

Abhinav Modi

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EDUCATION

University of Maryland, College Park
Masters of Engineering in Robotics

GPA: **4.0/4.0**
Aug. 2018 - May 2020

Birla Institute of Technology and Science(BITS), Pilani, India
Bachelors of Engineering(Hons.) in Mechanical Engineering

GPA: **7.53/10(3.18/4)**
Aug. 2014 - May 2018

Relevant Coursework: Path Planning for Autonomous Robots, Decision making for Robotics, Software Development for Robotics, Computer Processing of Pictorial Information, Perception for Autonomous Robots, Control of Robotic Systems

TECHNICAL SKILLS

Areas of Interest	SLAM, Deep Reinforcement Learning, Decision Making for Autonomous Systems, Deep Convolution Neural Networks(CNNs), Data Structures and Algorithms
Modeling and Analysis	Solidworks, MSc ADAMS, Simulink, MATLAB
Software development	Agile development, Automated/Manual Unit testing, Google Mock/Test framework
Softwares & Tools	C++, ROS, Python, Linux, Tensorflow, TFLite, PyTorch, OpenCV, Git, Numpy, LaTeX

RESEARCH EXPERIENCE

Autonomous Micro Aerial Vehicle(AMAV) Team
Research Assistant under Prof. Derek Paley

Dec. 2018 - Present

- Working with Intel's depth and stereo modules to develop vision algorithms for path planning and obstacle avoidance on micro UAVs.
- Participated and won the 7th edition of the VFS MAV Student Challenge, at the University of Pennsylvania, PA in May 2019.

Perception and Robotics Group, University of Maryland
Research Assistant under Prof. Yiannis Aloimonos

Aug. 2018 - Present

- Performed neural network compression for a pipeline which predicts dense depth, optical flow and camera pose. Implemented network distillation and model quantization across different network architectures for comparison.
- Successfully reduced the memory footprint of the model by 94% and the inference time by 90% using Tensorflow and TFLite frameworks in python.

PROJECTS

- **Structure from Motion:** Simultaneous 3D map generation and camera pose estimation using image sequences from a monocular camera.
- **Attitude Estimation:** Compared madgwick and unscented kalman filters(UKF) to estimate orientation of a 6-DoF IMU against ground-truth vicon data.([link](#))
- **Human Obstacle Detection:** Designed a software module to utilize a pretrained YOLOv3 network to detect and localize humans in a robot's reference frame.([link](#))
- **Travelling Salesman Problem:** Implemented a 2-approximation greedy algorithm using minimum spanning trees to find tours for the metric-TSP problem.([link](#))
- **Supervised Deep Homography:** Trained a Supervised Neural Network on COCO dataset to generate a panorama.
- **Deep Q-learning for MountainCar-v0:** Trained a deep Q-learning network for the discrete action space mountain car problem in OpenAI gym.([link](#))
- **Optical Flow based Obstacle Avoidance** Compared traditional Gunnar Farneback method and Spatial Pyramid network to compute dense optical flow for real time obstacle avoidance on micro UAVs.([link](#))
- **WALLE 2.0:** Modelled the forward and inverse kinematics of a mobile manipulator robot([WALLE](#)) to aid in nursing activities in a medical setting.([link](#))

LEADERSHIP EXPERIENCE

Inspired Karters, Formula Student Team, BITS Pilani
Team Captain

Feb. 2016 - Feb. 2017

- Established a new team structure for a team of 50 students from multiple disciplines to incorporate a KTM 390 engine, smaller wheels (10"), and a full body aero-package, all for the first time in the history of the team.
- Successfully raised INR 150,000 as a team in only one month's time, amounting to INR 7,50,000 during the whole year.