Chinmay Burgul

303 Hamlet Dr, Chalfont, PA 508.723.6596 cmburgul@gmail.com github.com/cmburgul

Objective

Looking for full-time research roles in the field of Motion Planning and Machine Learning

Education

Worcester Polytechnic Institute (WPI) Aug '18 – Aug '20
Masters of Science in Robotics Engineering *GPA: 3.84/4.0*

SRM University Aug '12 – May '16
Bachelor of Technology in Mechatronics Engineering *CGPA: 8.73/10*

Technical Strengths

- **Programming languages :** C++, Python, MATLAB
- **Software & Libraries :** SQL, ROS, TensorFlow, Pytorch, OpenCV, PCL, Catia, Hadoop ecosystem.
- **Related Skills :** Probability and Statistics, **Reinforcement Learning, Motion Planning**, Deep Learning, Data structures and Algorithms, Unsupervised Learning methods.

Work Experience

Research Assistant – WPI, Worcester, MA June '20 - Aug '20
- Building a framework for increasing the grasp synthesis in robotic manipulation using Action Vision and Reinforcement Learning techniques.

Machine Learning Intern – Phood LLC, Boston, MA May '19 – Aug '19
- Built a working setup of an image classification framework for food items.
- Worked on deployment and training of neural network models, Tensorflow, Cloud Clusters and AWS tools.

ROS Ambassador – The Construct Jan '18 – Aug '18
- Tutoring for ROS learning for motion planning and navigation packages.

Technical Engineer – Entra Mechatronics Pte Ltd July '16 – Mar '17
- Involved in developing food automation products, my roles included designing hardware by reverse engineering, strategic procurement of off the shelf components, vendor & OEM management

Projects

Within Hand manipulation with Reinforcement Learning – WPI
- Path Planning in With In-hand Manipulation task on Friction finger setup with model free Reinforcement Learning Algorithms as DQN, DDPG + HER, PPO2.
- Worked on Multi-goal, Multi-start Multi goal problems to perform versatile within hand manipulation and created a custom simulation environment.

Dynamic Task planning using Reinforcement Learning – WPI
- Trained a policy to perform a dynamic task of pushing a puck on 6 DOF fetch robot. Worked on Mujoco, Openai gym environment & openai stable baselines.
- Implemented DDPG + HER and experimented on training with different hyperparmaters.

Active Vision for Manipulation using Reinforcement Learning – WPI
- Working on improving grasp synthesis for an unknown objects by training a viewpoint optimization RL policy to guide the direction of exploration.
- Developing a dynamic RL environment to train a policy from the point cloud inputs. Working on ROS, C++, python, PCL and pytorch.

Motion Planning – WPI
- Developed a planning framework for multi-agent scenario with centralized planning using search based algorithms and visualized the paths of agents in Rviz.
- Developed a route planning framework for electric vehicles with graphs and analyzed its complexity.

Deep Learning – WPI
- Worked on skip-connection models (ResNet, DenseNet) and experimented a new architecture and compared its performance on CIFAR-10 dataset for image classification.

Sensor Fusion Ongoing
- Developed a framework for lidar obstacle detection for autonomous vehicles by filtering, segmentation and clustering the point cloud data.
- Developed a framework to calculate time to collision(TTC) by 2D based Feature tracking between camera images and fusion of camera image & Lidar data.

Unsupervised Learning

- Worked on Masked Autoencoder for Distribution Estimation(MADE).
- Worked on basics of Autoencoders, VAE and GANS.

Steerable Needle Design & Constraint Motion planning of MRI Robot – WPI Aug '19 – Dec '19

- Designed & prototyped a concentric cannula system, calculated trajectories for performing thermal ablation in minimal invasive surgeries of brain tumors.
- Worked on MRI safe neuro surgery robot & integrated cannula system to perform neuro surgeries in a constrained environment of MRI bore.

Autonomous Map Generation using RTAB Mapping and SLAM – WPI Feb '19 – Apr '19

- Developed an autonomous map generating algorithm in an unknown indoor environment.
- Worked with real time appearance based mapping (RTAB), SLAM, ROS Navigation stack, Gazebo simulation and frontier-based mapping algorithm.

High-Level Learning Symbolic Planning Method – WPI Jan '19 – Mar '19

- Leveraged high-level symbolic planning to investigate the high-level coordination strategy in manipulation when the low level planner fails after exploring the given tree.

Achievements

- Performance Award: University Rover Challenge - 2015, 2016 International Rank 12th and 9th respectively.
- South Asian Student Association (SASA), WPI (2019) – Elected as an Executive Committee member