Ananth Jonnavittula (AJ)

Contact Information

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Research Experience

Graduate Student Researcher Aug 2020 - Current

Institute: Virginia Tech

Advisor: Prof. Dylan Losey

- Developed inverse reinforcement learning based algorithm to learn from imperfect user demonstrations
- Developed a variational autoencoder based algorithm for imitation learning from user demonstrations
- Conducted stability analysis for imitation learning methods in the context of shared autonomy
- Developed a method that can incorporate human corrections for visual imitation learning

Research and Development Intern Jun 2022 – Aug 2022

Company: ABB Inc

Advisor: Harshavardan Reddy

- Implemented and analyzed methods that use stereo vision or RGBD images for instance segmentation
- Developed instance segmentation algorithm for small parcels singulation using detectron2
- Developed BlenderProc based pipeline to generate synthetic datasets for training models
- Developed pipeline to export trained models from Python to C++ using Torchscript
- Deployed instance segmentation models on production ready ABB robots

Graduate Student Researcher 2016

Institute: Robotics Engineering, WPI

Advisor: Prof. Marko Popovic

- Analyzed range of motion and dynamic requirements for a 2 DOF hydro-muscle actuated leg
- Designed a coupling mechanism that locks the leg while maintaining pose in case of serious failure
- Implemented closed-loop control system for leg actuation using four pairs of hydro-muscles
- Developed controllers for hydraulics and coupling mechanism using Arduinomicrocontrollers
- Implemented Communication protocols between on-board controllers and PC using MATLAB

Work Experience

Graduate Teaching Assistant – Virginia Tech Aug 2020 – Dec 2020

- Taught fundamentals of PID controller design to undergraduates
- Helped undergraduate students derive the transfer function for a padlock attached to a DC motor
- Conducted experiments related to unlocking a padlock using a connected electric motor
- Clarified questions related to the experiments in the padlock lab

Robotics/Vision Engineer – Parker Hannifin Corporation Jun 2017 – May 2020

- Developed an automated cell for palletizing over 100 different SKUs reducing labor costs
- Developed an automated laser marker that doubled throughput in multiple manufacturing cells
- Conducted Kaizen events for process efficiency improvements
- Developed an automated cell using UR5 robot and cameras for part recognition and end capped filters
- Developed a urethane end capping cell using FANUC robots

Engineering Intern – Parker Hannifin Corporation Jan 2017-May 2017

- Conducted feasibility analysis on automated end capping using collaborative robots
- Programmed controllers for automated part feeding using vibratory feeders
- Implemented image recognition using Keyence CV-X series to detect orientation of parts

Education

PhD in Robotics, Autonomous and Dynamical Systems 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

Publications

- **A. Jonnavittula** and D. P. Losey, "Communicating Robot Conventions through Shared Autonomy", IEEE International Conference on Robotics and Automation (ICRA), 2022
- S. Habibian, **A. Jonnavittula**, and D. P. Losey, "Here's What I've Learned: Asking Questions that Reveal Reward Learning", *ACM* Transactions on Human-Robot Interaction*,* 2021
- **A. Jonnavittula** and D. P. Losey, "Learning to Share Autonomy Across Repeated Interaction", IEEE International Conference on Intelligent Robots and Systems (IROS), 2021
- **A. Jonnavittula** and D. P. Losey, "I know what you meant: Learning human objectives by (under)estimating their choice set", IEEE International Conference on Robotics and Automation (ICRA), 2021

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

Technology Summary

- **Software:** MATLAB, ROS, Pytorch, OpenCV, Blender, Arduino IDE, Keyence CV-X series, Click PLC, Studio 5000,FactoryTalk, FANUC TPP, FANUC PalletTool Turbo II, KUKA WorkVisual
- **Languages:** Python, URScript, KUKA KRL
- **Interests:** Imitation Learning, Reinforcement Learning, Computer Vision, Learning from Demonstrations, Deep Learning, Robot Learning, Human-Robot Interaction, Visual Imitation Learning
- **Robots:** Fetch, FrankaEmika Panda, Universal Robots UR10, FANUC industrial robot arms, ABB industrial robot arms, KUKA industrial robot arms, Rethink Robotics Sawyer