Thariq Shanavas

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Education

2019 – Present PhD Candidate in Physics, University of Colorado, Boulder, USA

2015 – 2019 Undergraduate, Indian Institute of Technology – Bombay, India
Major in Electrical Engineering, Minor in Physics. *CPI – 9.00/10*

Publications

Farsinezhad, S., **Shanavas, T.**, Mahdi, N., Askar, A. M., Kar, P., Sharma, H., Shankar, K. (2018). Nanotechnology, *Core–shell titanium dioxide–titanium nitride nanotube arrays with near-infrared plasmon resonances.* http://doi.org/10.1088/1361-6528/aaad58

Research Experience

- **Undergraduate Thesis – IIT Bombay** *July 2018 – November 2018*
  Magnetometry using Nitrogen-Vacancies in Diamond *Advisors: Dr Pradeep Sarin, Dr Kasturi Saha*
  - Involved in designing the experimental setup for sensing weak magnetic fields at micron-scale resolution using nitrogen-vacancy centers in diamond.
  - Using a microwave antenna, provided a uniform RF excitation to the diamond sample for magnetometry using optically detected magnetic resonance.
  - Improvements in the microwave field delivery system led to 57 percent increase in usable nitrogen-vacancies as compared to the setup previously used in the group, corresponding to an expected shot-noise limited sensitivity improvement of 21 percent. Report

- **Tyndall National Institute, Ireland** *May 2018 – July 2018*
  Demonstration of 20Gbps communication over 10G-class optics enabled by machine learning
  Advisors: Dr Cleitus Antony, Dr Paul Townsend
  - Explored the use of neural networks for equalisation at the receiver end and pre-compensation at the transmitter end to compensate non-linear effects of the channel
  - Integrated recurrent, convolutional and decision-feedback neural networks to a simulation testbed and real time experimental setup.
  - Demonstrated 20Gbps data transfer over 10G-class optics using a convolutional neural network at the receiver, within the acceptable error rates for Forward Error Correction. Report

- **KEK, High Energy Accelerator Research Organisation, Japan** *Nov 2017 – Dec 2017*
  FPGA based controller for self-triggered hybrid pixel detector *Advisors: Dr Manobu Tanaka, Dr Tetsuichi Kishishita*
  - Developed the FPGA framework for a hybrid pixel detector.
  - Characterised the field response of the analog front end ASIC chip, with test signals using the developed framework.
  - Examined proposed changes to the amplification stages of the ASIC chip, recommended the design with the least equivalent noise charge using Cadence. Report

- **University of Alberta, Canada** *May 2017 – July 2017*
  Modelling of Photonic nanotubes exhibiting near-infrared plasmon resonance
  Advisor: Dr Karthik Shankar
  - Analytically modelled and numerically simulated the optical properties of titanium dioxide nanotubes coated with Titanium Nitride.
  - Analytical predictions made by modifying Gans theory for a composite nanostructure led to accurate predictions of the plasmon excitation, results agreed with experimental result.
  - Set up and documented a finite element modelling testbed on the University of Alberta Supercomputing cluster using Comsol to support future work on plasmon resonance.

Leadership and Organisation

- **Manager**, **Maths and Physics Club**, IIT Bombay *2017 – 2018*
  - As a junior undergraduate, I led a team of six sophomores to foster enthusiasm in mathematics and physics, tending to a community of 400 – 500 in campus.
  - Organised institute-wide quizzes, talks, group discussions and mentoring activities to promote interest in the fundamental sciences.
  - Introduced Scientific Computing Championship to promote interest in Numerical methods for scientific research, first ever conducted to this scale in campus.
  - Oversaw five times improvement in year-to-year participation in Summer of Science initiative, where the club matches senior students to mentor enthusiasts in an area of their interest. Work Report

Technical Skills

Programming Languages : C++, MATLAB, Python

CAD and Scientific Packages : Eagle, Altium, SolidWorks, Comsol, CST Microwave Studio

Other software : Atmel studio, Arduino, Latex, gnuradio, VHDL, Xilinx ISE

References

1. Prof. Juliet Gopinath
   Associate Professor
   University of Colorado, Boulder
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2. Prof. Pradeep Sarin
   Associate Professor
   Indian Institute of Technology, Bombay
   Undergraduate thesis supervisor
   +91-22-25767591
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3. Prof. Karthik Shankar
   Professor
   University of Alberta, Canada
   Internship Supervisor
   +1 780 492 1354
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4. Dr. Cleitus Antony
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