

ESTHER(YIJUN) GU

+1 7347809927 ◊ yjgu@gatech.edu

RESEARCH INTERESTS

Human Robot Interaction, Assistive Robotics, Machine Learning, Robot Perception, Physics Simulation

EDUCATION

Georgia Institute of Technology, Atlanta, GA, USA Aug. 2019 – present

Master of Science in Computer Science

GPA: 4.0/4.0

University of Michigan, Ann Arbor, MI, USA Sep. 2015 – Apr. 2019

Bachelor of Science in Computer Science Engineering

Bachelor of Science in Data Science Engineering

Minor in Mathematics

GPA: 3.7/4.0

UM-SJTU Joint Institute, Shanghai, China May – Aug. 2016

International Program in Engineering

PUBLICATIONS

Zackory Erickson*, **Yijun Gu***, and Charles C Kemp. *Assistive VR Gym: Using Interactions with Real People to Improve Virtual Assistive Robots*. in IEEE International Conference on Robot & Human Interactive Communication(RO-MAN), Aug 2020. (* Equal contribution.)

HONOR & AWARD

University Honors in University of Michigan 2015-2018

Engineering Dean's Honor List 2016-2018

RESEARCH EXPERIENCE

Safely Sim-to-Real Transfer of Robotic Caregiving Controllers Aug 2020 – present

Healthcare Robotics Lab, Georgia Institute of Technology

Principal Investigator: Prof. Charles C. Kemp

Goal: Develop techniques necessary to safely transfer robot controllers from physics simulation to real robots for robotic assistance.

- Benchmark how much observation noise standard robot control policies can handle when transferred to real robots.
- Investigate algorithmic advancements to improve robot control policy robustness to noise.

Assistive VR Gym: Interactions with Real People to Improve Virtual Assistive Robots Aug 2019 – Aug 2020

Healthcare Robotics Lab, Georgia Institute of Technology

Principal Investigator: Prof. Charles C. Kemp

Goal: Present a framework that uses virtual reality to evaluate and improve simulation trained assistive robots with real people.

- Connected assistive environments in real-time physics simulation into virtual reality with vrBullet.
- Developed improved reinforcement learning policies based on better human biomechanics models from virtual reality.
- Designed and conducted a user study to evaluate and analyze the performance of policies trained in simulation in terms of objective and subjective measures.

Archemedes

CROMA Lab, University of Michigan
Principal Investigator: Prof. Walter Lasecki

July 2018 – Apr 2019

Goal: Create a mix-initiative system to help robot recognize novel objects.

- Set up a platform that leverages real-time crowd workers to annotate subcomponents of objects and generate point cloud objects with new configurations.
- Evaluated performance of the model trained on a dataset of newly generated point clouds using PointNet.

Point Pair Features

Laboratory for Progress, University of Michigan
Principal Investigator: Prof. Chad Jenkins

Sep 2017 – Apr 2018

Goal: Explore Point Pair Features(PPF), an object recognition algorithm that uses oriented point pair features to match models to scenes.

- Implemented a PPF pipeline and developed a new feature mapping method for the pipeline.
- Refined the poses generated by PPF using Iterative Closest Point(ICP) and Fast Point Feature Histograms(FPFH).
- Compared and analyzed the performance with original PPF on a collection of real scenes.

PROJECT EXPERIENCE

Active Hierarchical Imitation and Reinforcement Learning in Continuous Tasks

Georgia Institute of Technology
Principal Investigator: Prof. Matthew Gombolay

Aug 2019 – Dec 2019

Goal: Purpose an Active Hierarchical Imitation and Reinforcement Learning framework that enables agents to learn multiple levels of policies in parallel in continuous space.

- Extended Hierarchical Actor-Critic(HAC) framework by using Data Aggregation(DAgger) to train a high-level controller and revised Deep Deterministic Policy Gradient(DDPG) to train a low-level controller.
- Enhanced framework's performance by learning an initialization of agent's starting location with a noise-based Active Learning method.

Autonomous Robot for Garbage Grasp and Classification

University of Michigan
Principal Investigator: Prof. Chad Jenkins

Jan 2019 - Apr 2019

Goal: Introduce a robot system which is capable of picking garbage in a structured environment and depositing garbage based on the respective categories.

- Created a point map for navigation using existed GMapping Simultaneously Localization and Mapping(SLAM) system.
- Programmed a local search algorithm to detect an object from the scene and trained a Convolutional Neural Network(CNN) to classify the detected object.
- Designed an optimal motion path for grasping and placing the object.

Parking sign recognition and semantic classification

University of Michigan
Principal Investigator: Prof. Jason Corso

Sep 2017 - Dec 2017

Goal: Develop a system to classify parking signs and learn the semantic information encoded in the signs.

- Implemented K-Means Clustering and Spectral Clustering algorithms to classify a dataset of parking signs.
- Interpreted location information of parking signs by pre-trained AlexNet and enforcement hours and time limit of parking signs by Optical Character Recognition(OCR).

TEACHING EXPERIENCE

Graduate Teaching Assistant

CS6601 Artificial Intelligence

Aug 2020 – present
Georgia Institute of Technology

- Host weekly office hours and answer questions online for over 600+ students
- Design and grade exams, projects and course content.

Teaching Assistant

EECS280 Programming and Intro Data Structures

Jan 2017 – Dec 2018
University of Michigan

- Led a weekly laboratory and guided 30+ students to work on coding exercises.
- Hosted weekly office hours and answered questions about projects and concepts.
- Designed and graded exams, projects and course content.
- Checked project cheating and sent feedback to Honor Council.

COURSES

Robotics

Autonomous Robotics, Human-Robot Interaction, Interactive Robot Learning, Robotic Caregivers

Graphics, ML, AI Math, Statistics

Computer Vision, Machine Learning, Artificial Intelligence, Computer Animation
Linear Algebra, Differential Equation, Cryptography, Probability and Statistics,
Applied Regression

SKILLS

Programming Languages Libraries and Tools

Python, C++, Matlab, Latex, HTML, IOS(Swift)
ROS, Bullet, MUJOCO, PCL, Virtual Reality, OpenNI, BLENDER,
OPENCV, PyTorch, Tensorflow, Scikit-learn

Languages

Chinese (Native), English (Proficient), Japanese (Conversational)