



**Shlok Vaibhav Singh**  
**Electrical Engineering**  
**Indian Institute of Technology Bombay**

**18D070064**  
**UG Third Year (B.Tech.)**  
**Male**  
**DOB: 24/02/2000**

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2021	9.54
Intermediate/+2	CBSE	Shri Kasera Bazar Vidya Niketan, Indore, MP	2018	95.60
Matriculation	CBSE	St. Joseph's Sr. Sec. School, Pipariya, Hoshangabad, MP	2016	10.00

- Pursuing **Minor Degree in Department of Computer Science** *January 2020- Present*

## ACADEMIC ACHIEVEMENTS

- Secured **AIR 320** in **JEE Advanced** given by over 0.15 million students *2018*
- Secured **AIR 680** in **JEE Mains** given by over 1 million students *2018*
- Secured **AIR 100** in **Kishore Vaigyanik Protsahan Yojana (KVPY)** exam conducted by Indian Institute of Science, Bengaluru *2018*
- Awarded conversion to **B. Tech. program** from **Dual-degree program** within the Electrical Engineering department by the Institute on the basis of excellent CPI in the first-year *2019*
- Received admission offer letter for 4 year BS (Research) programme at **Indian Institute of Science**, Bengaluru, based on the excellent performance in the **KVPY** exam *2018*
- Ranked **10<sup>th</sup>** out of 76 students of the third-year B.Tech. batch in the Electrical Department
- Received perfect **AA** grade (10/10) in **13 core courses** and awarded **AP** grade for the exceptional performance in Economics (only 7 out of 733 awarded)

## TECHNICAL AND SCIENCE PROJECTS

**Analysis and Modelling of Periodic Gratings** *December 2019-June 2020*  
*Guide: Prof. Siddharth Tallur, Department of Electrical Engg., IIT Bombay* *R&D Project*

- Validated and **simplified** an analytical model developed by a research group at UC Berkeley for computing **reflectivity** and **waveguide-mode profiles** of **1-D periodic** grating structures as **function** of incident beam angle and structure geometry using waveguide formalism
- Implemented a **working model** in **matlab** for computing reflectivity of **multilayered** grating structures and benchmarked performance with an **RCWA** (Rigorous Coupled Wave Analysis) based toolbox
- Optimized the model and achieved upto **25%** RCWA speed with less than **1% deviation** from RCWA results in most of the reflectivity spectrum in sub-wavelength and shallow-diffraction regime of operation
- Utilized the model to explore design space for **novel III-V heterostructure** high-contrast periodic gratings based optical modulators with **manuscript preparation** in progress

**Application of transforms in Electrical Engineering** *October 2019*  
*Guide: Prof. Vikram Gadre* *Course Project for Network Theory*

- Explored the applications of **Fourier** and **Laplace** transforms in electrical engineering
- Prepared a detailed presentation about the derivation of both transforms from scratch by showing the **intuitive development** of each transform starting from analysis of waves on string
- Presented the work in an **exhibition** to students and faculties from various colleges from different parts of India as part of the **Immersive Pedagogy Workshop**

**DC Signal Attenuator and Amplifier** *April 2019*  
*Guide: Professor Subhananda Chakrabarti* *Course Project for Introduction to Electronics*

- Implemented a circuit to amplify or attenuate a given DC input by a factor of two with the mode controlled by the choice of the user and worked as part of a team of **three people**
- Learned about and employed 8-bit Analog to Digital and Digital to Analog converters, Shift-registers and 555-timer made using op-amp for implementing the circuit

## Quantum Mechanics (as part of Summer of Science)

Guide: Math and Physics Club

July 2019

Self-Project

- Reviewed and understood the prominent features of **quantum mechanics** like the uncertainty principle, free-particle scattering, probability conservation and WKB approximation
- Interpreted **Wentzel-Kramers-Brillouin** approximation and **scattering** of free particle in terms of behavior of classical **waves on string** and explored the analogy between **Ramsauer-Townsend effect** and electromagnetic radiation passing through a dielectric slab.
- Demonstrated **similarity** between **time-frequency resolution** of **classical** dipole-radiation and the quantum mechanical uncertainty principle by designing a heuristic **thought experiment**

## TECHNICAL SKILLS

---

**Languages** : C++, Python, L<sup>A</sup>T<sub>E</sub>X, VHDL, HTML

**Softwares** : Matlab, Mathematica, Quartus Altera, AutoCAD, SolidWorks, NGSpice

**Packages** : Numpy, Pandas, Tensorflow, Matplotlib

## POSITIONS OF RESPONSIBILITY

---

**Teaching Assistant, Department of Physics**

PH108 - Professor Dinesh Kabra

January 2020-April 2020

IIT Bombay

- Selected on basis of a good grasp of subject and good communication skills, tutored a batch of 46 students
- **Mentored academically weak students** and catered to students' course related queries
- Solved weekly problem sessions and was involved in answer script evaluation in quiz and midsem

## KEY COURSES UNDERTAKEN

---

**Electrical Engineering:** Analog Circuits, Analog Lab, Semiconductor Devices, Electronic Devices Lab, Introduction to Electronics, Digital Systems, Digital Signal Processing\*, Signals and Systems, Network Theory, Power Electronics

**Computer Science :** Computer Programming and Utilization (C++ based), Data Structures and Algorithms

**Physics :** Quantum Mechanics, Electricity and Magnetism, Classical Mechanics

**Mathematics :** Calculus, Linear Algebra, Complex Analysis, Ordinary differential equations, Partial Differential Equations, Data Analysis and Interpretation

**Miscellaneous :** Engineering Drawing, Economics, Biology

*\*to be completed in Autumn, 2020*

**Online Courses:**

- Coursera: Machine Learning, Neural Networks and Deep Learning, Convolutional Neural Networks
- MIT OCW 8.05 - Quantum Mechanics-II-2013 taught by Dr. Barton Zwiebach: Learned variational principle, Heisenberg dynamics, two-state systems, coherent squeezed states of the harmonic oscillator

## EXTRA-CURRICULAR ACTIVITIES

---

- Completed introductory Mandarin course-TM01x offered by Tsinghua University on edX
- Completed a two semester-course in Keyboard (Playing the instrument and learning the musical notation) under National Sports Organization (IIT Bombay)
- Hobbies: Reading about history and learning languages