

Ishani Prabhudesai

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Objective

I am a driven engineer seeking admission to graduate school.

- ✓ To build assistive robots that broaden human capabilities.
- ✓ To engage in interdisciplinary research, bridging engineering and computer-related fields to innovate practical solutions.
- ✓ To pursue a doctorate in machines, become an entrepreneur, and contribute to sustainable and innovative human-machine systems.

Skills

Design and Analysis: Fusion 360 | CATIA v5 | SolidWorks | AutoCAD | Ansys | Canva

Programming: Python | MATLAB | C++ | JAVA | HTML | Arduino | Visual Studio Code | CSS | SQL | SAP

ML Packages: TensorFlow | NumPy | Pandas | PyTorch | scikit-learn | Keras | Matplotlib

Robotics: Prototyping | Motion Planning | Sensor Fusion | Control System Design | Perception | SLAM

Research Interests

- Robotics
- Industrial Automation
- Product development
- Design and Manufacturing Optimization
- Sustainable Technology

Education

B. Tech. in Mechanical Engineering **2019 - 2023**

Sardar Patel College of Engineering, Mumbai

C.P.I – 8.83/10

Converted GPA - **3.75/4**

Minor Specialisation in Computer Engineering **2020 - 2022**

Sardar Patel Institute of Technology, Mumbai

Higher Secondary Certificate (HSC) **2017 - 2019**

S.S. & L.S. Patkar College of Arts & Science, Mumbai

Percentage – **87.56%**

Secondary School Certificate (SSC) **March 2017**

Yashodham High School and Junior College, Mumbai

Percentage – **93.6%**

Internships/Work Experience

Mahindra & Mahindra Automotive Division **Aug 2023 – Present**

Graduate Apprentice Trainee – Supply Chain Management

- Spent time observing the assembly lines and understanding the various production units.
- Interacted with senior engineers and team leaders to grasp the company's best practices and production processes.
- Developed a functional safety stock database for efficient inventory management of bulk hardware materials, ensuring smooth operations.
- Introduced a practical Kanban three-bin system to control the use of metal shims in the Axle and Transmission assembly line.

- Simplified procurement by implementing daily automated triggers to suppliers through SAP software.

Skills acquired: Manufacturing, Inventory Management, SAP,

Ecozen Solutions Pvt. Ltd.

December 2022 - January 2023

Thermal Engineering Intern

- Conducted a comprehensive analysis, validation, and comparison of 20 emerging cooling technologies, focusing on thermodynamic considerations and cost-effectiveness.
- Thoroughly researched over 50 materials as potential alternatives to conventional thermal storage materials, and prepared a datasheet to identify the most suitable alternative.

Skills acquired: Market Research, Trade-off Analysis, Time Management

Schindler India Pvt. Ltd

July 2021 - September 2021

Modernization Transportation Intern

- Automated the Milestone activity tracking process from the order booking stage to the final customer handover.
- Planned and completed 20+ safety inspections through rigorous follow-up with Site Technicians.
- Created sales funnel by analyzing historical data of 1000+ customers using Advanced Excel tools followed by lead generation and cold calling.
- Minimized the number of days required to complete milestones by 20%.

Skills acquired: Planning and Coordination, Sales Pitching, Marketing, Negotiation, Microsoft Excel

AIIESEC

February 2021 - July 2021

Corporate Relations Associate

- Conducted comprehensive market research and implemented effective lead generation strategies.
- Participated in a three-day local conference, actively engaging in multiple brainstorming sessions aimed at enhancing organizational processes and outcomes.

Skills acquired: Oral and written communication, Market research, Marketing, Canva

The Sparks Foundation

November 2020

Data Science Intern

- Built a robust ML model to predict stock prices by tuning the parameters to achieve an accuracy of 90%.

Skills acquired: Python, Jupyter Notebook, Machine Learning

Co-curricular Activities

Mumbai Toastmasters

2021

- Developed strong communication skills by delivering speeches on several topics.

SPCE Racing

2020

- Gained expertise in aerodynamics, composites, vehicle dynamics, and powertrain design.
- Conducted research on utilizing phase change materials for battery pack cooling.

Teaching/Mentoring Experience

The Lighthouse Project, Mentor

July 2023 - Present

- Providing guidance and mentorship to under-resourced 10th-graders, offering insights into career choices, working on their communication skills, and broadening their perspective.

Vivekananda Youth Forum, Teacher

2020

- Taught Math to underprivileged 11th grade students.

