Mansi Sarawata

Graduate Student Researcher @ AIR Lab
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Education

Carnegie Mellon University **Pittsburgh, PA**
*Master of Science in Mechanical Engineering - Research [GPA: **3.84/4.0**]* *May 2024*
Relevant Coursework: *Learning for 3D* | *Computer Vision* | *Localization & Mapping* | *Geometry-Based Methods in Vision*

Indian Institute of Technology Kharagpur **Kharagpur, India**
*Bachelor of Technology (Honors) in Mechanical Engineering [CGPA: **8.85/10**]* *May 2022*
Relevant Coursework: *Systems & Control* | *Soft Computing* | *Automotive Sensors & Instrumentations* | *Probability & Statistics*

Research Experience/Projects

Multi-Modal Perception System for Uber Goods **Jan 2023 – Present**
Research Assistantship | *AIR Lab* | *CMU* *Pittsburgh, PA*
- Currently working on developing uncertainty-based place recognition for distributed collaborative multi-robot SLAM system
- Assisted the team to acquire **2 TB** SubT-MRS SLAM dataset, comprising **4** ground robots, **5** sensors, and **5** locations for paper [*]
- Reduced the thermal reprojection error of the payload camera to 0.2 by leveraging opensource tools such as **Kalibr** & OpenCalib
- Organizing Committee Member for **ICCV 2023** Workshop on Robot Learning & SLAM and **IROS 2023** multi-robot SLAM demo

Single View Scene Generation through Individual Object Reconstruction **Mar 2023 – Apr 2023**
Term Project | *Learning for 3D* | *CMU* *Pittsburgh, PA*
- Employed **YOLOv5** and **SAM** for object detection and segmentation along with **CubeRCNN** for 3D pose estimation
- Leveraged **PixelNeRF** & **Vision Transformer** for single image to NeRF predictions and **iNeRF** for object localization in 3D scene
- Demonstrated the approach on blender generated & KITTI dataset scenes and proposed method as a data labelling technique

RNN based monocular Visual Odometry **Oct 2022 – Dec 2022**
Term Project | *Machine Learning & Artificial Intelligence for Engineers* | *CMU* *Pittsburgh, PA*
- Deployed a RNN+CNN model on **KITTI** dataset to predict 3D trajectories with pose estimation from video sequences
- Compared this end-to-end model with conventional geometric-based Stereo Semi-Global Block Matching (SGBM) algorithm
- Reduced the average translation RMSE on the test sequences to **5%** by adding extra 2 **LSTM** layers to the RNN+CNN model

Gait generation for a quadruped using Fuzzy-PID controller **Jul 2021 – Apr 2022**
Bachelor Thesis Project | *Soft Computing Laboratory* | *IIT Kharagpur* *Kharagpur, India*
- Implemented **Raibert's Strategy** of virtual legs for generating trot gait of a quadruped with **12** degrees of freedom
- Designed a fuzzy logic controller to refine the gains of PID controller propositional to the values of error & its derivative
- Utilized SimMechanics and Simulink to compare the performance of Fuzzy-PID with PID & found Fuzzy-PID reduces error by **36%**

Autonomous Stair Climbing Robot **Jul 2020 – Aug 2020**
Semi-Finalists | *National Level Competition* | *Flipkart Grid 2.0 Robotics Challenge* *Bangalore, India*
- Ideated an autonomous quadruped robot with **12** degrees of freedom, capable of traversing uneven surfaces
- Conceptualized stair climbing ability of the robot using camera and IMU measurements to produce 3D map of the terrain
- Equipped the robot with cargo box for carrying a package, procuring a position in the **top 1%** among **1600+** teams across India

Internships

Decarbonizing Gas Turbines | **Summer Intern** | **General Electric** **May 2021 – Jul 2021**
Controls and Optimization Team, General Electric GRC *Bangalore, India*
- Analyzed hydrogen as a fuel in state-of-the-art gas turbines as a means of pre-combustion decarbonization
- Proposed Exhaust Gas Recirculation (EGR) as a solution to increase the ignition time delay enabling robust safe combustion
- Critiqued effects of hydrogen enrichment on the feedback cycle for thermoacoustic instabilities in Lean Pre-Mixed combustors

Skills

Languages & Libraries: C++ | Python | OpenCV | NumPy | Pandas | Pytorch | MATLAB | ROS | Arduino | Matplotlib
Software & Tools: Blender | Simulink | SOLIDWORKS | ANSYS | Fusion 360 | Gazebo | AWS | Webots | Cloud Compare | MS Office

Honors and Awards

- Awarded the **'Suhasini Devi Memorial Prize'** for being the best all-rounder female in the graduating batch of IIT Kharagpur 2022
- Bagged a position in the state **top 3** from over 1.48 million students in the Higher Secondary School Certificate Exam 2018
- Recipient of **Assistance to Meritorious Students Scholarship** and **INSPIRE Scholarship** by Maharashtra State Government

Publications

[*] SubT-MRS: A Subterranean, Multi-Robot, Multi-Spectral and Multi-Degraded Dataset for Robust SLAM submitted to ICCV'23