

KARTIK KULGOD

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INTEREST

Solving real world problems to make life better using communication technology & signal processing

EDUCATION

Birla Institute of Technology and Science, Pilani

August 2015 - Present

B.E. (Hons.) Electrical & Electronics Engineering

Overall GPA: 8.909/10

City International School, Pune

March 2015

High School

Overall Percentage: 96.8%

School Topper

PROJECTS

Long Term Evolution (LTE) & 5G

July 2018 - December 2018

Student Trainee

Samsung Research & Development Institute, Bengaluru

- Designed a simulator in C, based on the Cavium CNF75XX octeon processor for the following features: Uplink 256QAM (introduced in 3GPP Rel. 14), LAA - OTAR (License Assisted Access - Over The Air Rekeying)
- Developed tools for analysing logs generated by eNB using Python scripts, potentially *saving hundreds of hours*.

Satellite Communication

May 2018 - Present

Telemetry

Team Pixxel

- Pixxel is a pan-India team of students planning to participate in IBM AI XPrize. We aim to launch a satellite and use images to solve problems using AI. As an engineer I worked on establishing communication between transmitter and receiver at 433MHz center frequency and 25 kHz bandwidth with MSK modulation. We are currently researching S-band communication and optical inter-satellite communication.

Brain Signal Processing

January 2018 - May 2018

Prof. Veeky Baths

BITS Cognitive Neuroscience Lab

- Worked on left and right hand *motor imagery* (mu-band: 8- 12 Hz) based *brain computer interface*
- Calculated Event Related Desynchronisation (ERD) using Bandpower method and designed *notch*, *bandpass FIR* and *Common Spatial Filters* using *MATLAB* to generate feature vectors
- Tested the scripts on datasets gathered from experiments conducted at the lab, and [dataset 2A from BCI Competition IV](#). Classified the feature vectors to achieve an accuracy of 68% and Cross Validation score of 0.76.

All Pass Filter Design using Current Feedback Op-Amps

August 2017 - December 2017

Prof. Dipankar Pal

- Designed a first order all pass filter using a Current Feedback Operational Amplifier and realised the circuit using *45 nm CMOS* technology. Simulated the design on *Cadence Virtuoso* from a frequency range of 1 μ Hz to 1 THz. Achieved a gain of 0 dB with variation of 0.023% over the entire frequency range. [\[Project Page\]](#)

Internet of Things

May 2017 - July 2017

Intern

Ericsson R&D, Bengaluru

- Designed a simulacrum of a Smart Irrigation system that can control the movement of irrigation sluices depending on the water level in the field. Added a provision for a web server that displays the water level in the field, while also allowing the user manual control of the gates.

Hyperloop India

Electrical & Electronics Engineer, Embedded Systems - Software Lead

August 2016 - November 2017

Goa - Bengaluru - Los Angeles

- We were the *first* team to have represented India and the only two finalists from Asia, who had been selected to race our pod at the [SpaceX Hyperloop Pod Competition](#). The pod was built in a *record time of 3 months*. The pod was later presented to *Indian Prime Minister & advisor to the President of the USA* at [Global Entrepreneurship Summit 2017](#). We were also the winner of the [Hyperloop One Global Challenge](#).

My various roles as an Electrical and Electronics Engineer were:

- Selected over 30 sensors for measuring attitude (yaw, pitch, roll), kinematic variables (x, \dot{x}, \ddot{x}) in X,Y & Z co-ordinates, temperature, pressure, battery current, voltage and more. Wrote drivers for those sensors and actuators for a Teensy 3.6 MCU (ARM Cortex M4) running FreeRTOS, using *communication protocols* such as *I²C, SPI, UART and CAN*.
- Designed the schematics of the PCBs of the 4 major nodes on *Eagle CAD*. Tested the PCBs and all Electrical and Electronic Components at *DRDO's* vacuum chamber.
- *Assisted* with *industry standard* wiring and connector practices. Performed an exhaustive Failure Mode and Effects Analysis (FMEA) and implemented adequate redundancy. [\[Project Page\]](#)

ABU Robocon

March 2016 - March 2017

- The objective was to deploy a robot that launched polyurethane frisbees at specified points. As a member of the team I wrote the software for the brushless DC motor based launch system and for transmitting data among 3 Atmel 8-bit AVR microcontrollers using I2C Protocol and controlling the 4 wheel omni-drive base. [\[Project Page\]](#)

TECHNICAL SKILLS & SOFTWARES

C, MATLAB. *Comfortable with Linux and Windows OS*

RELEVANT COURSEWORK

- **Major courses:** Signals & Systems, Communication Systems, Digital Signal Processing, Data Communication & Networks, Mobile Telecom Networks, Microprocessor & Interfacing, Analog & Digital VLSI Design, Real Time Systems, Computer Architecture, Digital Image Processing.
- **Math:** Statistical Inference & Application, Calculus, Probability & Statistics, Linear Algebra & Complex Analysis, Ordinary & Partial Differential Equations, Optimization.

SCHOLASTIC ACHIEVEMENTS

- **KVPY** (*Kishore Vaigyanik Protsahan Yojana*) 2015 Scholar *selected among 200,000 students*.
- **All India Rank 1091** among 1.5 million students in *JEE (Mains)* 2015
- **School topper** in National Science Olympiad & International Mathematics Olympiad for several years

MENTORING & MANAGING EXPERIENCE

- **Teaching Assistant** for **Microprocessors & Interfacing course**, taught to *over 250+* CS & EE students
- **Panel Coordinator** for *Electrify* during Quark (the Technical Festival), comprising of events related to Electrical Engineering concepts. Managed a team of *13 people*, and *introduced a new headliner event, The IoT hackathon*.

MISCELLANEOUS

Hobbies

- My hobbies include playing guitar, a game of squash and watching Formula 1.

Community Service

- Supporting NGO's for teaching street children.
- Collecting funds/household items from neighborhood for victims of natural calamities.