Venkat Varun Velpula

velpula@seas.upenn.edu | Personal Website | LinkedIn | Github | 925-922-0843

EDUCATION

University of Pennsylvania, School of Engineering & Applied Science — *Philadelphia, PA*

- Master of Science in Robotics — ***GPA: 3.78/4.00*** — *May 2021*
- *Relevant Coursework:* Machine Learning, Linear Systems and Theory, Introduction to Robotics, Model Predictive Control, Learning in Robotics, Deep Learning for Data Science

National Institute of Technology Karnataka, Department of Mechanical Engineering — *Mangalore, India*

- Bachelor of Technology in Mechanical Engineering — ***GPA: 9.12/10.00*** — *May 2019*
- *Relevant Coursework:* Automatic Control Engineering, Theory of Sensors and Actuators, Robotics: Mechanics and Control, Pattern Recognition and Machine Learning, Linear Algebra, Product Development and Prototyping

PROFESSIONAL EXPERIENCE

University of Pennsylvania, Modular Robotics Laboratory (ModLab) — *Philadelphia, PA*

Graduate Research Assistant for ModQuad project, guided by Prof. Mark Yim — *June 2020- Current*

- Developed a RL algorithm to train a quadcopter attached with a gripper to grasp objects mid-air during motion
- The algorithm trains for determining the waypoints for motion, yaw angle of the quadcopter for optimal grasping and angle of the gripper for grasping
- Developed the simulation environment with a custom gripper-quadcopter contraption to train the RL algorithm

Indian Institute of Science, Department of Aerospace Engineering — *Bangalore, India*

Research Assistant in Autonomous Vehicle Lab, guided by Prof Ashwini Ratnoo — *Summer 2018*

- Developed an experimental setup consisting of autonomous Micro Aerial Vehicles (MAVs) to test laws of guidance such as Pure Pursuit and Good Helmsman and tracking laws based on potential vector fields
- Designed controls (PID tuners) for navigation of MAVs in indoor environment using data from IMU sensor and array of motion capture cameras. Implemented sensor fusion using Kalman filter to minimize noise and improve data reliability
- Devised network for communication of sensor data amongst MAVs, motion capture system and workstation using Robot Operating System (ROS) and MATLAB

PROJECTS EXPERIENCE

Predicting Success of Kickstarter crowdfunded projects using Machine Learning

- Performed regression to predict the amount of money a project can get funded for, and classification analysis to predict whether the project could successfully raise the quoted funding target given the project details
- Combined dataset from Kaggle and data scrapped from Kickstarter website to obtain a dataset of 69210 projects, which contained new features like the number of pictures, textual description of projects, etc. This helped improve test accuracy by 10% over the baseline model which used the original dataset
- Trained 10 different models to determine the model with highest test accuracy for regression and classification

Simultaneous Localization and Mapping (SLAM) using GraphSLAM

- GraphSLAM is used to generate and constantly update the environment around the robot in real time and localize itself in this environment
- Implemented a cost-effective solution by using an ultrasonic sensor for distance measurement and camera for obstacle detection instead of a stereo camera or a LIDAR sensor

On Effectiveness of camera on a UAV mounted search sensor

- Formalized a model for search effectiveness of a camera for search applications using a downward facing camera mounted on a UAV. This model captures the spatial variation of the camera in terms of its effectiveness in target detection
- Developed the experimental model to capture and analyze the images taken by an overhead camera to validate the model of search effectiveness for detection and correct identification of objects, using ArUCo markers as targets

TECHNICAL SKILLS, STRENGTHS AND HOBBIES

- *Programming Languages*: Python, C, C++, MATLAB
- *Tools & Skills:* Numpy, Scikit-learn, Pytorch, SolidWorks, Coppelia Robotics (V-REP), Robot Operating System (ROS), Git, Linux, AutoDesk Fusion 360, LabView, Arduino, Raspberry Pi, 3D Printing, Laser Cutting
- *Strengths:* Detail orientated, Adaptable (lived in multiple countries), Quick learner
- *Hobbies:* Listening to music, car designing, quizzing, reading, playing basketball, an avid soccer fan