Pursuing a **Minor** in **Computer Science and Engineering**

Scholastic Achievements

- Awarded **AP** grade in **Electronic Devices** for exceptional performance (given to **top 1**% students) *[2021]*
- Awarded **Branch change** to **Electrical Engineering** for exemplary academic performance(among 24/1100+) *[2020]*
- Secured All India Rank **851** in **IIT-JEE Advanced** out of **0.25 million** aspirants *[2019]*
- Awarded **Certificate of Merit** for securing **Rank 1** out of **200** students in IDUBS Junior College *[2019]*
- Bagged **1st place** in **school** for Class X **ICSE Examination** out of 500+ students *[2017]*

Industrial Exposure

Underwater Remotely Operated Vehicle (ROV) for surveillance *[March '20 - Present]*

Larsen & Toubro Defence | DST IMPRINT II.C *Principal Investigator: Prof. Leena Vachhani*

The project is a joint effort by AUV-IITB and Larsen & Toubro Ltd. under the IMPRINT II.C initiative of the MHRD

- Key member of a team developing a **Class-1 ROV** to be deployed in sea-waters for scanning and maintenance
- Designed **swappable** battery pods for **easy accessibility** and reduced the **testing time** of the ROV by **2 hours**

Key Projects

Matsya, Autonomous Underwater Vehicle (AUV) *[Oct '19 - Present]*

RoboSub, AUVSI & US Office of Naval Research *Project Guide: Prof. Leena Vachhani, Prof. Hemendra Arya*

An all-student **underwater-robotics research** team that works on **designing and developing** a robust AUV capable of localizing itself and performing realistic naval missions; that competes at **RoboSub, San Diego** and **NIOT-SAVe, Chennai**

- Bagged **3rd** prize at **Robosub, 2020** in the video presentation category amongst **30+ international teams**
- The team's latest iteration, Matsya 6, got featured in **Janes** - internationally most reputed defence journal
- **Special Mention** at poster presentation competition with **150+** participants at **MTS TechSym**, **IIT Madras**
- Awarded **Young Researchers' Prize** by **IEEE OES** at Underwater Technology Competition, 2021

Senior Electrical Designer *[June '21 - Present]*

- Co-guiding a **3-tier team of 11 members** on research front by ideating & planning all the research activities
- Currently working on developing hardware accelerators for **Underwater Localization** of static target using **FPGA**
- Used **VHDL** to describe the hardware that would take in 4096 samples of data after performing **FFT** (Fast Fourier transform) of the signal and gives a binary output if a particular frequency has **maximum amplitude**
- Utilized IP integrator of **Xilinx Vivado** to generate custom "Rising Edge" IP (Intellectual Property), which would perform **sliding window algorithm** for detecting the starting point of a sinusoidal signal engulfed in noise
- Programmed the **Microblaze processor** through Xilinx SDK to test and debug the IPs
- Achieved performance boost of **∼45 times** the current speed which is implemented in software

Mechanical Designer *[Aug '20 - June '21]*

- Co-author of the **Technical Development Paper** (TDP) on design and development of **Matsya 6A**
- Interviewed, recruited and mentored **6 freshmen** from the pool of **200+ UG applicants** for AUV-IITB
- Devised an **In-air feedback mechanism** for inspecting waterproofing of an enclosure. The mechanism can also increase the pressure inside the hull to further reduce the chances of O'ring failure underwater
- Ideated the concept of **removable wheels** for transporting the AUV over **long distances** with ease
- Documented **O'ring Groove Design guide** for selecting the right groove dimensions for **ISO 3601** certified O'rings decreasing the chances of misalignment between the groove and the O'ring

Fabrication Engineer *[Oct '19 - Aug '20]*

- Performed **static structural** analysis of the camera enclosure and verified it's safety at a water depth of 6m
- Executed the manufacturing of the vehicle structural components using industrial processes such as Waterjet Cutting, Vacuum Impregnation, 3D Printing, Welding, CNC Milling, and Lathe

