Thariq Shanavas

Indian Institute of Technology - Bombay

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Research Interests: Electromagnetics, RF Circuit design, Accelerator Physics

Education

2015 – Present **Indian Institute of Technology – Bombay**, *Mumbai*
B.Tech in Electrical Engineering
*CPI – **9.13/10.0***

2013 – 2015 **Intermediate/+2,** S N Trusts Central School, Kerala, Percentage – 97.8

2012 – 2013 **Matriculation,** S N Trusts Central School, Kerala, CGPA – 10.00

Research Internships

- **Analytical modelling and simulation of Photonic nanostructures** *May 2017 – July 2017*
  Dr Karthik Shankar, University of Alberta, Canada
  - Analytically modelled and numerically simulated the optical properties of titanium dioxide nanostructures using electromagnetic theory.
  - **Theoretically modelled** the observed surface plasmon resonances when the Titanium Dioxide nanotubes were coated with Titanium Nitride, using effective medium theories and the exact Gans theory. Calculations led to excellent agreement with experimental data.
  - Performed FEM simulations in the supercomputing cluster at the University of Alberta.

Major Projects

- **Calibrated Pulse generator | Prof. Pradeep Sarin** *Jan 2017 – Apr 2017*
  - Involved in the design of a high precision MHz - level pulse generator for the purpose of calibrating particle detectors in high energy experiments.
- **Coverage Control of multi-agent robotic systems | Prof. Sukumar Srikant** *Nov 2016 – Feb 2017*
  - Worked on the control of decentralised autonomous mobile robots.
  - Suitable for decentralised sensing and action, for example, cleaning up oil spills.
  - Proposed a Lyapunov-type proof for the stability and convergence of the system.
  - Numerical simulations carried out for the proposed controller. Results found to agree very well with coverage objective.
- **Matsya, Autonomous Underwater Vehicle | AUV-IITB** *Oct 2015-Oct 2016*
  International RoboSub, AUVSI & US Office of Naval Research
  Part of a 30 member team aimed at developing unmanned AUVs. The team came second in the world at the international Robosub competition 2016, San Diego, California.
  - Developed a **DC – DC Boost Converter** for boosting the battery voltage, enabling the use of more powerful actuators.
  - Designed a **motor driver module** which **is 80% cheaper and 200% as powerful** as the commercially available ones.
  - Implemented **hot-swapping** of batteries. Provided an additional layer of protection for the onboard computer in case of primary battery failure.
  - Developed the **water seepage sensor** to detect leakages during run time.
- **Simulation of Spiral RF inductors | Prof. Dipankar Saha** *Apr2016 - June 2016*

- Studied and simulated **Spiral RF inductors** in the micron scale using **MATLAB** and **Comsol Multiphysics**.
- Achieved a **95% agreement between simulation and experiment.**
- **Isolated** the chief cause of deviation from ideal behaviour by analysing the Smith chart.
- Explored new models which were found have better characteristics than conventional ones by simulation.
- Worked on the extraction of **S parameter** of **RF waveguides**, as a function of the frequency of operation.

- **Plasma Speakers | Institute Technical Summer Project** *Apr 2016*
  - Designed a Plasma speaker, which uses a flyback transformer to generate a pulsed high voltage spark, frequency modulated by an audio signal.
  - Generates frequency modulated pulses in spark temperature, creating pressure waves perceived as sound.

Scholastic Achievements

- Secured **All India Rank 69** in IIT JEE 2015 among 1.35 million candidates for admission to IITs.
- Secured **International Rank 31** in the 17th National Science Olympiad Competition.
- Secured **National Rank 11** in the National Level Science Talent Search Examination-2015.
- Secured **International Rank 136** in the 8th International Mathematics Olympiad Competition.

Scholarships

- Kishore Vygyanik Protsahan Yojana (**KVPY**) awarded by Department of Science and Technology for promotion of basic Sciences among high school students to ~250 students in the country - 2015
- National Talent Search Examination (**NTSE**) awarded by the National Council for Educational Research and Training to ~1000 students in the country – 2013

Positions of Responsibility

- **Manager**, **Maths and Physics Club**, IIT Bombay. *2015 - present*
  - Leading a team of six conveners to foster enthusiasm in mathematics and physics, tending to a community of 400 – 500 and an outreach of over 6000 online.
  - Organised several institute-wide quizzes and events to promote interest in the fundamental sciences.

- **Technical Mentor,** XLR8 2016 *Aug 2016*
  - Mentored twelve freshmen for the XLR8 competition, an institute-wide wireless car design and racing competition, with the participation of over 500 freshmen.

Technical Skills

Programming Languages	: C++, MATLAB, python
CAD Software	: Eagle, Altium, SolidWorks, AutoCAD
Simulation Software	: Comsol Multiphysics

Other software : Atmel studio, Arduino IDE, HTML, CSS, Latex

Extracurricular Activities

- Completed a two-semester long course on playing the Keyboard.
- Participated in 'Gesture Control using MATLAB' workshop, TechFest 2015.
- Built a line follower using an AVR microcontroller, implemented the **PID control loop**.
- Gave a talk on **Control loops** and the **PID algorithm** for the Robotics club, IIT Bombay.
- Successfully completed the Summer of Science initiative under an experienced senior mentor, on Cosmology under the Maths and Physics Club. Report
- Secured third prize in Electric Jhatka General Championship by the Electronics club, an institute-wide circuit design competition.