

Ananth Jonnavittula

Contact Information

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Research Interests

My research interests are in the areas of robot learning and human robot interaction

Education

PhD in Mechanical Engineering	May 2024 (expected)
Virginia Tech, Blacksburg, VA	
Master of Science in Robotics Engineering	May 2017
Worcester Polytechnic Institute (WPI), Worcester, MA	
Bachelor of Technology in Electronics and Instrumentation Engineering	May 2015
SASTRA University, Tamil Nadu, India	

Research Experience

Graduate Student Researcher	2020
<i>Institute: Mechanical Engineering, Virginia Tech</i>	
<i>Advisor: Prof. Dylan Losey</i>	
<ul style="list-style-type: none">Developed an algorithm to learn from imperfect user demonstrations (inclusive reward learning)Simulated Lunar Lander (OpenAI Gym) environment with multiple reinforcement learning algorithmsDeveloped a multi-robot swarm simulation to test inclusive reward learning	
Graduate Student Researcher	2016
<i>Institute: Robotics Engineering, WPI</i>	
<i>Advisor: Prof. Marko Popovic</i>	
<ul style="list-style-type: none">Analyzed range of motion and dynamic requirements for a 2 DOF hydro-muscle actuated leg that can carry the weight of an adult humanDesigned a coupling mechanism that locks the leg while maintaining pose in case of serious failureImplemented closed-loop control system for leg actuation using four pairs of hydro-musclesDeveloped on-board system operation for hydraulics and coupling mechanism using Arduino microcontrollersEstablished communication between on-board controllers and PC using MATLAB for decision making and trajectory generation	

Work Experience

Graduate Teaching Assistant – Virginia Tech	Aug 2020 – Current
<ul style="list-style-type: none">Helped undergraduate students derive the transfer function for a padlock attached to a DC motorConducted experiments related to unlocking a padlock using a connected electric motorClarified questions related to the experiments in the padlock lab	
Robotics/Vision Engineer – Parker Hannifin Corporation	Jun 2017 – May 2020
<ul style="list-style-type: none">Developed an automated laser etcher for labeling manufactured partsProgrammed a palletizing robot for 550 pallet patterns using a FANUC robot	

- Designed an automated epoxy end capping cell using Universal Robots UR5 robot
- Developed 2-robot automated cell for urethane end capping using FANUC LR Mate robots

Engineering Intern – Parker Hannifin Corporation

Jan 2017-Apr 2017

- Tested feasibility of automation with a Universal Robots UR5 robot
- Introduced sensors and programmed controllers for automated part delivery
- Implemented image recognition using Keyence cameras to detect orientation of incoming parts

Patents

US20170368696A1: Biologically inspired joints and systems and methods of use thereof

Selected Projects

Path planning and Semantic segmentation for Self-Driving Cars (Udacity)

- Developed traffic light detection, control and waypoint following for a self-driving car
- Designed Fully Convolutional Networks using a GPU to identify pixels of a road in an image
- Implemented behavior planning for a self-driving car utilizing sensor fusion to localize other moving cars on a highway
- Generated collision free smooth trajectories with lane changing and speed/jerk considerations

Sensor Fusion and Control for Self-Driving Cars (Udacity)

- Implemented controllers using model predictive control to drive a self-driving car around a simulated racetrack using cross track error and 100ms latency
- Developed a 2D particle filter to localize a self-driving car using noisy sensor and control data
- Utilized an Unscented Kalman Filter to estimate the state of a moving object with noisy lidar and radar measurements

Computer Vision and Deep Learning for Self-Driving Cars (Udacity)

- Developed a software pipeline to detect vehicles in a video using Support Vector Machines
- Identified lane boundaries using color, perspective transforms and polynomial curve fitting
- Implemented a Convolutional Neural Network to classify traffic signs from the German Traffic Sign Dataset

Path planning and navigation for UAVs (WPI)

- Implemented Simultaneous Localization and Mapping using ultrasonic sensors for a quadcopter
- Programmed a constant altitude path planner using A star to generate optimal paths with obstacle avoidance
- Designed a ROS based Q-learning Neural Network as a platform agnostic motion planner

Motion Controller for a Fixed Wing UAV (WPI)

- Developed controllers for Trim stabilization, autopilot, and airspeed stabilization for the Aerosonde fixed wing UAV
- Implemented Extended Kalman Filter for sensor fusion using simulated GPS, accelerometers, and gyroscope data
- Programmed a PID controller to follow Dubin's trajectories in a simulated airfield

Technology Summary

- **Software:** MATLAB, ROS, TensorFlow, OpenCV, Arduino IDE, Keyence CV-X series, Click PLC, Studio 5000, FactoryTalk, FANUC TPP, FANUC PalletTool Turbo II, KUKA WorkVisual
- **Languages:** C, C++, python, URScript, KUKA KRL