Academic Projects

Whac-A-Mole *[Apr '21]*

Course Project, Microprocessors Laboratory EE337 *Prof. Saravanan Vijayakumaran*

- Implemented a ten second Whac-a-mole arcade game on **8051** micro-controller using **Embedded C**
- Displayed the game screen on a 16x2 LCD display with **UART protocol** to communicate with the keyboard
- Used **timer interrupt** to keep a track of the duration of the game and also the total score accumulated
- Generated pseudo-randomness of the location of the mole by implementing Linear Feedback shift register

16 bit Arithmetic and Logical Unit *[Dec '20]*

Course Project, Digital Circuit Design EE224 *Prof. Virendra Singh*

- Synthesized **VHDL code** for **16 bit ALU**, capable of carrying out 4 operations: **addition, subtraction, bitwise-NAND, bitwise-XOR**, along with carry and zero flags for two input signals
- Implemented **Brent Kung** fast adder, reducing the time complexity of ripple carry adder from $O(n)$ to $O(log(n))$
- Generated **Digital Waveform** of the output of **RTL simulation** in **Quartus** for a coded **testbench**

Stock Market Analysis *[Apr '20 - June '20]*

Summer of Science | Maths and Physics Club *IIT Bombay*

- Learned the basics of Equity, Futures and Options, Fundamental Analysis, Technical Analysis of company stocks
- Started trading to apply the **strategies** learnt and gained experience about entry and exit points in the market

Positions of Responsibility

Convener | *Tinkerers' Laboratory, IIT Bombay* *[June '20 - June '21]*

A 24*7 'Makerspace' for innovators; catering to all the students of IIT Bombay to promote hands-on learning

- Organized a 4-week, intensive **workshop** on **Design Thinking & Innovation** by Anurag Mairal, **Director** of Global Outreach at **Stanford Bio-design** which was attended by **200+** students
- Mentored **20+ students** in successfully implementing **COVID Projects**, which were designed to aid in maintaining social distance and to minimise the spread of COVID-19 during the **pandemic**
- Initiated **Tinkering Tuesday**, a technology-based **blog series** providing insights into the **latest technology**
- Responsible for explaining the basic features and application of Arduino to **200+ students** through **live** sessions

Technical Skills

Programming	C++, Python, VHDL
Software	Xilinx Vivado, Quartus, Xilinx SDK, MATLAB, SolidWorks, ANSYS(Static structural)
Platforms	Artix 7 FPGA, Microblaze, Max-V CPLD, Arduino

Key Courses Undertaken

Electrical	Digital Systems | Analog Circuits | Signals and Systems | Microprocessors | Electronic Devices and circuits | Probability and Random Processes | Power Engineering Communication systems* | Electromagnetic Waves* | Computer network Computer programming and utilization
Mathematics	Complex Analysis | Calculus | Linear Algebra | Differential Equations

** to be completed by Dec'21*

Extracurriculars

- Elucidated the working and the **scope of utilisation** of Autonomous Underwater Vehicles to the public, entrepreneurs and academicians at the **Tech** and **RnD Exposition**, and to the soldiers of the **Indian Army** *[2019]*
- Completed an intensive one year-long course in **Lawn Tennis** through **National Sports Organisation** *[2019-2020]*
- Won **3rd place** in **Dance Arcade**, an Inter-hostel dance GC; performed amongst a group of **26** dancers *[2019]*
- Secured **1st prize** in directing and scripting a movie in **Freshiezza**, organised by Institute Cultural Council *[2019]*
- Bagged **1st runner-up** position in the **RC plane competition** held by Aeromodelling Club *[2019]*
- Volunteered as a **scribe** for a senior **disabled student** in Class X ICSE Examinations *[2016]*
- Secured All India Rank **11** out of **1176** students in Institute for Promotion Of Mathematics exam *[2016]*
- Received **Gold medal** at School level in 9th SOF-International Mathematics Olympiad(IMO) and achieved **13th rank** at **Maharashtra and Goa** zonal level *[2015]*
- Won the **first** position out of **four** teams in Annual **Volleyball Competition** in School *[2013]*