Advait Risbud | **200110089**
Metallurgical Engineering and Materials Science | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 9/9/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2024	
Intermediate	HSC	PACE Junior Science College, Dadar	2020	92.00%
Matriculation	IGCSE	Podar International School	2017	90.60%

Pursuing **Honours** in Metallurgical Engineering and Materials Science and a **Minor** in **Electrical Engineering**

Scholastic Achievements

- **Department Rank 15** among a batch of **140 students** in the MEMS Department *[2022]*
- Secured **98.6 percentile** in the JEE Advanced Examination | **99.61 percentile** in JEE Mains Examination *[2020]*
- Part of the team to be awarded **Young Researcher's Prize** by **IEEE-Ocean Engineering Society** at the Underwater Technology Competition organized by the University of Tokyo, Japan with teams from **18+ countries** *[2020]*

Industrial Exposure

Larsen & Toubro Defence | Mechanical Designer | *Subsea Surveillance Vehicle, Mumbai (IN)* *[2020-Present]*

- The project is a joint effort by IIT Bombay and Larsen & Toubro Ltd. under the IMPRINT II.C scheme
- Currently in its **fabrication and testing stage**; the ROV is to be deployed in seawaters for **scanning and surveillance**
- Simulated the performance of **5+** end cap designs for pressure hulls such as **honeycomb structures** to maximize safety factor against compressive and buckling stresses; achieving a final safety factor of **>2**
- **Designed and optimized** the tether mount after **simulating its performance** against a range of operating forces

Drona Aviation | Mechanical Designer| *Mass Manufacturable ROV* *[2020-Present]*

- Key member of a team working to create a **customizable ROV** for the consumer electronics market
- Designed and manufactured the main hull with **scalable** and **robust** wire routing between hulls and thruster
- **Analysed** multiple techniques for waterproofing miniature **brushed DC motors** to enhance life at rated RPM

Key Projects

Matsya, Autonomous Underwater Vehicle (AUV) *[2020-Present]*

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

*An all-student team of **55+ members** that works on building a robust and highly modular autonomous underwater vehicle (AUV), focus of the project is competing at RoboSub along with **industry collaborations** on research projects for commercialization*

- Won in 3 categories (propulsion systems, technical design report, and website) out of 4 at RoboSub 2021 out of 55+ participating teams from around the world; Semi-finalists in 2022
- Featured in Janes, a journal in the field of defense for the team's innovations in the underwater domain

Mechanical Sub-Division Head *[2022-Present]*

- **Designed and assembled** a pneumatics system involving **directional control valves** (solenoid-based), **pressure regulators** and **pressurized** CO_2 **cylinders** to actuate torpedo shooters and marker droppers
- **Manufactured** custom penetrators for waterproofing of underwater hulls **reducing cost** by **90 %**
- **Leading** a project to replace water-jet cut aluminium frames with fiber-reinforced composites manufactured in-house to increase **strength to weight ratio** at a reduced cost; **bringing down costs** by a **factor of 4x**

Mechanical Designer *[2021-2022]*

- Designed and manufactured a **rail-based mounting mechanism** for thrusters in a **cylindrical cavity**
- **Reduced time** for redesigning the marker-dropper by **80%** using equations in SOLIDWORKS
- Ideated an underwater pressure hull for a swarm AUV **optimizing** for space, weight, and accessibility

Learning OOMMF on a Remote Server *[2021-Present]*

Quantum Materials and Devices Lab, IIT Bombay — *Guide: Prof. Avradeep Pal*

- Simulating the **magnetization characteristics** for Permalloy thin-films using the **OOMMF** Software
- Worked with the **plottr** package and **QCoDeS** environment for real-time **data collection and visualization**
- Created a higher-order derivative graphing feature using python's **PyQt5** library to integrate with the **plottr** tool

Video Super Resolution *[2022]*

Seasons Of Code, Web and Coding Club, IIT Bombay

- Implemented a convolutional neural network to achieve image super-resolution with **ReLu activation** and **bicubic interpolation** for degrading images to generate training data using **PSNR** and **MSE loss** as parameters
- **Analyzing** the performance of multiple architectures for modelling degradation and achieving blind super-resolution

Computational Geometry *[2021]*

Seasons Of Code, Web and Coding Club, IIT Bombay

- Implemented image processing algorithms such as **Otsu thresholding**, **Lanczos resampling**, **Canny and Sobel edge detection filter**, using python (OpenCV & PIL) after analyzing their computational basis
- **Performed** blurring, grayscaling and smoothening operations on sample images **from scratch** using PIL

