

Durga Prakash Karuppannan

in [linkedin.com/in/durgaprakash](https://www.linkedin.com/in/durgaprakash)

Github: github.com/kdurgaprakash

Email dkaruppannan@wpi.edu

Mobile +1 (774) 701-8281

7 Berkshire Street, Apt 1, Worcester, MA 01609

EDUCATION

Worcester Polytechnic Institute

Master of Science - Robotics Engineering, GPA 4.0/4.0

Worcester, MA

Aug 2021 - May 2023

National Institute of Technology Tiruchirappalli

Bachelor of Technology - Mechanical Engineering, GPA 7.73/10.00

Tiruchirappalli, India

Aug 2014 - May 2018

COURSEWORK AND SKILLS

- **Coursework:** Deep Learning, Artificial Intelligence, Computer Vision, Motion Planning, Robot Dynamics
- **Languages:** C/C++, Python, MATLAB
- **Skills:** TensorFlow, PyTorch, keras, Numpy, OpenCV, Gym, SkLearn, Pandas, Git, Matplotlib, ROS, Unity, Gazebo

EXPERIENCE

- **Graduate Research Assistant:** May '22 - Present
VISLab, WPI - Advisor: Dr. Zhiming zhang
 - Working on creation of 3d point cloud feature detector and descriptor for effective point cloud registration
 - Implementing attention graph neural network to use descriptors for feature matching for 3D reconstruction
- **Occupant Safety CAE Automation Engineer - Sub Local Technical Lead :** Aug '18 - Aug '21
Renault Nissan Technology and Business Centre India
 - Deployed and validated python automation scripts for model setups and cut down processing time by 30%
 - Reviewed and enhanced quality of global projects, trained recruits, prepared guidelines and cascaded updates
 - Designed state of the art FEA methods for full vehicle crash analysis and improved safety performance

PROJECTS

- **Multi-Task model for Semantic, Instance Segmentation & Depth** (PyTorch | Python): [code](#) Feb '22 - Apr '22
 - Engineered MobileNet encoder and RefineNet decoder with pre-trained weights on Cityscape and NYUD dataset
 - Integrated proposal free instance segmentation using discriminative loss and found optimal hyperparameters
 - Achieved 0.43 mean Intersection of Union(mIoU) for segmentation and 0.2 RMSE for depth estimation
- **Real-Time Koala Bear Detection and Tracking** (Python | OpenCV | Scikit - Learn): [code](#) Oct '21 - Dec '21
 - Built detection model using Histogram Of Gradients feature descriptor and SVM classifier with 95% accuracy
 - Modeled detection using YOLOv3 with bounding boxes of confidence scores more than 0.7 on custom dataset
 - Performed Pose Estimation and Tracking of Koala Bear using SLEAP deep learning framework
- **Motion Prediction for Autonomous Vehicle with Lyft Dataset** (Pytorch| Python): Sep '21 - Dec '21
 - Constructed two variants of Convolutional Neural Network(CNN) for motion prediction using Lyft Level5 Dataset
 - Devised fully connected convolutional layer from scratch and fine tuned Efficient-b0 on ImageNet dataset
 - Attained best kaggle score 91.9 for mean pooling out of 3 ensembles - concatenation, weight and mean pooling
- **Motion Planning of Self Driving car with Reinforcement Learning** (Python| pytorch): [code](#) Sep '21 - Dec '21
 - Utilized Policy Proximal Optimization (PPO) reinforcement learning method with imitation loss based reward
 - Rendered trajectory from group normalized CNN and stable baselines Policy network with Gym environment
 - Obtained optimized trajectories of ego vehicle with 19.97 Average Displacement Error(ADE) metric
- **Classification for Fashion MNIST from scratch** (Numpy | Python): [code](#) Feb '22 - Apr '22
 - Created neural network and backpropagation with stochastic gradient descent and regularized cross entropy cost
 - Attained 87.75% test accuracy by optimizing the crucial hyperparameters on validation set using grid search
 - Performed Principal Component Analysis(PCA) to reduce parameters and plot 3D cross entropy loss vs parameters
- **Collision Avoidance of custom Mobile robot in Unity** (Python| Unity | ROS): [code](#) Feb '22 - Apr '22
 - Implemented Simultaneous Localization and Mapping (SLAM) for generating Hospital Map using ROS gmapping
 - Achieved optimized path planning using A* global planner with ROS Navigation stack and sensors for Perception
 - Formulated local planners with Time Elastic Band, Dynamic Window Approach and Model Predictive Control(MPC)
- **Implementation of Standard and Advanced Path Planning Algorithms** (Python): [code](#) Jan '22 - Apr '22
 - Incorporated BFS, DFS, Dijkstra and A* algorithms to find path from start to goal in custom generated maps
 - Programmed RRT, RRT*, Informed RRT* and PRM with random, uniform, gaussian and bridge sampling methods
 - Implemented D* algorithm to plan path in changing environment with process state and modify cost functions