ABHINAV SINHA   **Dual Degree (B.Tech with Honors + M.Tech)**
Electrical Engineering   **Specialization: Communications and Signal Processing**
Indian Institute of Technology, Bombay   **DOB: 8th May, 1990**

Examination	University	Institute	Year	CPI/%
Graduation (+Masters)	IIT Bombay	IIT Bombay	2012	8.72
Intermediate/+2	CBSE	R N Podar School	2007	91.8
Matriculation	CBSE	Atomic Energy Central School	2005	86.0

- *Addition Degree:* Completed **Minors** in Computer Science and Engineering Dept. (CSE) in IIT Bombay

PUBLICATIONS, CONFERENCES AND INVITED TALK

- Submitted journal paper to **IEEE Wireless Communication Letters** (WCL) titled "Optimality of Monotone Policy for a Renewable Energy empowered Battery" along with my guide Prof. Prasanna Chaporkar. The work here is a non-trivial generalization of work submitted to NCC 2012 (below)

- Submitted conference paper to **IEEE National Communications Conference** (NCC 2012) titled "Optimal Power Allocation for a Renewable Energy Source" along with my guide (see below for project)

- Officially reviewed a paper for **IEEE Wireless Communications and Networking and Conference** (WCNC 2012, in Paris) titled "Throughput Maximization for Energy Harvesting Nodes with Generalized Circuit Power Modeling and Transmit Power Constraint" through edas website (http://edas.info)

- Received offer to publish my research work as a student book from **Lambert Publishing House** (LAP) – **Germany**

- Conference proceedings published in **American Institute of Physics** (AIP) journal in June'11 on the topic – "Tuning the properties of Quantum Dots via the effective mass" for the work I presented in 55th DAE - Solid State Physics Symposium held at Manipal University, Mangalore, India in Dec 2010

- Selected for attending "Network Science in Electrical Engineering and Computer Science" for both school and workshop where leading researchers and professors from the world in the field of Communications are participating. It is being held at Indian Institute of Science (IISc), Bangalore, India from 2-14 January, 2012

- Participated in **Poster session** in International Conference on "Nano Science & Technology" (**ICONSAT**)- Feb'10 at Mumbai, India on 'Confinement Effects on Absorption and Luminescence in Low Dimensional Systems' held at IIT Bombay (proceedings published)

- **Invited Talk** presented at International conference on the frontiers of Physics (**ICFP**) in June'09 on "Excited States Calculations in Quantum Dots" organized by Nepal Physical Society held at Kathmandu, Nepal (proceedings published) being attended by Nobel Laureate Prof Klaus Von Klitzing.

INTERNSHIPS AND PROJECTS

Masters Project, IIT Bombay, India   July'11 - ongoing
Optimal power allocation for a Renewable Sensor

- Modeled an energy harvesting system for a wireless transmitter where both the fading channel and recharge energy (from renewable source) are random processes. Developed my own method of proof to show that optimal policy will be monotone in channel coefficient and the energy left in transmitter battery (ξ). Then made the extension of this result to the case where recharge energy is random but depends on ξ

- Current work is going on in making a multi user (uplink) generalization where users play a stochastic game

Supervised Research Exposition, IIT Bombay   Jan'11 – May'11

- Completed a project based course on Supervised Research Exposition on the topic "Stability in Queuing Systems" including techniques like "Fluid limits" and "Martingales" (mainly showing relevance as a conserved quantity). The work was written (report) and presented.

- Methods used in proofs of Lyapunov/Foster's Criteria were investigated and general version of the theorem were proved as well as used in cases like G/G/1 Queues. Same work was also done using Fluid limits

nanoHUB, Purdue University, Indiana, USA   June'10- July'10

Resonant Tunneling Diodes

- Worked on Resonant Tunneling Diodes (RTD) simulation using semi-classical theory and quantum theory from a tool – RTD NEGF, deployed at nanoHUB.org in Network for Computational Nanotechnology (NCN) group under Prof. Gerhard Klimeck, Director NCN Department and Professor of ECE, Purdue University, USA. This is to be a part of his book on Quantum Transport
  https://engineering.purdue.edu/gekcogrp/research-group/AbhinavSinha/
- Also learned how to integrate a physics simulation tool with an Interface using Rapture

Tata Institute of Fundamental Research (HBCSE-TIFR), Mumbai: May'09- July'09

Electronic Structure of a 2D Quantum Dot

- Selected for and attended National Initiative for Undergraduate Sciences (NIUS) camp in Advance Physics from 2008-10 at TIFR
- Received Certificate of Merit and scholarship from Homi Bhabha Centre for Science Education (HBCSE) and TATA Institute of Fundamental Research (TIFR) in NIUS for completing the project on Electronics Structure Of 2D Quantum Dot (2009), the project which led me to present my work in conferences mentioned above