Journal Publications

1. **Ishani Prabhudesai**. “Swarm Robotics Based on Collective Intelligence of Social Insects: A review” *International Journal of Scientific Research in Engineering and Management (IJSREM)*, Volume 07, Issue 09, September 2023, <https://www.doi.org/10.55041/IJSREM25558>

Conference Publications

1. **Ishani Prabhudesai** and Nilesh Raykar. “Banana Fiber Sandwich Panel as a Green Alternative to Synthetic Foams for Insulation in Transportation Industry” *Sardar Patel International Conference on Industry 4.0 - Nascent Technologies and Sustainability for 'Make in India' Initiative, Mumbai, Maharashtra, India*
2. Kripa Sethi, **Ishani Prabhudesai**, Isha Likhite, and Nilesh Raykar. “Nitya: A novel cleaning boat design to collect floating waste from water bodies” *Veermata Jijabai Technological Institute International Conference on Environmental Sustainability (ICES-2023), Mumbai, Maharashtra, India. (Awarded the best paper in the conference session)*

Projects

Review on Swarm Robotics Based on Collective Intelligence of Social Insects May 2023 – August 2023

- Identified the latest research contributions, methodologies, and key findings that have shaped the development of swarm robotics over the years.
- Conducted an extensive survey of peer-reviewed literature and relevant academic works, to gain a comprehensive understanding of the current state and prospects of swarm robotics.

Design of Robotic Arm

March 2023 – May 2023

- Designing and Modelling of a robotic gripper using Fusion360; 3D printing and functional testing of CAD model for prototype.

Nitya - A floating waste collection boat

July 2022 – March 2023

- Led a team of three in designing and prototyping Nitya: A floating waste collection boat using locally available green materials, including bamboo, banana fibre, and cornstarch for cleaning the college campus lake.
- Designed a user-friendly smartphone-based navigation system, integrating a Bluetooth module and Arduino Uno for enhanced control and functionality.
- Optimized the waste accumulator mechanism by analysing velocity, selecting a crank wheel diameter of 55 mm, corresponding to a maximum flap velocity of 0.4 m/s.
- Conducted a comprehensive risk assessment and fault tree analysis to ensure system reliability and safety.
- Conceptualized path planning using the A* algorithm, mapping the lake, and implementing sensor fusion of GPS, IMU, and compass through a Kalman filter on Raspberry Pi 3B for autonomous navigation.

Team TEJASVI:

December 2022 – May 2023

U.S. Department of Energy Solar Decathlon 2023 Design Challenge

- Designed a hybrid ventilation system for human comfort using Revit software and calculated the annual energy consumption for a stadium in Madhya Pradesh.

Neural Network Classifier for obstacle detection

November 2022

- Developed and trained a Neural Network Classifier for obstacle detection in autonomous vehicles.
- Gathered and preprocessed a labelled image dataset, encompassing various obstacle types, weather conditions, and lighting situations.
- Designed a Convolutional Neural Network (CNN) architecture tailored to the obstacle detection task.
- Split the dataset into training, validation, and testing subsets for model assessment.
- Optimized hyperparameters and fine-tuned the model's performance.

Generative Design of MBB Beam using GAN

July 2022 – December 2022

- Developed a generative design system for MBB (Minimum Bounding Box) beam structures.
- Leveraged Generative Adversarial Networks (GANs) for innovative design generation.
- Generated a topology-optimized image dataset using the SIMP (Solid Isotropic Material with Penalization) method in Python.
- Conducted image processing and hyperparameter tuning for GAN model training.
- Adeptly applied GAN-generated designs to the field of MBB beam engineering.
- Demonstrated the fusion of AI and engineering to streamline design processes.

Design of an innovative testing machine for combat shoes

November 2022

- Conceptualized and designed an innovative testing machine specifically tailored for evaluating the performance and durability of combat shoes under rigorous conditions.
- Implemented real-time data collection from load cells and pressure sensors using Arduino and USB connectivity.
- Created a graphical user interface (GUI) using Python's Tkinter library for data visualization.
- Designed the interface to display real-time load, pressure, and temperature data for precise control.

Machine Predictive Maintenance Classification

October 2022

- Gathered data from industrial sensors within a manufacturing company to predict maintenance needs, ultimately preventing equipment breakdowns and cost savings.
- Conducted thorough Exploratory Data Analysis (EDA) to gain insights into the dataset by finding the most relevant features using Matplotlib in Python.
- Implemented robust Data Preprocessing to prepare the dataset for modelling, including handling missing values, feature scaling, and encoding categorical variables using Pandas.
- Evaluated 5 ML models and selected Gradient Boosting Classifier based on the model accuracy.

