Aditya Chaugule

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EDUCATION

University of Maryland, College Park, MD Master of Engineering in Robotics | GPA 3.63/4.0 Aug 2022 - May 2024

Cognitive Robotics, Rehabilitation Robotics, NLP, Visual Learning & Recognition, Perception – Planning – Control of Robotic Systems

Savitribai Phule Pune University, Pune, India B.S. in Mechanical Engineering | GPA 8.11/10 Aug 2016 – May 2020

Capstone Project - Design, Analysis & Development of Connecting Rod for V12 Internal Combustion Engine

SKILLS

Engineering: Robotics, Control Systems, Mechanical Design, Documentation, FMEA, Solidworks, Ansys, MSC Adams

Computing: Deep Learning, Computer Vision, Pytorch, ROS, MATLAB, Python, C++, Ubuntu, MS Office

CERTIFICATIONS

Lean Six Sigma Green Belt Certification Grade: Excellent Accredited by ASCB(E) Ltd

Solidworks Mechanical Design Level: Expert (CSWE) Dassault Systems

PROJECTS

Quadruped Spiderbot —*ROS, Gazebo, Rviz, Python* Sep 2022 – Dec 2022

- Designed a teleoperated Quadruped Spider robot with 8 DOF, 4 arms and integrated Camera and LiDAR sensors
- Simulated ROS-enabled robot in Gazebo to emulate inverse kinematics capable of maximum speed of 0.8m/s and a maximum payload capacity of 1kg

RRT non-holonomic Path Planning in 3D Neurosurgical Environment —*Python* Apr 2023 – May 2023

- Developed a Rapidly-exploring Random Trees (RRT) path planning algorithm with non-holonomic constraints for steerable bevel-tipped needles in a 3D environment

Superpixels and Image Segmentation —*Python* Sep 2023 – Oct 2023

- Implemented a custom SLIC (Simple Linear Iterative Clustering) algorithm with enforced connectivity for image segmentation, and conducted a comparative analysis with k-means pixel clustering.
- Developed an Image Segmentation Network by training a Superpixel classifier to accurately predict segmentation maps.

Ablation Study of Human Trajectory Prediction —*Python, Pytorch* Oct 2023 – Dec 2023

- Conducted an ablation study to evaluate the impact of various design choices (input embeddings, pooling mechanism) using a multi-module LSTM network for human trajectory prediction accuracy in social environments
- Analyzed the effect of input embeddings - position, relative velocity, pose keypoints, and combination of embeddings in pooling layers to predict and compare the displacement errors and pedestrian collision for the design choices

Imitation Learning - Ariel Selfies from Video Demonstrations —*Unreal Engine, Pytorch* Mar 2023 – May 2023

- Explored stylized imitation Drone filming through an LSTM Network of custom Input Embeddings to capture realistic & dynamic aerial motion videos
- Studied a combination of input embeddings encapsulating video frames through EfficientFormer -Transformer network, Subject & Camera pose embeddings through a Fully Connected Network learned from OpenSFM reconstruction

Implicit Neural Representation of Images —*Python, Pytorch* Oct 2023 – Nov 2023

- Implemented a deep generative model, achieving superior image reconstruction with a high (30.7) PSNR metric, demonstrating effective parameterization of images and outpainting effects

Predictive Entry Guidance for Vertical Rocket Landing —*MATLAB, FlightGear* Oct 2022 – Nov 2022

- Developed a high-fidelity simulation for vertical rocket landing using advanced control system, optimizing the guidance algorithm via Monte Carlo simulations & achieving a landing precision within 10 meters under varied conditions.

Design of Output Feedback Controllers - LQR, LQG —*MATLAB* Oct 2022 – Dec 2022

- Analyzed Controllability and Observability by linearizing the non-linear dual pendulum cart system
- Designed LQR & LQG controllers, ascertained stability of the closed-loop system through Lyapunov stability criterion and simulated system response to reject constant force disturbances

Fiducial marker based localization of Turtlebot3 —*ROS2, Gazebo, C++* Sep 2022 – Oct 2022

- Developed an Odometry package with a non-static broadcaster node to navigate the robot to a custom initial goal
- Implemented a closed-loop PID control system to navigate the turtlebot3 to final goal using the odometry package

PROFESSIONAL EXPERIENCE

Robotics Engineer Intern, *Kick Robotics, MD, USA* Jul 2023 – Aug 2023

- Validated custom software package for SLAM & autonomous navigation, resulting in 20% improved navigation accuracy
- Successfully deployed waypoint-driven autonomous navigation robot, enhancing client's warehouse monitoring capability

Air Brakes Controls Engineer, *Terrapin Rockets, MD, USA* Nov 2022 – Jun 2023

- Developed library packages, including a multivariate Kalman Filter and sensor integration for the team's flight software
- Engineered a custom controller design for a high-powered sounding rocket's air brake system, aimed at achieving a target apogee of 10,000 ft

Team Captain, *Resonance Racing, Pune, India* Apr 2019 – Jun 2020

- Spearheaded 25 Member Team spanning 7 divisions - Technical, Manufacturing & Marketing Departments, led Red-Team reviews and directed a budget of 25,000+ USD, strategically allocating funds to key development initiatives
- Forged team's race and testing strategy with daily safety compliance and response tests for consolidated track-based Testing of 500+ km
- Regulated administrative functions - reviewing reports, approving expenditures, enforcing rules to ensure goal-oriented Project Execution improving productivity by 33% & cost-effectiveness by 15%