

Siddharth Agrawal

Robotics Institute, CMU

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<https://gutsy-robot.github.io/>

EDUCATION

- **Carnegie Mellon University** Pittsburgh, PA
Masters in Robotics; GPA: 3.83/4.0 August 2019 – Present
- **Indian Institute of Technology Delhi** New Delhi, India
Bachelor of Technology in Mechanical Engineering; GPA: 7.60/10 July 2014 – October 2018

EXPERIENCE

- **AART Lab, Robotics Institute, CMU** Pittsburgh, Pennsylvania
Graduate Research Assistant under Dr. Katia Sycara August 2019 - Current
- **Intelligent Motion Lab, Duke University** Durham, North Carolina
Visiting Research Scholar under Dr. Kris Hauser January 2019 - July 2019
- **DeepAffects** Mumbai, India
Data Scientist Intern July 2018 - December 2018
- **Mahindra Driverless Car Challenge, IIT Delhi** New Delhi, India
Team Lead, Perception and Motion Planning Feb 2017 - May 2018
- **UMass Lowell Robotics Lab, Dept. of Computer Science** Lowell, Massachusetts
Summer Intern under Dr. Holly Yanco June 2017 - July 2017
- **Innovation and Enterprise Lab, University of Technology Sydney** Sydney, Australia
Visiting Research Student under Dr. Mary-Anne Williams July 2016 - December 2016

PUBLICATIONS

- **Addressing reward bias in GAIL with neutral rewards**, in Deep Reinforcement Learning Workshop NeurIPS 2020, Jena, S.Agrawal, Sycara
- **Adaptive Agent Architecture for Real-Time Human-Agent Teaming**, in Planning, Activity and Intent Recognition Workshop AAAI' 21, S.Agrawal*, Ni*, Li*, Raja, Gui, Hughues, Jia, Lewis, Sycara
- **Would you obey an Aggressive Robot: A Human-Robot Interaction Field Study**, S.Agrawal*, M.A Williams in the 27th IEEE International Symposium on Robot and Human Interactive Communication.
- **Feedback Methods in HRI: Studying their effect on Real-Time Trust and Operator Workload**, 13th ACM/IEEE International Conference on Human-Robot Interaction, 2018, S.Agrawal*, H.Yanco.
- **Topics and Research Directions in Privacy-Sensitive Robotics**, Rueben, Aroyo, Lutz, Schmolz, Corti, S. Agrawal, Cleynenbreugel, Smart in IEEE Workshop on Advanced Robotics and its Social Impacts '18.
- **Team Synchronization and Individual Contributions in Coop-Space Fortress.**, Li, H., Ni, T., Agrawal, S., Hughes D., Lewis, M., Sycara, K in Proceedings of 64th Annual Meeting of the Human Factors and Ergonomics Society (HFES 2020).
- **Robot Authority and Human Obedience: A Study of Human Behaviour using a Robot Security Guard**, ACM/IEEE International Conference on Human-Robot Interaction, 2017, S. Agrawal* and Williams

RELEVANT PROJECTS

- **Learning Real-Time Adaptation in Human-Agent Teaming** Pittsburgh, PA
Master's Thesis work, CMU September 2019 - current
 - Formulated and tested a LSTM based method to create policy representation of human players to be used for online policy adaptation of agents in human-agent teaming in the Team Space Fortress setting.
 - Designed Reinforcement Learning agents in the Team Space Fortress environment by using Proximal Policy Optimization Algorithm in Tensorflow for conducting human-agent teaming experiments.

- **Learning Representations using Adversarial Training for Genre Transfer** Pittsburgh, PA
Machine Learning Course Project, CMU *September 2019 - December 2019*

 - Designed and tested an encoder-decoder model along with an adversarial classifier to disentangle genre-agnostic attributes from the genre-specific features in the latent representation of music MIDI files.
 - Implemented the method in Tensorflow and demonstrated successful conversion between pop and jazz genres by conducting a human study.

- **Addressing Reward Bias in Generative Adversarial Imitation Learning** Pittsburgh, PA
Research Project CMU *March 2020 - July 2020*

 - Formulated a novel reward function to solve reward bias in Adversarial Imitation Learning and achieved higher performance over existing methods on a suite of gym minigrid tasks and lunarlander.

