Debasish Panda

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Education

Indian Institute of Technology, Bombay *Nov 2021 – July 2026*

BTech + MTech (Dual Degree) ***Electrical Engineering*** ***Grade:*** *8.35/10.00*

with Specialisation in **Solid State Devices**

Scholastic Achievements

- Secured All India Rank 529 in JEE-Advanced examination among 141,699 candidates across India *(2021)*
- Secured All India Rank 561 in JEE-Mains among 939,008 candidates across India *(2021)*
- Secured All India Rank 4 in NEST(CEBS) among 24,328 candidates across India *(2021)*
- Secured 99.975 percentile in NEST(NISER) among 24,328 candidates across India *(2021)*
- Scored 356 marks out of 450 marks in the Birla Institute of Science & Technology Admission Test (BITSAT) *(2021)*
- Qualified for IOQC-Part II, having been placed in the National Top 1% of candidates in IOQC-Part I *(2021)*
- Recipient of the prestigious (KVPY) Fellowship with AIR 419 in SX stream *(2020)*
- Awarded the highly coveted NTSE scholarship, having qualified NTSE Stage-II *(2019)*
- Qualified for INJSO, having been placed in the National Top 1% of candidates in NSEJS *(2019)*

Experience

Texas Instruments *Bengaluru, India*

Analog Design Intern *May 2024 – July 2024*

• Designed a CMOS-based receiver-transmitter (Rx-Tx) block with integrated control logic to facilitate voltage level interfacing between a chip and external power supply as an intern with the I/O team.

• Reviewed multiple papers and analyzed previous team projects to gain a sound understanding of advanced circuit design principles, which were necessary for the development of the Rx-Tx block.

• Performed extensive Cadence simulations to optimize key performance metrics and overall reliability of the designed circuit.

Key Projects

Transport Phenomena in Devices with Superconducting Elements **GitHub**

Prof. Bhaskaran Muralidharan *Spring 2024 – Present*

• Engaged in supervised reading on foundational topics in condensed matter physics, including Green's function formalism, second quantisation, and band structure theory.

• Currently exploring the theoretical concepts and performing simulations on quantum transport in superconductor-semiconductor hybrid nanostructures using the Non-Equilibrium Green's Function (NEGF) framework.

IITB-RISC – 16-bit RISC Microprocessor **GitHub**

Prof. Virendra Singh *Spring 2023*

• Implemented the IITB-RISC, an 8-register, 16-bit single-cycle RISC processor based on the Turing Complete ISA through Structural Modelling in VHDL using Quartus Prime.

• Designed the 16-bit ALU (Arithmetic Logic Unit), Memory Unit, Pipeline Controller, and Datapath in VHDL.

• Implemented a 6-stage pipeline including data-hazard mitigation techniques, such as data-forwarding and branch predictor.

IITB-CPU – 16-bit Microprocessor **GitHub**

Prof. Virendra Singh *Autumn 2022*

• Designed the IITB-CPU, an 8-register, 16-bit elementary computer developed for teaching based on the Little Computer Architecture through Behavioral-Dataflow Modelling in VHDL using Quartus Prime.

• Implemented the Finite State Machine and optimized it to reduce the number of states involved.

• Designed the 16-bit ALU (Arithmetic Logic Unit), Memory Unit, FSM Controller, and Datapath in VHDL and verified the entities involved in the design by performing RTL simulations on some selective inputs.

Bubble Trouble Game – C++ Project **GitHub**

Prof. Parag Chaudhari *Autumn 2021*

• Developed a bubble shooter video game through advanced utilisation of C++ libraries, Object-Oriented Programming (OOP), header files, and XEvents for optimal performance and engaging user experience.

• Implemented several features, such as a progressive difficulty system for the players with different sizes of bubbles, shooter health, physical obstacles in the path of the bubbles, a timer, and the effect of gravity on the bubbles.

Other Projects

The Role of Magnetic Fields in Shaping Molecular Clouds **GitHub**

Krittika: The Astronomy Club, IIT Bombay *2023*

• Used healpy to extract molecular cloud regions using the polarisation data recorded by ESA's Planck mission as a part of the *Computational Astronomy Project* organised annually.

• Investigated the role of magnetic fields in guiding the movement of interstellar matter through filamentary structures within molecular clouds, which play a crucial role as precursors in the star formation process.

• Analyzed polarisation data to verify the correlation between gas column density and orientation of the magnetic field to generate the histogram of relative angles.

Device Physics **GitHub**

Maths & Physics Club, IIT Bombay *2022*

• Studied various fundamental physical processes and equations associated with semiconductor physics, along with their application in various devices as a part of *Summer of Science* organised annually.

• Analyzed the fundamental physics behind Metal-Insulator-Semiconductor (MIS) junctions, Metal-Semiconductor junctions and that behind the operation of semiconductor devices such as p-n junction diodes and MOSFETs.

Skills

Programming	Python, C/C++, VHDL, Verilog, Assembly, ngSpice, Qiskit
Softwares	LaTeX, MATLAB, Quartus Prime, Cadence Virtuoso, Sentaurus

Key Courses Undertaken

Electrical Engg	Power Engineering I & II + Lab, Analog Circuits + Lab, Electronic Devices & Circuits + Lab, Digital Systems + Lab, Signal Processing, Control Systems + Lab, Microprocessors + Lab, Communication Systems + Lab, Matrix Computations, Compound Semiconductor Materials & Devices, Quantum Transport in Nanoscale Devices, Electronic Design Lab, Topological Electronics, CMOS Analog VLSI Design, VLSI Technology
Physics	Quantum Mechanics - I, Electromagnetism, Applied Solid State Physics, Quantum Information & Computing - I
Mathematics	Single & Multi-variable Calculus, Linear Algebra, Differential Equations, Complex Analysis
Others	Computer Programming with C++, Organic & Inorganic Chemistry, Physical Chemistry, Biology, Engineering Drawing, Economics

Achievements & Extra-curriculars

• Represented the Mumbai chapter in the national round of the Sweden-India Nobel Memorial Quiz after winning the regional round, organized by the Embassy of Sweden, New Delhi. *(2023)*

• Won the General Quiz by Arul Mani, organised by Literati Club, IIT Bombay, in collaboration with ADCPS. *(2022)*

• Qualified the Prelims of National Anveshika Skill Test organised by IIT Kanpur & IAPT. *(2020)*

• Represented DAV Public School in Inter-School STEM Quiz organised by Mother's Public School and achieved first position in the competition. *(2019)*

Volunteering & Responsibilities

• Completed a year-long volunteering course at Green Campus, National Service Scheme IIT Bombay, to promote nature-friendly activities and awareness. *(2021)*

• Served as an undergraduate Teaching Assistant for the half-semester courses of Quantum Physics & Applications (PH112) and Differential Equations-I (MA108) *(April 2023 – June 2023)*

References

Prof. Bhaskaran Muralidharan
Professor, Department of Electrical Engineering
Inani Chair Professor of Semiconductor Technology
Indian Institute of Technology, Bombay
Mumbai, India, 400076
Computational Nanoelectronics & Quantum Transport Group
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