

Vaishnavi G. Agarwal

Third year undergraduate, Indian Institute of Technology, Bombay
+91 887 910 8304 | vaishnavi.agarwal@iitb.ac.in

RESEARCH INTERESTS

- Mainly in the domain of mechanical design engineering, particularly in the design of systems for applications in automobiles. 3D printing and biotechnology
- Also interested in Mechanical Engineering, specifically, manufacturing and mechanics

With these interests in mind, I have taken several courses and done projects in these fields, and am actively looking for research internships related to the same.

EDUCATION

IIT Bombay

Bachelor of Technology in Mechanical Engineering (with Hons.)

- CPI: 8.02/10.00

Mumbai, India

Expected May'23

Sri Chaitanya Junior College

Intermediate | Maharashtra State Board

- Percentage: 89.69

Pune, India

'19

D.A.V. Public School

Matriculation | CBSE

- CGPA: 10.00

Pune, India

'17

EXPERIENCE

Design of Tank for SLA 3D micro printing | Research Intern

Prof. Prasanna S. Gandhi, Suman Mashruwala Advanced Micro Engineering Lab

May'21 – September'21

IIT Bombay, Mumbai, India

- **Aim:** To design and develop a solid model for SLA based resin vat tank of a high-speed 3D micro printer system
- Understood the process requirements and identified the design specifications for the tank system considering them
- Performed a literature review on the leveling mechanism integrating 3 point leveling and mirror mount system
- Proposed a CAD model design of the resin tank employed for Stereolithography-based vat photopolymerization
- Researched for material selection and assisted in the process of fabrication of the system at an economical cost

Design of harmonic drive testing setup | Winter Research Intern

Prof. Prasanna S. Gandhi, Suman Mashruwala Advanced Micro Engineering Lab

December'21 - Present

IIT Bombay, Mumbai, India

- **Aim:** To design the test setup to characterise various attributes such as kinematic error, efficiency, load characteristics of these systems.
- Read literature regarding previous such test systems and catalogues to decide on the Harmonic drive to be tested
- Worked in a group of 3 to design solid models of the parts of the shaft line consisting of elements like motor (with integrated encoder), harmonic drive, etc. with appropriate bearing support structures and flexible couplings
- Designed solid model of structural elements that support the shaft line at appropriately spanned design locations

TECHNICAL PROJECTS

Design of Wire Fin Heat Exchanger (WFHE) | Summer Research Project

Prof. Milind V. Rane | Dept. of Mechanical Engineering | IIT Bombay

May'21 - July'21

- **Aim:** Optimization of various features of the Wire Fin Heat Exchanger to maximize heat transferred while keeping weight and cost low
- Comprehended heat transfer and exchangers to understand the variation of performance with design features
- Simulated heat transfer from copper tube at fixed temperature to the water flowing inside it for 7 inlet velocities
- Simulated heat transfer from a square copper tube at fixed temperature through a spring fin inside it to thermolol 55 flowing inside it for different inlet velocities
- Completed the CAD model for a Novel Wire Fin Heat Exchanger in SOLIDWORKS for its optimization study

Student Satellite Program, IIT Bombay

April'20 - Present

Star Tracker based Attitude Determination System | Mechanical Subsystem

- Ideated and designed the flex PCB implementation strategy to reduce the size of the star tracker system
- Performed a survey on various structural designs of STADS to select a robust and Cubesat compatible structure

Ground Station Segment | Communication Subsystem

- Engaged in the setting up of the Institute's autonomous UHF band Ground Station support capable of carrying out half-duplex communication for establishing contact with satellites transmitting in the respective band
- Successfully operated a Kenwood TS-2000 to receive and transmit signals from various satellites and process data
- Gained technical expertise on ATmega32 and implemented USART and SPI protocols of communication on it
- Received and decoded weather image signals from NOAA and ISS satellites using the SSTV transmission protocol

ACADEMIC AND SELF PROJECTS

Modelling MRR in Ultrasonic Machining | Course Project

July'21 - November'21

Prof. Pradeep Dixit | Department of Mechanical Engineering | IIT Bombay

- Read literature on Grain Throwing, Grain Hammering Model, applications in industry and its current status
- Simulated the indentation of a single particle using Grain Throwing Model in Ansys and that of multiple particles in MATLAB and plotted the trends of MRR with change in amplitude and frequency of the tool
- Calculated the total MRR making approximations about the number of particles (fully packed) and volume of material removed from the depth of indentation (hemispherical indent)

Single-Minute Exchange of Die (SMED) | Course Project

January'21 - May'21

Prof. Rakesh Mote | Department of Mechanical Engineering | IIT Bombay

- Conducted an extensive analysis on Toyota case study with special emphasis on lean manufacturing & Industry 4.0
- Documented the research on current and future applications and simulation of SMED by working in a group of 5

SONAR Technology | Course Project

January'21 - February'21

Prof. Atul Shrivastava | Department of Mechanical Engineering | IIT Bombay

- Explained its working, discussing its active and passive modes and compared it with other technique like RADAR
- Worked in a group of 3 and prepared a report discussing SONAR Technology and its application in submarines

Morse to Synthesized Speech App | Institute Technical Summer Project

April'21 - July'21

- Worked in a group of 4 to make a web application for people with partial disabilities or with voice impairments
- Implemented an end-to-end web application which synthesizes speech taking morse code as input
- Deployed a 3 phase pipeline TTS framework, having pretrained encoder, synthesizer and decoder for this
- Built a Flask framework to incorporate all the various parts of the project into a web app with a user-friendly UI

