Arbaaz Khan

Apartment 506,
241 S, 49th Street,
Philadelphia,PA,
USA 19139

Phone: +1 (412)-961-3258
Email: arbaazk@seas.upenn.edu
Birth Date: 13 July 1993
Website: arbaazkhan2.github.io

Education

Ph.D Electrical and Systems Engineering, School of Engineering and Applied Sciences, University of Pennsylvania, 2018. Advised by Dr. Vijay Kumar and Dr. Alejandro Ribeiro
Expected Graduation 2022

MSE Robotics, GRASP Lab, School of Engineering and Applied Sciences, University of Pennsylvania, 2016-2018.
Master's Thesis - Policy Optimization with Memory Augmented Networks in Mobile Robots.

B.Tech Electronics and Communications Engineering, Manipal Institute of Technology, Manipal University, 2012-2016.
Bachelor's Thesis - Learning Safe Recovery Trajectories with Deep Neural Networks for Unmanned Aerial Vehicles

Experience

Samsung Research America, New York City, NY, USA. May 2019-August 2019.
Worked on learning robust behaviors for grasping household objects using tools from differential geometry and machine learning.

NVIDIA, Redmond, WA, USA. May 2018-August 2018.
Worked with Nikolai Smolyanskiy on navigating indoor office spaces using deep reinforcement learning as part of the overall effort in building NVIDIA's Isaac simulator.

University of Pennsylvania, Kumar Lab (GRASP lab), Philadelphia, PA, USA. Sep 2016 - Current
Currently doing research advised by Dr. Vijay Kumar, Dr. Alejandro Ribeiro. Research focused on learning and decision making for robots and teams of robots.

Carnegie Mellon University, Robotics Institute, Pittsburgh, PA, USA. May 2015 - May 2016.
Worked with Dr.Martial Hebert and Dr. Drew Bagnell. Research focused on autonomous Unmanned Aerial Vehicles (UAV) flight through cluttered outdoor environments. This research was part of the BIRD-Multi University Research Initiative.

Research Interests

Machine Learning, Reinforcement Learning, Deep Learning and Robotics.

Learning complex behaviors for robots under uncertainty using end to end learning, model based learning and deep reinforcement learning.

Investigating algorithms to learn intelligent behaviors for teams of robots/agents.

Relevant fields Machine Learning, Deep Reinforcement Learning, Robotics, Optimization.

Publications

Graph Policy Gradients for Large Scale Unlabeled Motion Planning with Constraints. *Arbaaz Khan, Vijay Kumar, Alejandro Ribeiro. Submitted to International Conference on Robotics and Automation (ICRA) 2020.*

Learning Sufficiently Accurate Task Agnostic Models. *Clark Zhang, Arbaaz Khan, Santiago Paternain, Vijay Kumar, Alejandro Ribeiro. Submitted to International Conference on Robotics and Automation (ICRA) 2020.*

Graph Policy Gradients for Large Scale Robot Control *Arbaaz Khan, Ekaterina Tolstaya, Alejandro Ribeiro, Vijay Kumar. To appear in the 3rd Conference on Robot Learning (CoRL) 2019. Available here*

Learning Unlabelled Multi-Robot Planning with Motion Constraints. *Arbaaz Khan, Chi Zhang, Shuo Li, Jiayue Wu, Brent Schlotfeldt, Sarah Tang, Alejandro Ribeiro, Osbert Bastani, Vijay Kumar. In the proceedings of the 32nd International Conference on Intelligent Robots and Systems 2019, Macau. Available here*

Collaborative Multiagent Reinforcement Learning in Homogeneous Swarms *Arbaaz Khan, Clark Zhang, Vijay Kumar, Alejandro Ribeiro. Available here*

Sample Efficient Target Reaching for Mobile Robots *Arbaaz Khan, Vijay Kumar, Alejandro Ribeiro. In the proceedings of the 31st International Conference on Intelligent Robots and Systems 2018, Madrid. Available here*

Memory Augmented Control Networks *Arbaaz Khan, Clark Zhang, Nikolay Atanasov, Konstantinos Karydis, Daniel D Lee, Vijay Kumar. International Conference on Learning Representations 2018. Available here*

End to End Memory Networks for Planning, *Arbaaz Khan, Clark Zhang, Nikolay Atanasov, Konstantinos Karydis, Daniel D Lee, Vijay Kumar, In the proceedings of the 30th International Conference on Intelligent Robots and Systems 2017, Vancouver.*

End-to-End Navigation in Unknown Environments using Neural Networks, *Arbaaz Khan, Clark Zhang, Nikolay Atanasov, Konstantinos Karydis, Daniel D Lee, Vijay Kumar, Workshop on Learning Perception, Control and Autonomous Flight: Safety, Memory and Efficiency at RSS 2017, Boston.* Available here

Neural Network Memory Architectures for Autonomous Robot Navigation, *Steven W Chen, Nikolay Atanasov, Arbaaz Khan, Konstantinos Karydis, Daniel D Lee, and Vijay Kumar, 3rd Conference on Reinforcement Learning and Decision Making 2017.* Available here (Pg 117)

Robust Monocular Flight in Cluttered Outdoor Environments, *Shreyansh Daftry, Sam Zeng, Arbaaz Khan, Debadeepta Dey, Narek Melik-Barkhudarov, J. Andrew Bagnell and Martial Hebert.* `Available here`.

Learning Safety Recovery Trajectories with Deep Neural Networks for Unmanned Aerial Vehicles. *Arbaaz Khan, Martial Hebert. Aerospace Conference, 2018 IEEE.*

Multi Modal Pose Fusion for Monocular Flight with Unmanned Aerial Vehicles, *Arbaaz Khan, Martial Hebert. Aerospace Conference, 2018 IEEE.*

Green Relay Mechanisms Using Shape Memory Alloys, *Arbaaz Khan, Second International conference on Green Computing, Technology and Information, 2014, Malaysia. ISBN: 978-0-9891305-4-7,2014 SDIWC.* Available here

Teaching Experience

Teaching Assistant, Data Mining, University of Pennsylvania. Fall 2017

Teaching Assistant, Learning in Robotics, University of Pennsylvania. Spring 2018, 2019

Teaching Assistant, Reinforcement Learning, University of Pennsylvania. Fall 2019

Guest Lectures

CIS 700, Primer on Reinforcement Learning, University of Pennsylvania. Spring 2018

Honors and Awards

The Dean's Fellowship, University of Pennsylvania 2018.

The Leggett Family Endowed Fellowship, University of Pennsylvania (Awarded to top candidates receiving The Dean's Fellowship).

Master's Research Award, University of Pennsylvania 2018 (Awarded to students excelling in Research).

CMU RISS Scholar Cohort of 2015

Invited Talks

Motion Planning in Unknown Environments Intel WASTC, March 2018.

Model based learning for Motion Planning Samsung Research America, SAIC-NY, February 2019.

Learning Unlabelled Motion Planning AWS, California Institute of Technology, April 2019.

Professional Activities

Panelist for Workshop on Learning Perception, and Control and Autonomous Flight: Safety, Memory and Efficiency at RSS 2017, Boston.

Reviewer for International Conference on Robotics and Automation (ICRA) 2018,2019.

Reviewer for International Conference on Intelligent Robots and Systems (IROS) 2018,2019.

Reviewer for International Conference on Machine Learning, Optimization, and Data Science (LOD) 2018, 2019.

Reviewer for International Journal of Intelligent and Robotic Systems, Springer 2019.