Pruthak Utpal Joshi

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Professional Summary

Highly skilled mechanical engineer with a strong background in computer-aided design, prototyping, and system integration. Proven proficiency in machining and sensor integration, with hands-on experience in designing robotic systems and smart machining setups. Have experience working with varied engineering teams, optimizing mechanical designs, and conducting comprehensive research to develop innovative solutions. Committed to leveraging technical skills and research experience to contribute to cutting-edge engineering projects.

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

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*

- Designed an end-effector for a 7-DOF robotic bartender using SolidWorks, optimizing the gripper span to 110mm
- Enhanced gripper performance, safety, and tactile feedback with **TPU-based 3D-printed pads** and **Force Sensitive Resistors** for real-time feedback
- Implemented a lead-screw-based 4-bar mechanism, reducing mechanical 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*

- Designed and prototyped a **3-DoF MR-compatible robot** for teleoperated abdominal interventions inside a **70 cm bore diameter** MRI machine using remote centre of motion mechanism, linear guides, and non-metallic bearings
- 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**
- Engineered an MR-compatible anthropomorphic motion phantom utilizing **Arduino MEGA, air blowers, ON/OFF valves**, and **infrared sensors** to imitate linear movement of liver during human respiration

Engineering Intern - Seating Systems | Lear Corporation **April 2020 - June 2020**
Global automotive technology leader in Seating and E-Systems | Ranked 147th in 2019 Fortune-500 rankings *Pune, India*

- Delivered a **design guideline** by **benchmarking 10+ side valance designs** currently in practice using a2mac1
- Performed **calculations** for comparing the strain generated through bending and compression due to side and frontal impact loads in the ribbing patterns of the automotive side valance to arrive at a structure with optimal shape

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 a network of **current sensors, accelerometers, acoustic sensors**, and a **camera** with a Haas TM2P CNC machine to collect vibration and power data across various machining parameters, aimed at developing a predictive model to reduce power costs during drilling and milling operations
- Developed **G-Codes for drilling and milling** operations to gather data by adjusting key machining parameters, including spindle speed, depth of cut, and feed rate
- ***Poster:*** *Chi Yitian,* ***Joshi Pruthak****, Panda Shivam, Korambath Prakashan, Tsao Tsu-Chin, Li Xiaochun, Jawed M.Khalid.* ***Smart Machining - Sensing and Monitoring. 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 (0.17 million candidates) in JEE Advanced; 191 (1.2 million) in JEE Main **2017**

Technical Skills

Scientific Tools and Programming Languages: MATLAB, Simulink, C++, Python, GCode, Arduino
Modeling and Analysis Software: SolidWorks, ANSYS, ADAMS, Abaqus, Siemens NX, AutoCAD, Fusion 360