Academic Projects

Dynamics Analysis of a Mobile Stand *[2021]*

Course Project, Theory Of Machines & Machine Design *Prof. Shantanu Tripathi*

- **Redesigned** the model to achieve an increase in minimum safety factor to **>1.6** for a **30%** increase in load after **evaluating potential points of failure** using simulations via **Ansys Mechanical** and **MSC Adams**
- Ideated and modeled a **spring-based locking mechanism** for arresting one degree of freedom
- Proposed an **analytical solution** to **increase toppling load** and **angle of repose** by up to **40%**

Colloids and Interface Science *[2021]*

Course Project, Colloids and Interface Science *Prof. Mithun Chowdhury*

- Studied the use-cases of products that utilize colloidal phenomena such as tunnel air purifiers, aerogels, quantum dot-based screens and Cottrell precipitators
- Reproduced the analytical formulation from a research paper to predict the thickness of polymeric shells

Solving 2-D heat equation for a semi-infinite slab *[2021]*

Course Project, Transport Phenomena *Prof. Nurni Vishwanathan*

- Wrote a python script to find the time evolution of temperature at various points in a semi-infinite solid
- Used a **dynamic programming** algorithm and **finite-difference discretization** for solving the heat equation

Finite Element Modelling *[2021]*

Term Paper, Mechanics Of Materials *Prof. Aparna Singh*

- **Authored** a term paper on the basics and applications of finite element modelling of materials
- **Elucidated** the ideas of discretization, **Galerkin's method**, direct method, and use of **Gaussian quadrature**

Predominance Diagram Modelling *[2021]*

Course Project, Thermodynamics Of Materials *Prof. Nurni Vishwanathan*

- **Assimilated** data for **free energy** and **entropy** of reaction for metal-sulphur-oxygen equilibria
- **Executed** a python script to generate the **predominance diagram** as a function of temperature

Mentorship, Leadership and Teaching Roles

Department Academic Mentor | *D-AMP, MEMS IITB* [2022-Present]

- Part of a **35-member team** selected from **90+ applicants** based on a **stringent interview** and **peer reviews**
- Mentoring **six sophomores** from the MEMS Department on a one-to-one basis on **various aspects of their life**
- Part of the subgroup in the D-AMP council in charge of conducting help sessions for department courses, and information dissemination for various activities such as higher studies, semester exchange, internships etc.
- Among the **4 students** from the department to be nominated for **Institute Student Mentorship**

Teaching Assistant | *Department Of Physics*

- Conducted **weekly tutorials** for a batch of 40 students and solved problem sets as well as the doubts of students
- Conducted a help session for the entire first year batch to elucidate concepts and take queries in electromagnetism

Convener | *Group For Rural Activities, IITB* [2021-2022]

- **Initiated a podcast series** titled "Gram Charcha" with interviews of eminent personalities that are doing pivotal work in developing the rural parts of India by transforming the **education** and **agriculture** sectors in these regions

Technical Skills

Programming	Python (*PyTorch, pandas, numpy, scipy, OpenCV, PIL*), R, tcl/tk, HTML, CSS
Software	OOMMF, SOLIDWORKS, ANSYS (Fluent and Mechanical), ROS, Git, MATLAB, LTSpice

Key Courses Undertaken

Materials Science	Crystallography, Thermodynamics, Transport Phenomena, Mechanics Of Materials, Theory Of Machines and Machine Design, Data Analysis & Interpretation, Colloids and Interface Science, Kinetics Of Processes*, Phase Transformations*
Physics and Electrical	Quantum Mechanics-1, Electricity and Magnetism, Signal Processing, Digital Electronics*
Miscellaneous	Numerical Analysis, Differential Equations, Linear Algebra, Calculus, Text Mining in R**

(=to be completed by Nov 22', **=Online Course)*

Extracurriculars

Culturals

- **Composed an original song** for the Inter Hostel Music GC and bagged the 2^{nd} prize among teams from 17 hostels
- Hosted the **finals** of the MI-Idol singing competition as a part of Mood Indigo 2020 with a footfall of **500**
- **Wrote** an original stand-up set as a part of the Laughter Riots competition by Comedy Cons, IITB

Technology

- Stood 3^{rd} amongst all hostels in the Electronics and Robotics GC on embedded systems and mechatronics
- **Volunteered** in NSS to mentor and teach physics to an underprivileged student for JEE Advanced for 8 months, created problem sets, and took regular doubt clearing sessions resulting in the student's admission to **IIIT Bhopal**

Sports

- Part of the school **football** and **table tennis** team competing in events at the Mumbai **city** and **district** level