- **Outlier Filtering for Deep Point Cloud Registration** Pittsburgh, PA
SLAM Course Project Project, CMU *September 2020 - December 2020*

 - Designed and tested a method to filter out outliers present in the input point clouds using the embedding space of a pretrained Deep Closest Point Model.
 - Using this method, achieved a 52% improvement in rotation RMSE over the standard DCP model when evaluated on the ModelNet 40 dataset.

- **Combining Motion Planning and Learning from Demonstration** Durham, North Carolina
Research Project under Prof. Kris Hauser *January 2019 - July 2019*

 - Used Dynamic Motion Primitives(DMP) to learn trajectories from demonstrations, capable of adapting to changes in start and goal configurations.
 - Designed an Incremental PRM Planner to make the DMP trajectories adaptable to obstacle workspaces.
 - Formulated a reward function for the planner to iteratively choose the best distribution for sampling configurations, using the Upper Confidence Bound algorithm of Multi-Arm bandits.

- **Speech Enhancement for Speaker Verification** Mumbai, India
Internship Project at DeepAffects *July 2018 - December 2018*

 - Developed a model to clean the noisy MFCCs for improving performance of the downstream speaker verification model by training the network using a multi-task loss for denoising and verification.
 - Improved the equal error rate on the speaker verification task by 12% using the model as a preprocessor.

- **Real-Time Trust of an Operator in Semi-Autonomous Systems** Lowell, Massachusetts
HRI Study under the supervision of Prof. Holly Yanco *June 2017 - July 2017*

 - Designed different feedback strategies to evaluate their effect on real-time trust and control allocation strategy of a human operator in shared autonomy scenarios such as autonomous cars, autopilot systems.
 - Programmed an **iRobot Atrv** robot using ROS for a Human-Robot Interaction experiment, in which participants were to remotely supervise a robot performing a navigation task.

- **Robot Authority and Human Obedience** Sydney, Australia
HRI study under the supervision of Prof. Mary-Anne Williams *July 2016 - December 2016*

 - Designed and implemented robot behaviors for an autonomous security robot using ROS on a **PR2** robot and conducted user studies for evaluating the factors which affect human obedience to robots.

- **Autonomous Control of a Self-Driving Car using ROS** IIT Delhi, India
B.Tech Project(Senior Thesis) under the supervision of Prof. Sunil Jha *August 2017 - May 2018*

 - Developed and implemented real-time algorithms for lane detection, obstacle/street light detection, path planning and localization in ROS for the autonomous navigation of the Mahindra Driverless Car.
 - Tested an Extended Kalman Filter based module for fusing multiple sensor streams to produce an accurate odometry for the car. Also tested a RGB-D Graph-Based SLAM using a stereo camera.

- **Detection of Glottal Closure Instants using Dilated CNNs**

IIT Delhi, India

Course Project under Prof. Prathosh AP

September 2018 - October 2018

- Implemented a DCNN model to extract embeddings from overlapping windows from the audio and trained two different downstream models for detection and localisation of GCIs using a multi-task learning loss.
- Evaluated the performance of the model on the CMU Arctic Data set by measuring the IDRs, MRs and FARs and got comparable results to state-of-the-art signal processing techniques for GCI detection.

GRADUATE COURSEWORK ASSIGNMENTS

- **Computer Vision:** Completed implementations of Lucas-Kanade Tracking, AR and Panorama using Planar Homographies, 3D Reconstruction and Photometric Stereo Reconstruction.
- **SLAM:** Implemented EKF SLAM and 3D Dense Reconstruction using Point-Based Fusion in Matlab and Particle Filter based SLAM in Python.
- **Reinforcement Learning:** Implemented and tested Model Based Policy Optimisation, Policy Gradients, DAGGER, Deep Q-Learning and Deep Deterministic Policy Gradients using Tensorflow.

SKILLS AND COURSEWORK

- **Languages and Frameworks:** Python, C++, Matlab, R, Shell, ROS, Keras, Tensorflow, PyTorch
- **Coursework:** Computer Vision, Machine Learning, Convex Optimisation, SLAM, Reinforcement Learning