Neel Bhavesh Rambhia | **22B1298**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 03/10/2003

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	
Intermediate	HSC	Bhavani Shankar Road Jr. College of Sc.	2022	96.50%
Matriculation	CISCE	Shishuvan	2020	97.57%

Pursuing a **Dual Minor** in **Physics** and **Computer Science** at IIT Bombay

Scholastic & Academic Achievements

- Presented with the **Institute Academic Prize** given to **top 30** overachieving **Academic Performers** in first year ('23)
- Conferred with **4 AP grades** in Analog Electronics (only **1** student out of **100+** students), Multivariate Calculus (only **27** students out of **1400+** students), Quantum Physical Chemistry (only **31** students out of **1400+** students), Theoretical Classical Physics (only **12** students out of **1400+** students) for **exceptional performance in courses** ('23)
- Received the reputable **K.T.S.E. Scholarship**, recognizing **top 20 overachievers** among the **Grade 10 students** ('20)

Professional Experiences

Quantum Engineering Research Intern | Photonics Device Lab (May '24 - Jul '24)
Guide: Prof. Andrew POON | Mentors: J. Wang, Q. Zhang | The Hong Kong University of Science and Technology
Awarded Letter of Recommendation for doing exceptional work, by Prof. Andrew POON
Quantum Photonics:
- Extensively studied & derived the **Hong-Ou-Mandel Effect**, constructed and fine tuned the **apparatus** for the same
- Studied team's existing work on **Notch Filter Ring Resonators**, verified outcomes through **48+ hours** of simulation
- Used industry standard dimensions to simulate **Bent Waveguide Ring Resonator**, improvising for better **Q-Factor**

Data Analytics:
- Applied **ML models**, **Cauchy Fit** on **200+ Waveguide Refractive Index** data points to find coupling coefficient, loss
- Explored the possibility of using **Voigt Profile fit** for simulated resonance data rather than Lorentzian, Gaussian fit
- Implemented **Voigt Distribution** to find **Q-Factor** for Simulated Ring Resonator & tallied it with existing literature

Winter Intern | Embedded Systems Lab (Dec '23 - Jan '24)
Guide: Prof. Maryam S. Baghini | Mentor: Moin Shaikh | IIT Bombay
- Studied the **sensors** being used in the Lab & **working** of **wearable device** made by integrating all of them together
- Extracted motion data from this device, by capturing **6 degrees of freedom**, in the three axes, using a **Serial Plotter**
- Collected data using the device for **50+** individuals, in group of **6**, for activities like running, walking, climbing, etc.

Technical Projects

Unknown Impedance Analyser | Winter Project (Dec '23 - Jan '24)
Guide: Prof. Maryam S. Baghini | Embedded Systems Lab | IIT Bombay
- Collaborated with a team of **6** to design circuits like the **Trans-Impedance Amplifier, Attenuator, Schmitt Triggers**
- Researched about **Op-Amp non-idealities**, understood Op-Amp selection and employed them in the above circuit
- Made **Ref. Voltage Generator**, for streamlined **3.3V supply**, tested circuits with Oscilloscope, Waveforms Software
- Showcased **proficiency** in **circuit designs**, emphasizing simplicity, robustness while **integrating** above components

IITB RISC Computing System | Course Project (Apr '24 - May '24)
Guide: Prof. Virendra Singh | Microprocessors | IIT Bombay
- Designed **16 bit computing system** using total of **8 16-bit registers**, **64-kB RAM** to execute **14** different instructions
- Implemented **six staged pipeline**, optimized it by **deducing state equivalences** and **hazard mitigation techniques**
- Synthesized the **ALU**, **Instruction Memory**, integrated using **VHDL** and **Verilog**, created test bench, testing scripts

Quantum Machine Learning & Quantum Error Correction | Summer Project (Jun '24 - Present)
Guide: Siddhant Midha | IIT Bombay '24
- Reviewed literature on implementation of **QCNN** based on **MERA** framework, **QEC** & its advantages over CCNN
- Modelled, trained and tested **convolutional** and **pooling layers** of QCNN for varying qubit inputs and layer depth

Microcontroller Interfacing and Programming | Course Project (Feb '24 - Mar'24)
Guide: Prof. Nikhil Karamchandani | Microprocessors | IIT Bombay
- Implemented **Low Pass Digital FIR filter** from scratch with sampling frequency 20kHz, verified results graphically
- Implemented **ReLu** activated 2 input **neural network** with 3 layers and **watchdog timer**, serially outputting results
- Established **serial communication** at different **baud rates** in modelling **Temperature Sensor**, **ATM Machine**, **CNN**

Miscellaneous Projects

Quantitative Momentum | Analysis Project (Jun '23 - Aug '23)
FinSearch '23 | Undergraduate Academic Council | IIT Bombay
- **Optimised Investment Returns** by scrutinizing the literature on **Stock analysis** & **Efficient Momentum Strategies**
- Devised an efficient **Momentum Trading strategy** in a team of 4 members with the **indicators** like RSI, MACD, etc.
- Raised profits by **revamping strategies** based on past literature and **verifying** it on the existing N.S.E. Trading data

