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: 8.732/10
Ranked 9th in Dept.

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), Frequency Domain Equalization, 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 435MHz 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 using 3 algorithms (LDA,SVM & Logistics Regression) implemented in Python. Achieved an accuracy of 68% and Cross Validation score of 0.76. [Project Page]

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 µHz 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 *August 2016 - November 2017*

Electrical & Electronics Engineer ***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 $I^2C, SPI, UART$ 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

MATLAB, C, Assembly Language (x86), Arduino, Orcad PSpice, Eagle CAD, Proteus, Cadence Virtuso, Python, Simulink, Verilog, HTML & CSS, LaTeX. *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.
- **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.