AREAS OF INTEREST

Embedded Systems, Energy Harvesting, Internet of Things

TECHNICAL SKILLS

- **Languages**: C/C++, Python, Bash, VHDL
- **Tools & IDEs**: Git, LaTeX, Atmel Studio, Code Composer Studio, Eagle, Quartus, MATLAB

MAJOR PROJECT AND SEMINAR

- **Design of IoT based Energy efficient subsystem for greenhouse** (*M.Tech Project*) *[Jun'17 - present]*
  (Guide: Prof. Kavi Arya)
  - **Idea**
    - A **closed loop** irrigation control system for urban farming to promote optimum growth.
    - A low power sensor node with **solar energy harvesting** capability and an actuator for drip irrigation.
    - Part of a low maintenance and affordable solution for sustainable urban farming.
  - **Completed Work**
    - Studied about solar harvesting power supply design and **duty cycling** for low power operation.
    - Modified an existing **Wifi** based **solenoid valve** controller for single battery low power operation.
  - **Ongoing and Future Work**
    - Design of solar harvesting power supply for a sensor node and requirements for **energy neutrality**.
    - **Real time monitoring** of soil moisture for closed loop control of irrigation.
    - Analyzing an **Evapotranspiration** estimation model and its effectiveness in irrigation scheduling.
- **Study of Energy Harvesting for Embedded Systems** *(Seminar)* *[Jan'17 - Apr'17]*
  (Guide: Prof. Kavi Arya)
  - Surveyed the different **ambient energy** sources available and their harvesting potential.
  - Practically examined the **V-I characteristics** of 6V, 200 mA solar panel in different levels of illuminance.
  - Built a **data logging device** to measure the current output from the solar panel.

WORK EXPERIENCE

e-Yantra, Department of Computer Science & Engineering, IIT Bombay *[February 2014 - present]*
Senior Project Technical Assistant

- Conducted **9** two-day workshops covering the basics of an **Atmega2560** based Robotics and Embedded research platform for teachers of engineering and polytechnic colleges in different regions of the country.
- Intergral part of the e-Yantra Lab Setup Initiative (eLSI) team, responsible for setting up Robotics and Embedded Systems labs in **208** colleges across the country.
- Conceptualized and implemented a module based online learning method **(Task Based Training)** for teachers on basics of Embedded systems along with another team member.
- Created learning modules for Task Based Training and successfully **coordinated** with a team to complete **five** editions of this online training.
- Key member of a team involved in organizing and handling an annual **e-Yantra Symposium (eYS)** having representation from **100+** colleges for the last two years.
- Streamlined routine communication flows and data collection for interaction with engineering colleges.
- Core member of a team that developed **Themes** (real-world problems abstracted into games) based on Valet Parking and Plant Growth Monitoring as challenges for teachers after completing Task Based Training.
- Created a Fire Fighting Robot Theme in a team of three, for the national level e-Yantra Robotics Competition (eYRC) for students.

RELEVANT COURSES

- **Embedded**: Electronics System Design, Embedded System Design, Sensors in Instrumentation, Software Development Techniques for Engineering & Scientists
- **Digital Design**: System Design, VLSI Design Lab, Foundation of VLSI CAD (Ongoing)
- **Signal Processing**: Digital Signal Processing & its Applications, Digital Signal Processing - System Design & Implementation

POSITIONS OF RESPONSIBILITY

- **Teaching Assistant** for Embedded Systems course of Department in Computer Science & Engineering (CS 684) for Autumn Semester, 2016. Assisted in designing lab experiments on the TM4C123G Launchpad for the course.
- Mentor for student internship projects based on sensor interfacing, Internet of things application and **Unit testing** for Embedded C code.
- Member of the core team that **organized** the national level e-Yantra Robotics Competition finals in 2015 and 2016.

COURSE PROJECTS

- **Air Quality Monitoring** *[Jan'17 - Apr'17]*
  (Guide: Prof. Krithi Ramamritham)
  - Designed a **MSP430F5529** based sensor node having a **stackable** design with temperature, humidity, CO and particulate matter (PM 2.5) sensors on-board.
  - PM 2.5 and CO sensor were calibrated using their sensitivity characteristics and the performance of low cost PM 2.5 sensor was **compared** with a commercially available sensor.
- **Image Compression and Wavelets** *[Jan'17 - Apr'17]*
  (Guide: Prof. Sachin Patkar)
  - Prototyped Wavelet based image compression in **MATLAB** and then implemented **2D Haar Wavelet Analysis** filter bank with thresholding in **VHDL**.
  - Built a Nios-II based **Qsys** component on the DE0-Nano **FPGA** development platform for 1D Discrete Haar Wavelet transform.
- **Python API for mobile robot control** *[Jul'16 - Nov'16]*
  (Guide: Prof. Prabhu Ramchandran)
  - Developed a **Python API** along with the corresponding firmware to control a mobile robotic platform using **Raspberry Pi** providing an **abstraction** over Embedded C.
  - The project involved following **coding guidelines** (PEP8), use of version control (Git), **documentation tools** (Sphinx) and **Unit testing** for Python Code.
- **Multiload Dimmer** *[Jan'16 - Apr'16]*
  (Guide: Prof. P. C. Pandey)
  - Implemented a micro-controller based **power control** of multiple loads along with frequency compensation.
  - Supplemented the system with an Android app having ON/OFF, intensity and **intensity-duration** control.
- **Multiband Dynamic Range Compression for Hearing Aids** *[Jul'15 - Nov'15]*
  (Guide: Prof. Vikram Gadre)
  - Built a frequency dependent gain function based on **FFT Analysis** and **Synthesis** for auditory critical bands.
  - The proposed solution was successfully tested on **TMS320C5515** Digital Signal Processor using a pre-recorded sentence.
- **Auto-zeroing Differential Amplifier** *[Jul'15 - Nov'15]*
  (Guide: Prof. P. C. Pandey)
  - Designed a **reset stabilized amplifier** using an internal ADC of a micro-controller for sampling and a serially controlled DAC to generate the compensation voltage for offset nulling.
  - Tested the solution with a differential amplifier having a gain of 100 built using Op-amp IC µA741.

OTHER ACTIVITIES

- Enjoy playing Squash and Cricket.
- Other hobbies include watching Standup Comedy and Squash tournament matches online.