Pruthak Utpal Joshi

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Professional Summary

Mechanical Design Engineer with experience in robotic system design, CAD modeling, mechanical prototyping, and Design for Manufacturing (DFM). Proficient in SolidWorks, Fusion360, ANSYS, and CNC and sheet metal-based manufacturing processes. Successfully led end-to-end development of robotic arms focusing on cost efficiency, manufacturability, and performance. Demonstrated success in collaborative team environments and cross-functional R&D projects. Seeking to apply design expertise to innovative hardware development roles.

Education

University of California, Los Angeles (UCLA) *Los Angeles, U.S.A.*
Master of Science in Mechanical Engineering, GPA: 3.97/4
Recipient of UCLA Division of Graduate Education Fellowship

Indian Institute of Technology (IIT) Bombay *Mumbai, India*
B.Tech. + M.Tech. (Dual Degree) in Mechanical Engineering, GPA: 9.12/10
Specialization: Computer-Aided Design and Automation

Work Experience

Mechanical Engineer | **Reazon Human Interaction Lab** | **Reazon Holdings** **January 2025 - Present**
Pioneer in researching and developing advanced human-computer interaction technologies and systems *Tokyo, Japan*

- Designed the mechanical hardware for **OpenArm v1.0**, an open-source robotic arm scheduled for release in **July 2025**, focusing on modularity and integration readiness
- Applied advanced robotic design and **Design for Manufacturing (DFM)** principles, achieving a **24% reduction in production cost** while maintaining structural performance
- Created **URDFs from CAD models** for integration with ROS-based control systems and robotic simulation stacks
- Optimized the hardware design through comparative analysis of **cost, manufacturability, and functionality**
- Designed and iteratively refined multi-version **end-effectors** compatible across robotic arm generations
- Generated detailed **Bills of Materials (BOMs)** for OpenArm assemblies specifying part numbers, material specifications, quantities, and supplier references to streamline procurement and fabrication
- Created comprehensive **mechanical assembly guides** using exploded-view diagrams and step-by-step instructions to support users during manufacturing and ensure consistency across hardware batches

Engineering Intern | **Reazon Human Interaction Lab** | **Reazon Holdings** **June 2024 - Sept' 2024**
Pioneer in researching and developing advanced human-computer interaction technologies and systems *Tokyo, Japan*

- Engineered the end-effector of a teleoperated robotic bartender using SolidWorks with optimized 110mm gripper span
- Designed TPU-based compliant gripping pads to safely handle fragile glassware; tested under dynamic teleoperation
- Integrated Force Sensitive Resistors (FSRs) for adaptive grip control and enhanced tactile feedback
- Implemented compact 4-bar mechanism driven by lead screw, reducing system footprint and increasing grip strength

Design of MR-compatible Robotic System for Abdominal Interventions **Sept' 2022 - June 2024**
Advisor: Prof. Tsu-Chin Tsao, Mechanical and Aerospace Engineering Department, UCLA *Los Angeles, USA*

- Developed a 3-DoF MR-compatible robot for abdominal procedures inside a **70cm bore MRI** using RCM principles
- Used **linear guides and non-metallic bushings** to ensure smooth motion under MR constraints
- Developed a comprehensive testing setup to analyze force and motion transmission in low friction hydrostatic actuators, utilizing **precision linear motors, force sensors, and pressure sensors**
- Fabricated and programmed a respiratory liver motion phantom with **Arduino, airflow systems, and IR sensors**

Research Experience

Smart Machining: Data Collection, Sensing, and Monitoring **Dec 2022 - June 2024**

Advisor: Prof. Tsu-Chin Tsao, Mechanical and Aerospace Engineering Department, UCLA

- Integrated multi-sensor setup **(current, accelerometer, acoustic, camera)** with Haas TM2P CNC to monitor power and vibration
- Programmed and executed **G-code-based parametric machining** tests by varying spindle speed, feed rate, and depth of cut to systematically gather performance data
- **Analyzed datasets** to identify energy-efficient machining conditions, informing predictive control strategies
- Co-authored poster on sensor-based diagnostics presented at UCLA Smart Manufacturing Symposium 2023

Modeling and Characterization of a Soft Robotic Finger | Master's Thesis **May 2021 - June 2022**

Guide: Prof. Abhishek Gupta, Department of Mechanical Engineering, IIT Bombay

- Perused existing literature about the different manufacturing & actuation methods and sensors used in **soft robotics**
- Examined two kinematic models for a **3-link, 3-joint tendon-actuated** soft robotic finger
- Corroborated the trajectory of the finger through **image processing** and simulations in **MATLAB and Simulink**
- Experimentally verified the accuracy of the **RRR model** in predicting the fingertip position across various trajectories, resulting in a correlation of **0.9722 in the x-coordinate, and 0.9330** in the y-coordinate

Design and Development of Setup for Characterization of Liquid Bridge Separation **May 2019 - July 2019**

Guide: Prof. Prasanna Gandhi, Department of Mechanical Engineering, IIT Bombay *Research Project*

- Performed iterative analysis to dimensionalize parallelogram compliant mechanism to satisfy given specifications
- Analyzed the **adaptive setup** using **ANSYS** to get the tip displacement in the μm range for a mN load
- Modeled the design in SolidWorks and prepared drawings with Geometric Dimensioning & Tolerancing for fabrication

Leadership and Mentoring Roles

Team Leader and Lead Mechanical Engineer | IITB Mars Rover Team **April 2020 - April 2021**

- Led the team to **4th position in IRDC-2020** among 28 international teams from 7 countries (best position to date)
- Raised funds and managed resources worth **INR 1.38 Million+** acquired through the institute STP Committee
- Designed a **3-link, 6-DOF** robotic arm capable of reaching heights upto 1.2m and lifting upto 5 kg weight
- Implemented **ANSYS** to perform **structural and multibody dynamics analyses** of the design and achieved a 30% weight reduction and 5% increase in strength by using carbon fiber links over Al and SS alloys
- Conducted safety-risk analysis of the rover for safe performance under extreme conditions during terrain traversal, autonomous equipment servicing, and extreme retrieval
- Coordinated the **procurement of components and led the assembly** of the mechanical, electrical, and biosciences subsystems thereby building the rover for student competitions

Scholastic Achievements and Accolades

- Recipient of UCLA Division of Graduate Education Fellowship **'22-'24**
- Secured All India Ranks of 425 among 170k+ candidates in JEE Advanced **2017**
- Achieved an All India Rank of 191 among 1.2 million candidates in JEE Main **2017**

Technical Skills

CAD & CAE Tools: SolidWorks, Fusion 360, ANSYS, AutoCAD, OnShape

Programming: MATLAB, Simulink, Python, C++, Arduino

Manufacturing: CNC machining, 3D printing, Sheet metal fabrication, GD&T, BOM preparation

Simulation & Analysis: FEA (structural and dynamic), Multi-body dynamics, Motion simulation

Other Tools: ROS, URDF, G-code, LaTeX