Shrvam Rajesh Ambokar
Mechanlcal Engineering
Indian Institute of Technology Bombay

200100145
B.Tech.
Gender: Male
DOB: 22/2/2002

| Examination | University | Institute | Year | CPI/% |
|---|---|---|---|---|
| Graduation | IITBombay | IIT Bombay | 2024 | |
| Intermediate | CBSE | Air Force School Viman Nagar | 2019 | 95.00% |
| Matriculation | CBSE | Air Force School Viman Nagar | 2017 | 10 |

Pursuing a Minor degree in Artificial Intelligence and Data Science at Centre for Machine Intelligence and Data Science

## SCHOLASTIC ACHIEVEMENTS----------

- Secured an All India Rank of 1017 in JEE-Advanced 2020 | Achieved a percentile of 99.82% in JEE-Main 2020 *(2020)*
- Attained the 2nd rank out of 80+ students in Class XII (AISSCE) at school level with a percentage of 95% *(2019)*
- Awarded a Certificate of Merit by CBSE for securing the highest grade of A1 in all of the five subjects in class X *(2017)*

## INTERNSHIPS----------~

### deMITasse Energies | Mechanical Engineer *(Jul '22 - Aug '22)*

- Involved in the mechanical design & analysis of underwater vehicles and engines under Research & Development stage
- Employed CFD to determine drag values & losses to optimize the design, adopting a simulation-based design approach

## INDUSTRIAL COLLABORATION----------

### Larsen & Toubro Defense | Mechanical Designer | Subsea Surveillance Vehicle, Mumbai (IN)

*Principal investigator- ProfLeena Vachhani, Dept of Systems and Control, IIT Bombay* *(Aug '21 - Present)*

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

- Pivotal role in the mechanical subdivision of the team involved in the design and development of the Class-1 ROV
- Undergoing fabrication & testing, the ROV is aimed to be deployed in sea waters for scanning & ship-hull maintenance
- Redesigned the baseplate & optimized component positioning subject to constraints yielding a 47% decrease in volume
- Created a model for extensive hydrodynamic analysis of ROV by CFO using ANSYS Fluent to get drag values

### Drona Aviation | Mechanical Designer | Mass Manufacturable ROV *(Feb '22 - Present)*

*Principal investigator- ProfLeena Vachhani, Dept of Systems and Control; IIT Bombay*

The project is an industrial collaboration between AUV-IITB and Drona Aviation Pvt Ltd to design an underwater drone kit

- Key involvement in mechanical designing, development and the optimization of the minimum viable product
- Manufactured and assembled the prototype of the underwater drone, which is currently undergoing its testing phase

## KEY PROJECTS~~~~~~~~~~~~~~~~~~~~~~~~~~~~

### Autonomous Underwater Vehicle, Matsya 6 | Team AUV-IITB *(Jan '21 - Present)*

*Principal investigator - ProfLeena Vachhani, Dept of Systems and Control, IIT Bombay* *IIT Bombay*

*All-swdent team working on designing and developing a state-of-the-art AUV, worth INR 5 million, capable of performing realistic naval tasks in marine conditions lhat competes internationally at RoboSub international competition for universities across the globe*

*Accolades*

- Secured 2nd position in the Propulsion System Video category and 4th position in the Technical Design Report category among 50+ university teams from 12 different countries in RoboSub 2021 organised by RoboNation Inc
- Awarded the prestigious Young Researchers' Prize by IEEE OES (Ocean Engineering Society) at Underwater Technology Competition organized by the University of Tokyo, Japan with teams from 18+ countries
- Matsya 6, the team's latest iteration, got featured in Janes, one of the most reputed international defense journal

*Mechanical Designer* *(Apr '21 - Jul '22)*

- Employed SolidWorks & ANSYS (Static Structural & Fluent) to design and analyse various parts of the vehicle, Matsya 6
- Assisted in the planning and execution of overall testing & preparations for RoboSub 2022 throughout summers
- Performed Static Structural analysis and Topology Optimization on the supporting structures and handles of the vehicle, Matsya 6, achieving a safety factor >= 2 in each case by incorporating a simulation-based design approach
- Conducted Eigenvalue Buckling analysis on waterproof hulls and vehicle structures to rule out failure due to buckling
- Created the design of a sliding-rails system and a locking mechanism for better accessibility and faster removal of hulls
- Analysed feasibility of bio-inspired undulatory fins as alternatives to conventional thrusters for small swarm AUVs
- Using the principle of development-design, designed & fabricated a prototype of a secure underwater switch housing
- Worked on Computational Fluid Dynamics (CFD) analysis of NACA aerofoils and AUVs (and their components) under both laminar and turbulent flow conditions using ANSYS Fluent, and created steady-state and transient simulations
- Used the Motion Study feature of SolidWorks and Solidworks Visualize software to design and create animations of various parts of the vehicle and their exploded-views, such as the arm & the frame, for RoboSub video submission

