Siddharth Singh

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Education

UNIVERSITY OF PENNSYLVANIA   **AUGUST 2018 - MAY 2020**

M.S. Electrical Engineering CGPA:3.7

JSS ACADEMY OF TECHNICAL EDUCATION   **AUGUST 2013 - MAY 2017**

B.S. Mechanical and Automotive Engineering CGPA:3.8

KEY SKILLS & RELEVANT COURSES

PROGRAMMING AND SCRIPTING LANGUAGES: C/C++, Python, Java, Kotlin, Bash

PLATFORMS AND LIBRARIES: Matlab, ROS, Pytorch/Numpy/Scipy/Scikit, Opencv, Linux, TensorRT

COURSES: Advanced Topics In Machine Perception, Advanced Robotics, Autonomous Vehicles, Control In Robots, Applied Machine Learning, Introduction To Machine Learning, Statistics For Data Science, C++ For C Programmers, Algorithms And Data Structures, Numerical Optimization

EXPERIENCE

Software Development Engineer | Lab126, Amazon | September 2021- Present

- Designed & implemented physics based user controlled simulation scenarios for robotic algorithm development.
- Improved the fidelity of simulated human detection modules and simulation sensor modules.

Software Development Engineer | Amazon | August 2020- August 2021

- Designed an automated data vending system to provide data to consumers based on user filters and business requirements.System proved capable of scaling under constraints of database and communication systems

Research Assistant | GRASP Laboratory, UPenn | April 2019- May 2020

- **Project**: Embodied AI for active semantic goal navigation for indoor environments (published).
  - Implemented a semantic mapper for creating ground truth for generative adversarial network based ensembles.
  - Experimented with shape embedding and RGB embedding for predicting spatial distribution of object semantics.
  - Achieved state of the art results in object goal navigation for Habitat-AI datasets(MP3d & Gibson).
- **Project** : Curious reinforcement learning for exploration of multi-agent systems (published)
  - Implemented curiosity motivated Q-learning algorithms over multi-agents for exploration and foraging experiments.
  - Proved that curious agents lead to a more equitable society with more equally distributed payoffs.
- **Project**: RoboNet: Visual foresight based learning for action prediction and planning (published)
  - Demonstrated generalization capabilities of video prediction networks across unseen robots and environments.
  - Applied state space augmentation during training to help generalize across robots for zero shot and few shot learning.

Research Assistant | PRECISE Center, UPenn | November 2018 - May 2020

- **Project :** Development of 1/10th scale autonomous vehicles using Jetson TX2 and multimodal sensor suit.
  - Developed a perception pipeline with RGBD cameras to creating semantic depth maps & perform video predictions[Link]
  - Use of hourglass deep learning models and novel loss functions using temporal and gradient deltas across frames.
  - Achieved obstacle avoidance using MPC for trajectory generation and tracking via IPOPT optimization techniques.[Link]

Research Associate | Robotics Research Center, IIT Hyderabad | June 2017 - November 2018

- **Project :** Autonomous Vehicles Development(published)
  - Developed software stack for real-time Model Predictive Speed Control framework coupled with a RRT* based planner.
  - Demonstrated better performance on varying surface gradient & friction along with lateral dynamic approximation.[Link]

Publications

- S. Singh.A. Modh, et al. Gradient Aware-Shrinking Domain based Control Design for Reactive Planning Frameworks used in Autonomous Vehicles. Advances in Robotics 2019
- S. Dasari, F. Ebert, S. Tian, S. Nair, A. Xie, B. Bucher, S. Singh, K. Schmeckpeper, S. Levine, C. Finn. RoboNet:Learning and Generalizing across Robots through Large-Scale Visual Prediction and Planning. CoRL, 2019.
- S. Singh, B. Bucher, et al. Curiosity Increases Equality in Competitive Resource Allocation, ICLR 2020
- G.Georgakis, B.Bucher, K.Schmeckpeper, S.Singh, et al, Learning to Map For Active Semantic Goal Navigation. ICLR 2022