

## EDUCATION

### IIT KANPUR | B.TECH IN ELECTRICAL ENGINEERING

July 2015-current | **Cumm. Grade point- 9.9/10**

### KHALSA COLLEGE PUBLIC SCHOOL | GRADE XII, CBSE

Grad. May 2015 | Amritsar, India | **Percentage: 92.8%**

### SACRED HEART CONVENT SCHOOL | GRADE X , ICSE

Grad. May 2013 | Village Punga, Teh. Ajnala, Amritsar, India | **Percentage : 94%**

## ACHIEVEMENTS

- Among the top 0.3% of the 1.5 million applicants in JEE Mains 2015.
- Secured All India Rank 1168 in JEE Advanced 2015 among the 120 thousand shortlisted candidates.
- Received the Academic Excellence Award for exceptional academic performance both in 2015-16 and 2016-17 academic session.
- Secured Rank 1 in "Super 50" Exam conducted by Khalsa College Public School and Government of Punjab.
- Secured All India Rank 3899 in JEE Mains 2015 among 1.5 million candidates.
- Received a research grant for a three months long project under the **Summer Under-graduate Research and Graduate Excellence (SURGE'17)** programme at IIT Kanpur.

## INTERNSHIP

Texas Instruments, Bangalore

- Created an automated FIFO(First In, First Out) TestBench Generation Python script, generating a TestBench which takes some arguments to determine its starting conditions.
- Worked on several FIFO configurations having single/multiple read and write Clocks.
- Generated Logic For Calculating optimal Latency in terms of number of samples.
- Constructed logic for catching Overflow/Underflow in several FIFO configurations. Used that to create assertions for both Overflow and Underflow in any generic synchronous FIFO.

## RESEARCH PROJECTS

### SHORT TERM TRAFFIC PREDICTION USING DTC | PROF. KETAN RAJAWAT

Mar'17-Ongoing | Kanpur,India

- Implemented matrix completion via rank minimization using the SVT (Singular Value Threshold) algorithm.
- Successfully implemented the Dynamic tensor completion(DTC) designed in such a way so as to utilize the multimode information to utilize to forecast traffic data while maintaining the low rank constraint.
- Collected Traffic data from PeMS and structured it into a 4-D tensor.Ran DTC on this tensor to obtain the MAE(Mean Absolute Error) close to 10. Our intent is to design a fast online algorithm for predicting Real time Traffic data.

### TV DENOISING OF SIGNALS WITH POISSON DISTRIBUTION | PROF. IVAN SELESNICK, NYU

May'17-Ongoing| Kanpur, India

- Learned and worked on problems related to sparse regularization and total variation(TV).
- Gained knowledge about the benefits of having a signal with sparse representation.
- Looked into the model of Poisson distribution and Analyzed the differences b/w the Poisson noise and the Gaussian noise. Determined the problems with the Poisson noise like the dependence of variance on the input signal, presence of log(x) in the fidelity term etc.
- Implemented the total variation Denoising (TVD) algorithm for Poisson noise using alternating direction method of multipliers (ADMM).our target is to propose a non-convex penalty(more sparse than  $l_1$  norm) for the objective function.
- our Aim is to propose a non-convex penalty (more sparse than  $l_1$  norm as penalty) for getting a much better solution as compared to present methods.

### HRTF PHASE SYNTHESIS USING GROUP DELAY COMPENSATION FILTER | PROF. R.M. HEGDE

May'17-Ongoing| SURGE,IIT Kanpur

- learned about the Head-Related transfer function(HRTF) and ITD.
- studied dependence of ITD on the frequency of a signal.
- Determined the dependence of Group delay of an HRTF Filter on frequency and the relation b/w group delay and ITD (Interaural Time Difference).Designed 2nd and 32 order group delay equalization filters using two different techniques.
- Aim to use these techniques for constructing a head model with constant group delay and use it for ITD calculation.

## OTHER PROJECTS

### CODING TASKS | RTE INTERNSHIP , IIT KANPUR | MAY'17 - JULY'17

Improve Phabricator-Jenkins integration :

- Show summary of compiler error/warnings in the Jenkins comment on Phabricator.

Fix automatic version bump setup

- Bump the version number automatically . Depending on the command ,it will bump the Major/ Minor/Patch accordingly before publishing the app.

### TOROID WINDING MACHINE | MANUFACTURING COURSE | FEB '17 - APR'17

- Designed model of a toroid winding machine involving a team of 8. Won the consolation Prize in class of 400 students.