Indian Statistical Institute (ISI), Bangalore: June'08, June'09 and Dec'09

- Selected for and attended 4 year Mathematics Nurture Program (only for Mathematics Olympiad Students) held at ISI where theory and problem solving were taught in advance topics in Algebra, Number Theory and Combinatorics, to cover equivalent syllabus for undergraduate core Math courses
- Awarded the nurture program scholarship by National Board of Higher Mathematics (NBHM) based on my performance for 3 terms

Other projects and relevant course work (term papers) are mentioned below in a different section

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REPRESENTED COUNTRY AND OTHER OLYMPIADS

- *Asian Physics Olympiad (APhO)* **–** Represented India in 7th APhO (2006) held in Almaty, Kazakhstan and was awarded Honorable Mention for my performance in theory and practical exams. Also received **Letter of Appreciation** from **Government of India** (GoI) for getting Honorable Mention and representing the country in APhO for the first time.
- *International Mathematics Olympiad Training Camp (IMOTC)* – Selected for IMOTC for 3 successive years 2005-2007 after qualifying Indian National Mathematics Olympiad (INMO, national level) and Regional Mathematics Olympiad (RMO, regional level), where only 30 students from India get selected every year and is the final camp for selection of Indian team at IMO every year.
- *International Physics Olympiad (IPhO) Selection camp:* Selected for Orientation cum Selection camp (OCSC) for IPhO 2007 after qualifying Indian National Physics Olympiad (INPhO) and National Standard Examination in Physics (NSEP). Was awarded **Gold Medal** for outstanding performance in INPhO and also received certificate of Merit for being in National Top 1% for two successive years in NSEP
- *Astronomy Olympiad (IAOTC):* Selected for International Astronomy Olympiad training camp in 2006

SEMINARS, TERM PAPERS AND OTHER PROJECTS

- Currently working on a project in Coding Theory. The task is to characterize weight distribution of a general Reed-Muller code. Projective Geometry based approach is being tried out.

- Have experience as Teaching Assistant for the course "Introduction to Probability and Stochastic Processes" in fall semester 2011 and will continue as TA for next semester in "Markov Chains and Queuing Systems"

- Completed a term paper on "Event Based Dynamic Programming" for the course Markov Decision Processes. Mainly first order properties were proved and monotonicity results were shown.

- Completed a term paper on the seminal work done by R.Knopp and P.A.Humblet ("Information Capacity and Power Control in Single-Cell Multi User Communications") for Information Theory and Coding course

- I have participated in international workshop on **Signal Processing Telecommunication and networking** (JTG Summer School-2011), organized by Department of Electrical Engineering ,IIT Bombay in May'11 where there were series of lectures by Prof Martin Wainwright, EE Dept, UC Berkeley and Prof Prasanna Chaporkar, EE Dept, IIT Bombay

- I have participated in an International Workshop on "Non-Hermitian Hamiltonians in Quantum Physics" organized by Bhabha Atomic Research Centre (BARC) during Jan'09

- Other projects include work on maintaining **Database** (Eclipse was used) for a auctioning website, work on **Spin Hall Effect and Rashba Spin coupling** to making a feasible memory device

───── ACHEIVEMENTS, DEGREE AND SPECIAL MENTION ─────

- *Fellowship of Indian Institute of Science (IISc)* – Holder of prestigious fellowship 'Kishore Vaigyanik Protsahan Yoajana' (KVPY) for the period 2005-2007 awarded by IISc, Bangalore based on theory and interview exams, also participated in a camp for selected students held at Homi Bhabha Centre for Science Education (HBCSE), Mumbai

- *Heritage Fund Scholarship:* Received **R.G. Revankar scholarship** from IIT Bombay Heritage Fund, USA in 2007-08 based on my performance in first year of college

- *Full Score in SAT:* Have Perfect score 1600/1600 in official SAT exam conducted by College Board, USA

- Received Certificate of Merit for a Maths Olympiad held in IIT Bombay

- *Special Mention in Periodicals:* a) National Newspaper "Times of India", b) International newspaper "Economic Times" published articles covering my achievements and c) Marathi Newspaper in Maharashtra "Loksatta" also published a half page article covering my academic achievements

───── RELEVANT COURSES ─────

Have completed following graduate level courses that are relevant to my area of interest (Wireless Communication and Stochastic Control) other than undergraduate courses like Probability and Stochastic Processes, Digital Communications and Communication Systems

- Markov Chains and Queuing Systems, Markov Decision Processes, Mobile and Wireless Communication, Finite Fields and its Applications, Information Theory and Coding, Error Correcting Codes, Optimal Control Systems, Non-linear Dynamical Systems, Behavioural Theory of Systems

───── TECHNICAL PROFICIENCIES ─────

• *Coding Tools and Packages*: C, C++, MATLAB, LaTeX, Rappture, Illustrator, Photoshop, MySQL, Eclipse, Mathematica, Linux, Windows, Mac OSX, MS Office, Spice, Cadence, Sentaurus, 8085 Assembly

───── HOBBIES ─────

• Following Crime fiction   • Playing Lawn Tennis (completed formal training of 100 hours)

• Following cinema (world), mostly from before 2000