TECHNICAL SKILLS

Software and packages : Catia, SOLIDWORKS, AutoCAD, Ansys, Adams Microsoft Office
Programming : C, C++, Python, L^AT_EX, MATLAB, GNU Octave
Simulation Software : Proteus 8, CAMotics, CNC Simulator
Libraries & Web Development : Numpy, Pandas, Matplotlib, Seaborn, Tkinter, HTML

ACADEMIC ACHIEVEMENTS

- Acquired rank 25 in the Regional Mathematics Olympiad (RMO) in the Maharashtra and Goa Region October'17
- Finished amongst the top 30 in city in SPARK-Catch Them Young Exam conducted by Infosys, Pune May'15
- Secured 99.1 percentile and 99.73 percentile in JEE Advanced and JEE Main exams respectively May'19

KEY COURSES UNDERTAKEN

- **Mechanical Engineering:** Engg. Drawing, Engg. Mechanics, Strength of Materials, Solid Mechanics, Structural Materials, Mechanical Measurements, Manufacturing Processes I, Microprocessors and Automatic Control, Manufacturing Processes II, Kinematics and Dynamics of Machines*, Industrial Engineering & Operational Research*
- **Other courses:** Biomedical Microsystems*, Biology, Psychology, Introduction to Economics, Developing a Proof-of-Concept (Basic and Advanced)

(*To be completed by May'22)

COMMUNITY & LEADERSHIP

Teaching Assistant | BB 101 - Biology

January'22 – Present

Faculty: Prof. Ambarish Kunwar | Department of Biosciences and Bioengineering | IIT Bombay

- Selected as UG Teaching Assistant out of 100+ applicants for BB 101 - Biology based on prowess in the subject
- Accountable for conducting tutorials throughout the semester for Biology course in a class of 40+ students
- Responsible for mentoring the students, helping them get a better understanding of concepts, solving problems and clearing their doubts

Convenor | Ham Radio Club, IIT Bombay

February'20 – Present

Ham Radio is a global community of amateur ham enthusiasts, bringing electronics and communications together

- Responsible for conducting amateur radio activities attended by 300+ undergraduate & postgraduate students
- Organised multiple activities like Online Satellite Tracking Session & quizzes attended by 600+ Ham enthusiasts
- Educated ham enthusiasts about amateur radio through 25+ blogs and a series of posts with 1500+ viewership
- Executed a three step recruitment process to shortlist 10 students from the subsystem from 100+ applicants

Corporal | 2 Maharashtra Engineers Regiment

December'20 – Present

The 2 Maharashtra Engineers Regiment is a National Cadet Corps unit under the aegis of the Bombay Engineer Group

- Awarded the rank of Corporal on the basis of the performance in a rigorous 3-day Council Training Camp consisting of fitness, training, mental and aptitude tests and group discussions with all day long commitment
- Currently pursuing the 'C' certificate under the authority of Ministry of Defence, Government of India

Cultural Secretary | National Cadet Corps, IIT Bombay

May'20 – June'21

Selected out of 40+ aspiring candidates on the basis of assignments and skills evaluated in groundworks and interview

- Part of a 3-member team responsible for the ideation and execution of cultural activities and social events
- Worked towards the restructuring of all the activities suiting the online system during COVID-19 pandemic
- Hosted alive webinar on Facebook with Kargil War veteran, Major D. P. Singh as the Guest of Honour
- Ideated and executed the first-ever Online Cooking Competition for the students of the Institute

EXTRACURRICULARS

Workshop

- Took an hour-long lecture on YouTube Live on the topic Slow Scan Television (SSTV) '21
- Organised Ground Station Workshop attended by 150 enthusiasts from 40+ colleges in India '21
- Anchored an hour-long talk on YouTube Live on the topic Amateur Radio Astronomy '20

Cultural

- Performed in the Annual InSync Dance Show (AIDS), organized by InSync, Institute's Dance club '20
- Part of 4-member team that acquired 2nd position in Scavy Hunt in the Institute's Cult Carnival '19
- Secured Grade A in Elementary as well as Intermediate Grade Drawing Examination '13,'14

Social

- Volunteered in Masti Ki Paathshaala in order to familiarise the NGO students with basic science concepts through fun activities that increase logical activity in children '21
- Volunteered for Career Counselling and lecturing on Climate Change Awareness across BMC schools of S and N wards of Mumbai organized by Abhyuday, IIT Bombay '19

NCC

- Received A (Alpha) grade in 'B' certificate under the authority of Ministry of Defence, Govt. of India '21
- Part of the first-ever Girls Contingent of NCC IIT Bombay in the Institute's Republic Day Parade '20
- Fired 10 rounds of 0.22 Sporting Rifle and won a Silver Medal among 150+ cadets '19

Technical

- Completed Python, Data Analytics and LaTeX courses under the Learners Space program conducted by the Undergraduate Academic Council (UGAC), IIT Bombay '20
- Successfully completed 2 weeks of training on Information Technology Concepts and Applications conducted by Infosys Limited, Pune Development Centre '15

Certifications

- Completed Introduction to Psychology course online offered by the Yale University '20
- Successfully completed online non-credit courses Programming for Everybody and Python Data Structures and Algorithmic Toolbox offered by Coursera '20