JEMUEL STANLEY PREMKUMAR

Ann Arbor, MI, USA | linkedin.com/in/jemuelstanley47 | +1 (734)-596-5791 | jemuelstanley47@gmail.com

To emerge as a successful roboticist and conduct research in the area of vision aided robotic manipulation and locomotion. Displays extensive knowledge in robotics, computer vision and physical modeling.

EDUCATION

University of Michigan   **Ann Arbor, MI, USA**
MS in Robotics   *Aug 2022-Present*
- **CGPA**   : 3.62/4.0
- **Relevant Coursework :** Math for Robotics, Robotics Systems Lab, Machine Learning, Robot Learning for Planning & Control, Deep Learning for Robot Perception, Action and Perception

SRM Institute of Science and Technology   **Kanchipuram, Tamil Nadu, India**
B. Tech Mechatronics with specialization in Robotics   *2018-2022*
- **CGPA**   : 9.08/10
- **Relevant Coursework :** Advanced Robotics, Robot Control, AI for Robotics and Vision, Planning and Decision making for Robotics, Computer Vision and its applications, Linear Digital Control Systems, Design of Mechatronics Systems

EXPERIENCE

ABB Corporate Research Centre, Raleigh   **Raleigh, NC, USA**
Robotics Research Intern   *May 2023 –Aug 2023*
- Developed a framework for Visual-language reasoning using a high-level embodied agent as the task planner
- Demonstrated an inclusive approach by creating interfaces for non-technical users, eliminating coding barriers

Motion Analysis Research Laboratory   **SRM IST**
Research Member   *June 2021 –May 2022*
- Involved in multi-fidelity simulations for manipulators and autonomous mobile robots using MATLAB
- Implemented fusion filters for multi-sensor pose estimation and implemented path planning algorithms

Association of Mechatronics Engineers (AME)   **SRM IST**
Member   *Dec 2020 – May 2022*
- Assisted in conducting various technical workshops and seminars

RELEVANT PROJECT EXPERIENCE

NeuralODE for learning dynamics   **SRM IST**
Learning Dynamics | Simulation | OpenGym   *April 2023*

- Neural ODE model trained using the adjoint method for predicting the dynamics of a cart-pole environment
- Trajectories collected by sampling from the cart-pole gym space
- Model evaluated on three different setups: NeuralODE, Residual NeuralODE, and ResidualDynamics

Trajectory Optimization   **SRM IST**
Linear MPC | MPPI | Simulation | PyBullet   *Feb 2023 – Mar 2023*

- Worked extensively on PyBullet's Franka robot environment for transition episode data collection for block pushing tasks
- Implemented Linear MPC and MPPI for trajectory optimization of the panda robot
- Performed pushing tasks

Path planning and trajectory generation for ABB Yumi IRB 14000   **SRM IST**
Path Planning | Physical modeling | Robot manipulation | Simulation   *Oct 2021 – Dec 2021*
- Simulated motion planning algorithms on MATLAB's simulink environment
- Performed kinematic analysis on MATLAB simulated environment

Modeling and control of FJMS | Spatial Parallel manipulator   **SRM IST**
Physical modeling | Non-linear control | MATLAB-Simscape-Simulink   *Aug 2021 – Oct 2021*
- Implemented the concepts of non-linear Force-position control schemes for vibration suppression
- Extensive involvement in physical modeling (kinematic and dynamic modeling)

Modeling of a simple Delta Robot on MATLAB **SRM IST**
Physical modeling | MATLAB-Simscape-Simulink *Aug 2021 – Sept 2021*
● Involved in physical modeling on MATLAB's simscape-simulink

OTHER RECENT PROJECTS

Vision-aided autonomous manipulation of colored wooden blocks **UMich**
Robot Perception and Manipulation | Computer Vision | ROS *Aug 2022 – Oct 2022*
● Developed a computer vision system to perform 5-DOF robotic grasp on colored blocks using Interbotix Reactor-X 200 serial robot arm and an overhead Intel Realsense LiDAR RGB-D Camera
● Demonstrated performance of the manipulation on 5 tasks

Autonomous Non-holonomic Differential Drive Robot with LiDAR **UMich**
SLAM | LiDAR | Odometry | Robot Navigation and Reasoning *Oct 2022 – Dec 2022*
● Concerned with the development of an autonomous wheeled mobile robot (MBot) for Simultaneous Localization and Mapping (SLAM) with onboard LiDAR, Raspberry Pi, Picoboard, IMU and magnetic wheel encoders.
● Designed Proportional-Integral (PI) feedback controllers for the velocity control of two individual wheels, and robot frame velocities
● Performed MCL and developed particle filter based on action model and sensor model
● Performed A* path planning and exploration for navigating in an unknown environment

Development of grasp localization algorithm based on deep learning aided vision system **SRM IST**
ABB | AI and Machine Learning Algorithms | Robot Perception and Manipulation *Dec 2021 – May 2022*
● Developed a deep learning aided vision system to perform 6-DOF robotic grasp on novel objects using ABB Yumi Dual Arm Robot and an overhead kinect RGB-D camera.
● Demonstrated different approaches to grasp localization (model-based and model-free), namely Contact GraspNet, GQ-CNN and explored PointNetGDP. A classical computer vision model was also presented.
● Developed a python-based interface between Linux-based OS and IRC5 controller.
● Studied and compared results with appropriate grasp metrics

TECHNICAL SKILLS

Programming Languages: Python, MATLAB, RAPID, C

Hardware: ABB IRC5, Raspberry Pi, Picoboard, RP LiDAR, Kinect RGB-D camera, Intel Realsense D435, ClearCore Motion Controller, Arduino

Software: MATLAB-Simulink, RobotStudio, Git

Relevant Libraries: PyBullet, OpenGym, PyTorch, Tensorflow, Keras, OpenCV, Matplotlib, Numpy

OS: Ubuntu, Windows

EXTRA-CURRICULAR ACTIVITIES

National Service Scheme **SRM IST**
Volunteering Member *June 2018 – Nov 2019*
● Participated in social, environment and health awareness programmes

Robotics Workshop **JNV Shimoga**
Trainer *Mar 2020*
● Provided hands-on experience in robotics using Arduino for under-privileged residential school students