pilot contamination on MIMO channel estimation.

### Completed work:

- Implemented **Multi Cell MMSE based MIMO precoding** in multiple antennas systems which used non-orthogonal pilots for channel estimation.
- Analysed and implemented **covariance based channel estimation** which uses Bayesian Estimation in single cell system and observed its performance based on rate vs number of antennas.
- Implemented **Kalman estimation** for single cell multi antenna system.

### Ongoing work:

- Working on implementation a basic precoder which utilises the information obtained from **Kalman** estimate in **coordinated MIMO** systems.

- **M.Tech Seminar: Inter cell interference in Multi Cell MIMO systems** (Jul'18 - Nov'18)

Guide: Prof. Kumar Appaiah, Electrical Engineering, IIT Bombay

- Studied the structure and working of **MIMO systems** and impact on BER on using Non-orthogonal pilot sequences for channel estimate.
- Simulated **BER vs SNR** for MIMO systems in Interference and Interference free scenarios to study the impact of pilot contamination on the performance of the system.

## WORK EXPERIENCE & NON ACADEMIC PROJECT

- **Interview Management Software | Electrical Engineering Department, IITB** (Feb'18 - present)

Guide: Prof. Bikash kumar Dey, Prof. Madhu N Belur, Electrical Engineering, IIT Bombay

- **Roles and responsibilities:** Lead role in building online system that made automatic coordination across interview committees possible through their interfaces..
- Online system allowed committees to decide in real-time using a mobile/PC-browser about interviews.
- Built various other peripheral interfaces to collect data at different times from students and other sources.
- This system was used in the last 3 admission sessions with success.

- **Systems Engineer | Infosys Technology Ltd** (Dec'15 - Jul'17)

- **Tools Used:** Oracle Peoplesoft.
- **Roles and responsibilities:** part of the team which developed an application which automates billing for the customers of the client.
- Wrote SQL queries to fetch data to the module and to develop features using Oracle Peoplesoft ERM tool.
- Assisted in designing billing template in XML and in completion of Technical Document Report for the project.

## KEY COURSE PROJECTS AND SEMINAR

- **Scheduling in 4G LTE** (Jan'18 - Apr'18)

Guide: Prof. Abhay Karandikar, Electrical Engineering, IIT Bombay

- Studied about different scheduling schemes for resource block allocation to users in LTE systems.
- Implemented channel aware scheduling schemes such as Maximum Throughput, Proportional Fairness, Throughput to Average and compared all three scheduling schemes based on cell throughput, average user throughput and Jain Fairness index.

- **Simulation of Cellular System in Octave** (Jan'18 - Apr'18)

Guide: Prof. Abhay Karandikar, Electrical Engineering, IIT Bombay

- Computed **SIR, blocking probability** for different cluster sizes and **sectoring**. Analyzed **handover** process and **ping-pong** rate for different user mobilities and hysteresis values.
- Analyzed BER performance for **space** and **time diversity** in a slow flat fading Rayleigh channel.
- Analyzed BER performance for a single-cell and multi-cell scenario in a **CDMA** cellular system.

- **Image Dehazing using color attenuation prior and dark channel prior** (Jul'18 - Nov'18)  
Guide: Prof. Amit Sethi, Electrical Engineering, IIT Bombay
  - Implemented **Color Attenuation Prior and Dark Channel Prior** techniques to estimate the Depth map.
  - Implemented **Guided Filter** to reconstruct the Haze-free image using Hazy Image and its Depth map.
- **Basic Image Editor tool in Python** (Jul'18 - Nov'18)  
Guide: Prof. Amit Sethi, Electrical Engineering, IIT Bombay
  - Built a **GUI tool using PyQt** to implement Histogram Equalisation, Gamma correction, log transformation, Horizontal and Vertical edge detection using Sobel operators, blurring and sharpening with a mechanism to control the extent of blurring and sharpening respectively .
  - Implemented **Image Deblurring** using Inverse filter, Truncated inverse filter, Weiner filter, Constrained least square filter and analysed the performance with help of metrics PSNR and SSIM.
- **Wavelet based leaders and P leaders in Multi Fractal Analysis** (Jul'18 - Nov'18)  
Guide: Prof. Vikram M Gadre, Electrical Engineering, IIT Bombay
  - Studied about **p-exponents** and **p-leaders** which measure negative regularity which appear in most real time signal analysis.
  - Simulated p-leaders for several signals and were able to prove their convergence with **DWT based Wavelet leaders** as **p** becomes large.
- **Spam URL classification using Machine Learning** (Jan'19 - Apr'19)  
Guide: Prof. Gaurav S kasbekar, Electrical Engineering, IIT Bombay
  - Exposure of 3 among the Top-10 vulnerabilities of **OWASP** Standard with practical implementation and proposed solutions.
  - Spam URL classification using Machine Learning Techniques like **Logistic Regression, Naive Bayes, Support Vector Machine, One-vs-Rest**.
  - An increase of **3 percent** in accuracy was obtained by replacing logistic regression by one vs rest classification.

## RELEVANT COURSES

- |                                      |                               |                    |
|--------------------------------------|-------------------------------|--------------------|
| • Wireless and Mobile Communications | • DSP and its Applications    | • Image Processing |
| • Applied Linear Algebra             | • Statistical Signal Analysis | • Network Security |
| • Information Theory and Coding      | • Optimisation                | • Wavelets         |

## TECHNICAL SKILLS

- Languages** : C, C++, Python, Bash scripting, HTML, PHP
- Tools** : Matlab/Octave, L<sup>A</sup>T<sub>E</sub>X, Git.

## POSITIONS OF RESPONSIBILITY

- **System Administrator: PC Lab, Electrical Department, IIT Bombay** (Jul'17 - Present)
  - Building and maintaining website of EE department, maintaining TA feedback and allotment portals.
  - Provide mail service, storage space, computing facilities and network facilities to department.
  - Designed online portals and automated Interviews co-ordination in the department admission process.
- **Web Nominee: Post Graduate Academic Council, IIT Bombay** (Jul'18 - Jun'19)
  - Designed new web portal for PGAC which is used by all the Post Graduate students of the institute.
- **Mess Secretary: Hostel-1, IIT Bombay** (Sep'17 - Mar'18)
  - Managed all mess related activities for a mess which catered for 250+ students with an approximate budget of 8,00,000/- per month.

## CO & EXTRA CURRICULAR ACTIVITIES

- Conducted a introductory session on **Linux, vim and Git** as a part of Bridge Course which helps in smooth transition of new joiners to institute. (2019)
- Volunteered for an introductory session on **Python** which was conducted as a part of Bridge Course. (2019)
- Completed **Machine Learning** course by **Andrew Ng** from Coursera. (2019)
- Completed a **100 hrs** course on **Chinese** language conducted by International Relations office IIT Bombay. (2019)
- Completed Basic course in **French** Language from Vivekananda Institute of Languages, Hyderabad. (2013)
- Completed Diploma in spoken English from Vivekananda Institute of Languages, Hyderabad. (2012)
- Active member of **National Service Scheme (NSS)** for 2 years and attended a camp conducted in a village to perform social activities like conducting medical camps, cleaning and painting common facilities like village panchayat, temple etc. (2013)
- Volunteered for 1<sup>st</sup> **World Parliament on Spirituality** for a week as part of NSS activity. (2012)