Thariq Shanavas

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Research Interests – Particle Physics, Control Systems, Condensed Matter Physics

Education

2015 – Present **Indian Institute of Technology – Bombay**, *Mumbai*
B.Tech in Electrical Engineering, Minor in Systems and Control Engineering,
*CPI – **9.16/10.0***

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

Major Projects

- **Calibrated Pulse generator | Prof. Pradeep Sarin** *Jan 2016 – Present*
  - Involved in the design of a high precision GHz - 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 - Present*
  - Working 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** *Apr - 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

- **Convener**, **Maths and Physics Club**, IIT Bombay. *2015 - present*
  - Part of a team of 8 members aimed at fostering enthusiasm in mathematics and physics, tending to a community of 400 – 500 and an outreach of over 5000 online.
  - Organised several institute-wide quizzes and events to promote interest in the fundamental sciences.
  - Conducted group discussions on various topics like EPR paradox, arrow's theorem, Maxwell's demon, etc.
  - Organised lab visits to labs in and around IIT Bombay.

- **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.