Gear Box Design

September 2022

- Developed a gearbox to deliver 42 kW power with a power efficiency of 95%. The steady state input speed was 1500 rpm and the steady state output speed was 268 rpm. The gears involved were helical and the gear-train was a two-stage reverted one.
- Developed a detailed design calculation report, and a general assembly drawing on Catia. It also included a detailed drawing for intermediate shaft.

Predictive Analysis of carbon steel using Regression Model

August 2022

- Developed a linear regression model to predict the crack growth rate in a standard compact tension specimen of carbon steel when subjected to cyclic loading.
- Preprocessed the collected data, handling missing values, outliers, and normalizing the data.
- Identified the key features that significantly affect crack growth rate, such as stress intensity factor and loading frequency.
- Developed a multi-variate regression equation that relates the selected features to crack growth rate based on the features and data distribution.
- Evaluate the performance of the regression model using the testing data. Utilized metrics like Mean Absolute Error (MAE) and R-squared (R^2) to assess model accuracy.

Optimisation of pressure vessel for weight reduction

April 2022 - May 2022

- Implemented four optimization algorithms (Simulated Annealing, Particle Swarm Optimization, Random Search Method, and Genetic Algorithm) using Python.
- Tackled the challenge of multi-variate optimization with eight geometrical design constraints, showcasing a deep understanding of the problem domain.
- Conducted thorough parameter tuning and data normalization, resulting in a comprehensive analysis of the obtained results.
- The Python code significantly optimized computational efficiency and led to a substantial reduction in the weight of a pressure vessel, surpassing existing literature on the subject.

- Awarded the "Best Project" in the class, demonstrating exceptional problem-solving and programming skills.

Design and Prototyping of insulation panels

July 2021 – August 2022

- Designed a biodegradable banana fiber sandwich panel using a corn starch matrix with superior thermal performance than the traditional XPS panel for transport vehicle insulation.
- Conducted extensive research involving thermal and structural simulations in Ansys to optimize the corrugation angle of the panels. This optimization aimed to achieve the dual objectives of reducing weight and maximizing thermal conductivity.
- Successfully prototyped the composite panels using a hand layup process, showcasing the feasibility of the design and manufacturing process.

Healthcare Website with Enhanced Doctor Access

July 2021 – August 2022

- Designed the front-end of a healthcare website aimed at digitizing and efficiently managing patients' medical history data.
- Utilized HTML and CSS to create an intuitive and user-friendly interface that eliminates the need for paper records.

Smart Walking Stick with distance measurement

July 2021 – August 2022

- Designed a smart walking stick equipped with distance measurement sensors, ensuring obstacle detection and safe navigation.
- Integrated ultrasonic or infrared sensors and a microcontroller to calculate distances and provide real-time feedback to the user.
- Implemented user-friendly features, such as vibration alerts or auditory signals, to warn the user of obstacles or changes in walking conditions.

Geneva mechanism design

June 2021

- Designed a Geneva mechanism tailored for large-scale applications, such as the food packaging industry and industrial automation.
- Utilized Fusion360 to process the CAD model for Additive Manufacturing, which included slicing the model and generating G-code for production.

Database management Ecommerce Website to sell electronics

May 2021

- Constructed the backend architecture for a resilient management system tailored to an electronics E-commerce website.

Design of Diving Board

May 2021

- Designed an overhung diving board with a primary goal of minimizing weight while upholding structural integrity through an iterative design process.
- Employed weight optimization techniques, including strategically incorporating trusses into the board to reduce material without compromising its structural strength.
- Conducted stress analysis using Ansys to ensure the design's structural integrity, confirming that stress concentrations remained within acceptable limits.

Hobbies/ Interests

- Violin playing (*Passed Trinity Grade I examination with Distinction*)
- Hindustani Classical singing
- Yoga and Meditation
- Stock market
- Cooking

Courses

Complete TensorFlow 2 and Keras Deep Learning Bootcamp	Udemy	July 2022
Complete Data Wrangling & Data Visualization with Python	Udemy	January 2021
Leadership and Emotional Intelligence	Indian School of Business Coursera	September 2020
Improving Deep Neural Networks: Hyperparameter tuning, Regularization, and Optimization	Deeplearning.ai Coursera	July 2020
Neural Networks and Deep Learning	Deeplearning.ai Coursera	June 2020
Catia V5	Udemy	May 2020

Professional References

Dr. Nilesh Raykar

Capstone Project Guide

Professor, Mechanical Engineering Department

Sardar Patel College of Engineering, Mumbai, India

Known for 4 years

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Dr. Kiran Bhole

Dean R&D, Associate Professor, (Mechanical Engineering)

Sardar Patel College of Engineering, Mumbai, India

Known for 4 years

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Known for 4 years

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