

# Abhinav Modi

✉ [abhinav.modi888@gmail.com](mailto:abhinav.modi888@gmail.com) |  [abhinavmodi16](https://github.com/abhinavmodi16) |  [abhi1625.github.io](https://github.com/abhi1625) | 🏠 8402 49<sup>th</sup> Avenue, College Park, MD

## EDUCATION

**University of Maryland(UMD), College Park**  
*Masters of Engineering in Robotics*

GPA: **3.84/4.0**  
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:** Perception for Autonomous Robots, Decision making for Robotics, Software Development for Robotics, Computer Processing of Pictorial Information, Robot Learning, Planetary Surface Robotics

## TECHNICAL SKILLS

<b>Areas of Interest</b>	Motion Planning, SLAM, Multi-view geometry, 3D Mapping, Localization, Deep Reinforcement Learning, Decision Making for Autonomous Systems
<b>Modeling and Analysis</b>	Solidworks, MSc ADAMS, Simulink, MATLAB
<b>Software development</b>	Agile development, Automated/Manual Unit testing, Google Mock/Test framework
<b>Softwares &amp; Tools</b>	C++, ROS, Python, Linux, Tensorflow, TFLite, PyTorch, OpenCV, Git, Numpy, LaTeX

## RESEARCH EXPERIENCE

**Geometric Algorithms for Motion, Modeling and Animation(GAMMA) Labs, UMD**  
*Research Assistant under Prof. Dinesh Manocha*

Jan. 2020 - Present

- Creating environments to simulate Indian traffic conditions using PyGame and OpenAI Gym.
- Developing a learning-based approach to model driver behaviours to navigate through dense and aggressive traffic.

**Autonomous Micro Aerial Vehicle(AMAV) Team, UMD**  
*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, UMD**  
*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

- **Optical Flow based Obstacle Avoidance** Compared traditional Gunnar Farneback method and deep learning based Spatial Pyramid Network to compute dense optical flow for real time obstacle avoidance on micro UAVs. ([link](#))
- **Kids Next Door:** Developed a software package using ROS and C++ to simulate a mobile manipulator robot Tiago++ for pick and place operations. .([link](#))
- **Deep Q-learning for MountainCar-v0:** Trained a deep Q-learning network for the discrete action space mountain car problem in OpenAI gym.([link](#))
- **Cable Suspended Load from a Quad:** Implemented Geometric Control based on differential flatness to track trajectory of a load suspended from a quadrotor.([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](#))
- **BIOBOT:** Simulated a conceptual model of a PLSS rover capable of carrying one crew member under the guidance of Prof David Akin. ([link](#))

## LEADERSHIP EXPERIENCE

**Graduate Teaching Assistant**  
*Perception for Autonomous Robotics - ENPM673, University of Maryland*

Jan. 2020 - Present

- Helping students to learn various software packages to implement projects related to multi-view geometry, image segmentation, motion processing and object recognition.
- Assisting Dr Mohammed Charifa(course instructor) in developing course material and grading student submissions.