Pruthak Utpal Joshi

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Education

University of California, Los Angeles (UCLA) **Present**
Master of Science in Mechanical Engineering, GPA: 3.97/4 *Los Angeles, USA*

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 - subsidiary of Reazon Holdings **June 2024 - Sept' 2024**
Pioneer in researching and developing advanced human-computer interaction technologies and systems *Tokyo, Japan*

- Designed an end-effector with a **gripping span of 110mm** for a teleoperated 7-DOF robotic arm using SolidWorks
- Integrated **low-cost Force Sensitive Resistors (FSRs)** and **3D printed TPU**-based adaptive gripper pads into the gripper system to provide real-time force feedback and enhance operational safety
- Employed iterative design methodology to finalize a **lead-screw-based 4-bar gripper** to minimize the mechanical footprint while enhancing gripping strength and maneuverability; took the project from ideation to production

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 to evaluate image-guided interventions

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

- Delivered a **design guideline** by **benchmarking 10+ side valance designs** currently in practice using a2mac1
- Studied the **frontal and side impact tests** performed on vehicles to visualize the **failure modes** of the side valance
- 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 and dimensions

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
- *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 September 29*

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

- Examined two models for a **3-link, 3-joint tendon-actuated** soft robotic finger to formulate model-based control strategies
- 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
- Corroborated the dynamic behavior of the finger through **image processing** and **simulations in MATLAB and Simulink**

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 using **SolidWorks** a 3-link, 6-DOF robotic arm capable of reaching heights upto 1.2m and lifting upto 5 kg weights
- 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

Scholastic Achievements and Accolades

- Recipient of UCLA Division of Graduate Education Fellowship **'22-'24**
- Secured an All India Rank of 425 among 0.17 million candidates in JEE Advanced; 191 out of 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