Route Tracing Hazard Mitigator | Makerspace Course Project (Dec '22 - Feb '23)
Guide: Prof. Rakesh Mote, Prof. Joseph John | Dept. of Electrical Engg. | IIT Bombay
- Developed a **Line following bot** in a team of 6 students with the additional obstacle **detection** & **shooting** features
- Minimized complexity in making the circuitry and improved the **mechanical design** of **bot**, **shooting mechanisms**

Cosmological Parameter Constraints for Dark Energy Models | Computational Self Project (Dec '23 - Jan '24)
- Explored models with **Hubble**, **Baryon Oscillation** data, used **MCMC analysis** to optimize **LCDM**, **XCDM model**
- Extended analysis deriving **confidence interval contours**, **1-σ upper & lower limit** for robust parameter constraint

Optimal Control Theory | Summer of Science '23 (May '23 - Aug '23)
Institute Technical Council | IIT Bombay
- Reviewed the literature on Calculus of Variations, Optimal Control Theory, **Lagrangian** & **Hamiltonian Mechanics**
- Summarized **findings** and **learnings** in a **visual representation** and documented various concepts in a brief report

Technical Skills

Programming	C | C++ | Python | JAVA | HTML | Verilog | VHDL | LaTeX | Lumerical Script
Software	Quartus | Arduino | Ansys Lumerical | Fusion360 | LTSpice | Modelsim
Libraries	Tensorflow | Qiskit | Scikit-learn | SciPy | Kwant | Pandas | Numpy

Courses Undertaken

Electrical & Electronics	Analog Circuits[§] | Digital Circuits[§] | Electronic Devices | Control Systems | Microprocessors[§] | Signal Processing | Power Engineering[§] | Quantum Transport
Maths & Sci. Computing	Introductory & Multivariate Calculus | Data Structures & Algorithms | Differential Equations | Linear Algebra | Probability & Random Processes | Computer Programming [§]
Physics	Introduction to Classical Physics[§] | Introduction to Quantum Physics[§] | Classical Mechanics
Others	Economics | Management | Engineering Drawing & Circuit Assembly [§] | Design Thinking [§] | Machine Learning (Stanford)[†] | Quantum Computing (IBM) [†] | Lazer Safety (HKUST)

Positions of Responsibility

[§] Associated with a Lab Component [†] Online

Department Research Coordinator | **Undergraduate Academic Council (UGAC)** (Jul '24 - Present)
*Nominated as **Research Coordinator** for Dept. of Elec. Engg. & SysCon for promoting research among **200+** students by **briefing** them about **opportunities** available, maintaining **special interest groups** for sharing ideas, updates, news*

Institute Academic Coordinator | **Student Support Services, UGAC** (May '23 - May '24)
*Selected among **12 out of 200+** applicants after rigorous interviews to address the queries of **5000+ undergraduates***

Initiatives	• Organised **help sessions (Tutorial Service Centres)** for **first year & second year students** before exams, quizzes with motive of **revising** their concepts, giving them extra practice, solving **doubts** • Addressed queries of **5000+ students** regarding course registration prior to onset of new semester • Fostered Mental Well-being among students with "**Mental Health Mondays**", **Mental Health talks**
Management	• Organised and executed a week-long orientation and rehabilitation of **1500+ undergraduate new entrants** and **2000+ parents** in an offline setting and catered to their academic and logistical needs • Attracted **100+** project submissions in **2-day** Research Conclave, securing sponsorship (**INR 0.5M**) and introduced **200+** students to scientific writing by designing research-paper themed crypt hunt • Conducted Sophomore 101 in 12+ Departments, introducing freshmen to academic opportunities

Teaching Assistant | **Department of Mathematics, IIT Bombay** (Jan '24 - May '24)
*Entrusted out of merit with the responsibility of teaching **30+ freshmen** in **MA 110: Linear Algebra and Differential Equations** course to enhance their academic performance through **weekly** tutorials and help sessions of up to **2 hours***

Student Mentor | **Summer of Science '24** | **Maths and Physics Club, IIT Bombay** (May '24 - Present)
*Guided **2 students** with suitable references and materials to build theoretical understanding of **Quantum Mechanics***

Extra-Curriculars

- **India Finalist** in the **Microsoft World Championship 2018**, placing in **top 0.5%** out of a total of **20,000 participants**
- Awarded **Certificates of Merit** for the **Dr. Homi J. Bhabha Balvaidynanik Examination** in Grade **VI** and Grade **IX**
- **Volunteered** for social service in **Sustainable Social Development** under the **National Service Scheme** for one year
- **Volunteered** for **Rangavali 2022 - 2023**, the **Annual Queer fest** held in IIT Bombay, organised by Saathi, IIT Bombay
- Certified as a **Microsoft Office Specialist** in MS PowerPoint®2013, in MS PowerPoint®2016 and in MS Word®2016
- Coordinated and Conducted a **revision session** on **Digital Electronics** for the first year students before their exams
- **Volunteered** for the **Department Convocation** & **Department Alumni Meet** of Electrical Engineering at IIT Bombay