*Fabrication Engineer* *(Feb '22 - Jul '22)*

- Employed industrial processes such as Waterjet Cutting, Laser Cutting, 3D Printing, CNC Machining, Welding, Vacuum Impregnation, Powder Coating & Manual Milling to manufacture structural components of the vehicle
- Manufactured custom penetrators for underwater hulls reducing cost by 90% compared to its market counterparts
- Assembled the pneumatic system of MKI'SYA 6 consisting solenoid valves, pistons, pneumatic cylinders & regulators

*Mechanical Trainee* *(Jan '21 - Apr '21)*

- Developed a 3-Dimensional parameterised CAD Model of the flintlock mechanism in SolidWorks software
- Investigated the structural strength and stresses in a Bike Crank using the Static Structural module of ANSYS
- Studied the effect of addition of hemispherical dome on cylindrical hulls on drag coefficient using ANSYS Fluent

### Verification of Euler-Bernoulli Beam Theory | Student Design Experiment *(Mar '22 - Apr '22)*

*Course/Academic Project | Solid Mechanics Lab*
*Course Instructor: Prof KN Jonnalagadda, Dept of Mechanical Engg, IIT Bombay*

- Devised an experiment to verify Euler-Bernoulli Beam theory by comparing results with theoretical deflections
- Worked in a team of 4 to execute the experiment and analyze the results; 1% relative error was found for small deflections

### Identification of musical instruments from audio sample using ML algorithms *(Apr '22 - May '22)*

*Course/Academic Project | Introduction to Machine Learning*
*Course Instructor: Prof Abir De, Dept of CSE, IIT Bombay*

- Developed a program to determine the dominant instrument in a given audio file & ranked algorithms based on accuracy
- Employed several Machine Learning & Deep Learning classification algorithms, including the Random Forest (RF) classifier & ANN, and ranked them based on their validation set accuracy with a max of 72% for Random Forest Classifier
- Processed .wav audio files from Google NSynth database using librosa python library for feature extraction

### EmotiQuad (Facial Emotion Recognition Program) *(Apr '21 - Jul '21)*

*Institute Technical Summer Project* *IIT Bombay*
*Mentor: Harshit Varma, Fourth Year Undergraduate, Dept of CSE, IIT Bombay*

- Created a facial emotion recognition deep learning program that accepts an image or the real-time video of the user as its input, identifies the face in the input using the haar cascade algorithm, and uses it to predict their emotions
- The model, to which the image is fed for emotion prediction, uses modified MobileNetV2 convolutional neural network model with seven nodes in the output layer corresponding to the seven emotions and a softmax activation function
- Used various python libraries and packages such as pandas, matplotlib, numpy, and opencv; deep learning python libraries and packaged, including Keras and Tensorflow, were utilised extensively for making the deep learning model

### Lasso (Game) *(Jan '21 - Feb '21)*

*Course/Academic Project | Computer Programming and Utilization* *IIT Bombay*
*Course Instructor: Prof Kameswari Chebrolu, Dept of CSE, IIT Bombay*

- Developed a given C++ program ('Game') and incorporated several significant improvements, including the introduction of levels, variations in gameplay and display of cumulative and level-wise scores for each session
- Executed the concepts of functions, pointers, and classes in a way consistent with Object-Oriented Programming

## POSITIONS OF RESPONSIBILITY

### Mechanical R&D Division Head | AUV-IITB *(Jul '22 - Present)*

- Responsible for planning and managing the R&D activities of the team; leading five Junior Design Engineers
- Interviewed, recruited and mentored 5 freshmen from a pool of 200+ undergraduate applicants through a two-stage recruitment process that tested their communication skills, time management, practical approach, and teamwork

### Teaching Assistant | Department of Mechanical Engineering, IIT Bombay *(Mar '22 - Jun '22)*

*Engineering Graphics & Drawing | IIT Bombay*

- Catered to the academic needs of 180+ UG freshmen while aiding in the smooth conduct of weekly labs and examinations
- Created solutions in AutoCAD on a weekly basis for all of the labs & examinations and evaluated students' answer sheets

## KEY COURSES UNDERTAKEN

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|---|---|
| Core Courses | Strength of Materials \| Solid Mechanics \| Mechanical Measurements \| Electrical & Electronic Circuits \| Fluid Mechanics \| Structural Materials \| Thermodynamics \| Engineering Mechanics \| Manufacturing Processes |
| Others | Introducing to Machine Learning \| Optimization Models \| Computer Programming and Utilization |

## TECHNICAL SKILLS

| | |
|---|---|
| Programming Languages | C/C++ \| Python \| Numpy \| Pandas \| Tensorflow \| OpenCV \| Scikit-Learn \| Keras |
| Software & Tools | SolidWorks \| ANSYS \| AutoCAD \| MS Office \| LaTeX |

## EXTRACURRICULARS

- Completed an intensive two-semester-long guitar course in National Sports Organization (Culturals) *(2021)*
- Undertook a guitar course under the Summer School of Cult held by the Institute Cultural Council *(2021)*
- Ranked 1st out of 70+ participants in the Hindi Creative Writing General Championship *(2021)*
- Conducted a tutorial session on SolidWorks, organized by Tinkerers' Lab as part of the Tinkering Bootcamp *(2021)*
- Awarded a grade of B in the Intermediate Grade Drawing exam conducted by the Govt of Maharashtra *(2016)*