

Ritwik Manish Saraf

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A 4th generation Mechanical Engineer with a hunger for design problems and a taste for automating the solutions.

EDUCATION

Purdue University, West Lafayette
MS Mechanical Engineering

Aug'23-Present

Mumbai University, Mumbai
BE Mechanical Engineering

CGPA: 8.21/10

Jul'19-Jun'23

EXPERIENCE

Applied Materials

Mechanical Engineering Intern

May'24-Dec'24

1. Cleanroom Robot repeatability Test.

- Developed a test for vacuum robot repeatability within a **5-micron specification** by calibrating a 2-micron precision laser sensor, minimizing vibration interference and deployed a rapid-prototype in a cleanroom environment for Proof-of-Concept.
- Automated data capture through a .NET C# program interfaced with EtherCAT modules, reducing manual process variability.
- Enhanced measurement accuracy, achieving improvement in test reliability and reducing manual operator time by **60%**.

2. Automated loading of semiconductor manufacturing chamber lids for leak checking.

- Designed an automated solution for positioning chambers for a UR Cobot for leak checking, balancing accuracy and efficiency.
- Simulated CAD and RoboDK paths to ensure precision and collision-free operation in a constrained cleanroom environment.
- Increased testing efficiency by **50%** and reduced setup time, cutting testing cycle duration by **30 minutes**.

3. Automated Chamber Leak Check

- Developed a collaborative robot process for automated chamber leak checks, eliminating the need for manual operations.
- Automated program generation using RoboDK Python API for an Omron TM12 Cobot to reduce repetitive programming effort while maintaining test accuracy and repeatability leading to an overall **2-step reduction** for a traditionally manual process.
- Decreased engineering time and equipment downtime by over **50%**, enhancing reliability and throughput.

4. Metal Deposition Process Chamber Assembly Automation

- Initiated an automation plan for chamber assembly to reduce human error and minimize downtime while maintaining efficiency.
- Designed for process for a cost-benefit analysis, evaluating potential ROI on automated assembly investment.
- Initiated plan for automation capabilities, estimating potential productivity gains by **40%** and error reductions by **100%**.

AIDRF-BARC

Research Intern

March'21-Aug'21

- Conducted research on water desalination using vacuum technology under the guidance of BARC scientist Dr. N. K. Prasad.
- Developed experimental setups to test desalination efficiency and evaluated the effects of vacuum technology on water purification processes while working on minimizing energy consumption by **35%** in deployable vacuum pumps.
- Gathered and analyzed data to improve scalability and efficiency of desalination methods, with potential applications in sustainable water management, potable water generation, and efficient alternatives to desalination by expensive osmosis processes.

ACADEMIC PROJECTS

Title: IoT-based Agricultural Automation System for Optimized Fertigation

2023

Developed an IoT-based fertigation system using real-time sensor data to automate precise irrigation and nutrient delivery, enhancing crop yield. Tested in a lab environment, the system demonstrates scalability for autonomous management of larger agricultural areas.

Publication: Presented at IEEE Conference and published in IEEE Xplore.

Title: Acoustic Pulse Reflectometry for Pipe Blockage Detection

2022

Developed a non-destructive testing system using Acoustic Pulse Reflectometry (APR) to detect pipe blockages by analyzing sound wave reflections. Validated the system through simulations and experiments, establishing a correlation between blockage size and reduced acoustic intensity for industrial applications.

Title: Design and Fabrication of urban Vertical Axis Wind Turbine

2021

Designed a vertical axis wind turbine (VAWT) optimized for urban environments, enhancing efficiency with integrated deflectors. Simulated the design in Autodesk Inventor and ANSYS Fluent, and developed an Arduino-based smart system for improved energy control and power management.

LEADERSHIP ROLES

FCRIT-Student Council

Joint Secretary

Sep'21-Jun'22

- Led a team of 300+ students to organize two major intercollegiate festivals with 150+ technical and cultural events.
- Secured \$50,000+ in sponsorship, with all proceeds dedicated to breast cancer awareness initiatives.
- Organized India's first night drone racing event in partnership with the Indian Drone Racing League(IDRL), attracting 21 top participants nationwide.

TECHNICAL SKILLS

Key Skills: Design and Rapid Prototyping, Electromechanical Systems, Collaborative robotics, **Cleanroom protocols**, Semiconductor manufacturing technology, Automated manufacturing design, CAD

Software: **Mayan**, **RoboDK**, EtherCAT, Solidworks (2024), Autodesk Inventor (2023), Fusion 360 (2024), Ansys-FLUENT, NI-Labview, Matlab, Python, C++,C#(.NET), COMSOL 5.5

Certifications: Mastering Ansys CFD Level 1& 2 (Udemy), Nvidia DL Institute- Fundamentals of Deep Learning