Rakshit Jain

Indian Institute of Technology Bombay

205, Hostel 4
Indian Institute of Technology Bombay
India
✉ *rakshit.jain@iitb.ac.in*
home.iitb.ac.in/ rakshit.jain

I am passionate about Semiconductor devices, Theoretical and Experimental aspects of Quantum Information, Stochastic Modeling and Theoretical Computer Science

Education

2014–2018 **Bachelors of Technology**, *Indian Institute of Technology*, Bombay.
B.Tech in Engineering Physics, Minor in Computer Science, CPI - 9.13/10.0

2012–2014 **Intermediate**, *Shri Barfani Academy*, Indore.
Awarded Medhawi Protsahan Scholarship for excellence, Percentage - 88.4

2006–2012 **Matriculation**, *S.I.C.A Higher Secondary School*, Indore.
CGPA = 10/10

Research Experience

June 2016 – Present **Detection of Magnetic Field Orientation in Birds**.
Guide: Prof. Swaroop Ganguly, Electrical Engineering Department, IIT Bombay.

- Studied present model based on Isotropic and Anisotropic hyperfine interaction between electron and nucleus and zeeman interaction between electron and earth's magnetic field
- Extending the Hyperfine model based on HG Hiscock et al. paper on quantum needle of avian compass to include zeeman effects in order to achieve more realistic model
- Studied various quantifiers for coherence and tried to model the coherence as the time evolves.
- Simulated the system to see various parameters such as functional window and singlet yields in order to explain the functionality of such a compass

June 2016 – August 2016 **miRNA regulation of Gene expression**.
Guide: Prof. Amitabha Nandi, Physics Department, IIT Bombay.

- Extensively studied various feedback mechanisms by which non-coding RNAs play a role in regulating a reaction
- Modelling regulation in the gene expression network by forming a complex between miRNA and mRNA i.e. adding regulation in the research paper by Mukund Thattai et al. on gene expression
- Analytically calculated fano-factors and various moments for miRNA regulation of gene regulation by analysing master equation of the set of reactions
- Simulated system in Python using Gillespie algorithm and Chemical Langevin algorithm to analyse steady state behaviour

August 2016 – Present **Electrical and Optical Properties of MoS_2**.
Guide: Prof. Saurabh Lodha, Electrical Engineering Department, IIT Bombay.

- Studied various lattice structures and band structures of mono-layer and multilayer MoS_2
- Learnt ways of determining layer structure of MoS_2 using Raman Spectra and PL characterisation
- Studied fabrication of MoS_2 by exfoliation and Transfer of chemical vapor deposition.

December 2015 – January 2016 **Exciton transfer in photosynthesis**.
Guide: Prof. Swaroop Ganguly, Electrical Engineering Department, IIT Bombay.
- Studied the FMO Complex based exciton energy transfer in photosynthesis process
- Studied various energy levels and splitting that leads to efficient transfer in photosynthesis

November 2015 – December 2015 **Prototype Spark Chamber for detecting Cosmic rays**.
Guide: Prof. Pradeep Sarin, Physics Department, IIT Bombay
- Worked in teams of four and learnt a practical way of detecting cosmic ray particles
- Learnt how to operate gas cylinders, building electrical circuits and to work with High Voltage and preventing corona discharge between the metal plates
- Designed PC boards with the help of EAGLE and used them as plates to reduce corona. Report here

Course Projects

Autumn 2015 **Modelling of Indus Valley Civilisation**.
Guide: Prof. Amitabha Nandi and Prof. Raghunath Chelakkot, Non-Linear dynamics.
- Used Coupled Logistic Equation to show the Effects of Migration over Population Dynamics
- Plotted phase plots to show the effects of coupling factors over different values of parameters
- Slides regarding the presentation can be found here

Spring 2015 **Adaptive Signal Processing**.
Guide: Prof. Tapanendu Kundu , Waves.
- Applied a simple algorithm on audio signals recorded from two different source treating one as noise and other as signal in order to remove the noise from the original signal. Performed these operations recursively in order to achieve better accuracy
- Used ANFIS function in MATLAB in order to find correlations between the signals and then reduced the noise by subtracting this correlation from the signal. Report here

Spring 2015 **Fast Fourier Transform using FPGA**.
Guide: Prof. Pradeep Sarin, Digital Lab.
- Implemented Fast Fourier Butterfly Algorithm on an FPGA using VHDL to reduce processing time. Also used the inbuilt ADC code to feed signal to the FFT algorithm
- Implemented display by writing down a simple VGA driver in VHDL to present the results on a monitor. Report here

Autumn 2014 **Employee Data Management System**.
Guide: Deepak B Phatak and Prof. Supratik Chakraborthy, CS 101.
- Created a login system and Salary management system for employees. Used File writing and reading functions to maintain a proper record of Salary and Attendance
- Also given Administrator access to the employer in order to do various functions such as search ,edit and salary analysis of the employees

Programming skills

Proficient MATLAB, C++, Python

Intermediate Arduino, Jekyll

Basic VHDL, Django, HTML, CSS

Key Courses

Physics and Mathematics	Photonics, Quantum Mechanics 2, Group Theory Methods Complex Analysis, Numerical Analysis, Linear Algebra, Partial Differential Equations
Electrical Engineering	Signals and Systems, Digital Systems, Data Structures and Algorithms, Design and Analysis of Algorithms, Games and Information
Labs	Analog Lab, Devices Lab, Digital Lab, Micro-Controller Lab, General Physics Lab

Academic Acievements

- Secured All India Rank 746 in JEE-Advanced 2014 amongst ~120,000 candidates
- Awarded with Medhawi Vidyarthi Protsahan Scholarship and Certificate of merit for being among the top candidates in Madhya Pradesh in Higher School Certificate Exam
- Awarded with Scholarship for Higher Education scholarship by Department of Dcience and Technology India
- Among the Top 300 candidates in India who qualified for the INPhO (Indian National Physics Olympiad) in the year 2014
- Among the Top 300 candidates in India who qualified for the INMO (Indian National Mathematics Olympiad) in the year 2013

Positions of Responsibility

May 2016 - June 2016 **Teaching Assistant**.
PH-108 Summer Course.

- Taught and Mentored over 35 Students for two months under Prof. C.V. Tomy for Electricity and Magnetism freshmen course
- Organised extra sessions for clearing doubts of students

April 2016 - Present **Manager**.
Tinkerers' Laboratory and Public Relations.

- Leading a team of 3 Conveners in order to ensure proper functioning of a student run laboratory called Tinkerers' laboratory and maintaining relations with alumni and other Institute Bodies

April 2015 - March 2016 **Technical Secretary**.
Hostel 4.

- Organised Hostel Level events and ensured participation in General Championships.Mentored various freshmen in various technical activities and competitions

Extra-Curricular

- Won first prize in Hydro-Foam General Championship by making a bot from Styrofoam.
- Participated in Physics General Championship and made Tesla Coil from a Mosquito Racket which gave arching lengths of 5-6 cms.
- Designed a crude vibration sensor from a resistor and spring and sampled using a micro controller
- Awarded with Hostel Technical Color for participation in Technical Activities