### DECAPTCHA | INTRODUCTION TO MACHINE LEARNING | AUG '17 - NOV'17

- broke the CSE online Squirrel Mail client captchas.
- Methodolgy adopted included
  - Preprocessing - Algorithms used Correlational Filtering,K-means filtering,Selective filtering.
  - Segmentation - Used Column based segmentation and Connectivity based segmentation.
  - Classification - Used Convolutional Neural Network/Autoencoders for Classification.
- Worked on Both Python and MATLAB environment with a team of 5.
- Achieved an accuracy of 97.94% with CNN and an accuracy of 98.24% with Autoencoders.

## **SIMULTANEOUS LOCALIZATION AND MAPPING(SLAM), UGP MENTOR: PROF. KETAN RAJAWAT, DEPARTMENT OF ELECTRICAL ENGINEERING|Aug'18-ongoing**

- Aiming to Validate One-sensor based SLAM algorithms using our own collected Dataset of different sensors
- Aim to design algorithms for better fusion of multiple sensors for enhancing the results and getting rid of the outliers

## **CAN CRUSHER | MANUFACTURING PROCESSES COURSE | AUG '16 - NOV'16**

- Self designed and fabricated model of a Can crusher which involved a collective work of team of 4.
- Could be helpful in reusing coca cola cans and thus saving environment.
- Used manufacturing processes Like Welding,Brazing,sheet metal forming,Molding etc.

## **RELEVANT COURSES**

- |                                   |  |                                 |
|-----------------------------------|--|---------------------------------|
| • Signal,Systems and Networks(A)  | • Partial Differential Equations (A)             | • Computer Organization (A*)    |
| • Data Structures and Algorithms  | • Ordinary differential equation (A)             | • Digital Signal Processing (A) |
| • Fundamentals of Computing (A)   | • Machine Learning, Coursera,Stanford university | • Power Electronics (A*)        |
| • Linear algebra (A)              | • Communication skill and composition            | • Electro Magnetic Theory (A)   |
| • Introduction to Electronics (A) | • Introduction to Electrical Engineering (A)     | • Wireless Communication*       |
| • Control systems analysis (A)    | • Principles of Communication(A)                 | • Computer Networks*            |
| • Microelectronics (A*)           | • Digital Electronics and Microprocessor (A)     | • Analog/Digital VLSI Design*   |
| • Introduction to Economics (A*)  | • Power Systems(A)                               | • Macroeconomics*               |
| • Probability and Statistics (A*) | • Introduction to Machine Learning (A)           |                                 |

A\*: Grade for exceptional performance

A: Grade for good Performance

\*Ongoing courses

## **TOOL-KIT**

Languages: C, C++, HTML,  $\LaTeX$ , MATLAB, Python, Bash, Gawk, Java

Softwares and Libraries: Git, Tensor Toolbox, Jenkins, Phabricator, Micro-Cap, GNU Octave

Microcontrollers : Arduino, AtMega

Operating System : Windows, Linux

Electronics simulator : Proteus ISIS

## **POSITIONS OF RESPONSIBILITY**

Student Guide| Counselling Service,IIT Kanpur|July'16-Apr'17

- Mentored and guided 6 freshmen in dealing with their emotional and academic predicaments.
- Acted as a link between the students and the professional counsellors.
- Helped in organizing and managing Orientation Program for smooth induction of fresher students.
- Co-ordinated with a team of 150 colleagues for the orientation of first year students.
- Mentored 6 fresher's to acclimatize to the IIT K environment by establishing cordial communication lines with them and guiding them in all walks of life especially during their initial days.
- Successfully handled problem case such as depression and distraction from studies.

Volunteer | Student Placement Office , IIT Kanpur|Nov'16-Dec'16

- Managed logistics of shortlisting tests , interviews for the recruiting process.
- Handled recruitment process of companies like Tower Research, IBM ,edelweiss.
- Acted as a link between Placement core team,companies and Students during placement process.

## **EXTRA -CURRICULARS**

- Won in Volleyball event during Intramurals'15 at IIT Kanpur.
- Part of the Runner up volleyball Team in Inferno'15, an inter-hall sports event .
- volunteered in various events like Techkriti (workshops) , Udghosh etc.
- participated in Electromania in Takneek'15, the intra-IITK Science and Technology Championship.

## **OTHER INTERESTS**

VolleyBall •Cricket