Abhinav Modi

abhi1625@umd.edu | abhinavmodi16 | abhi1625.github.io| 8402 49th Avenue, College Park, MD

EDUCATION

University of Maryland, College Park GPA: **7.53/10(3.18/4)**
Masters of Engineering in Robotics *Aug. 2018 - May 2020*

Birla Institute of Technology and Science(BITS), Pilani, India GPA: **7.53/10(3.18/4)** *Bachelors of Engineering(Hons.) in Mechanical Engineering* *Aug. 2014 - May 2018*

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

TECHNICAL SKILLS

Concepts & Interests	Deep Learning, Computer Vision, Data Structures and Algorithms, Image Processing, SLAM, Deep Convolution Neural Networks(CNNs)
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, PyTorch, OpenCV, Git, Numpy, LaTex

RESEARCH EXPERIENCE

Perception and Robotics Group, University of Maryland *Aug. 2018 - Present*
Research Assistant under Prof. Yiannis Aloimonos

- Worked on compression of a neural network pipeline which predicts dense depth, optical flow and camera pose. Implemented compression techniques like network distillation and model quantization across different network architectures to compare the results.
- Additionally, implemented Geometric and Model Predictive based controllers for online trajectory tracking on quadrotors.

Autonomous Micro Aerial Vehicle(AMAV) Team *Dec. 2019 - Present*
Research Assistant under Prof. Derek Paley

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

PROJECTS

- **Attitude Estimation:** Implemented and compared madgwick and unscented kalman filters(UKF) to estimate orientation of a 6-DoF IMU.(link)
- **Human Obstacle Detection**: Designed a module to utilize a pretrained YOLOv3 network to detect and localize humans in a robot's reference frame.(link)
- **Edge Detection using Pb-Lite:** Edge detection in images with texture reduction using "Probability of Boundary" method by performing k-means clustering on texture, brightness and color gradient maps.(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)
- **Structure from Motion**: Implemented a pipeline to generate 3D map and estimate camera pose using image sequences from a monocular camera.
- **GapFlight:** Developed a Gaussian-Mixture-Model(GMM) based vision feedback system to autonomously fly a quadrotor through a window of known dimensions but unknown position and orientation.
- **Advanced Lane Detection:** Developed a pipeline to mimic turn prediction system in self-driving cars, using histogram of lane pixels.

LEADERSHIP EXPERIENCE

Inspired Karters, Formula Student Team, BITS Pilani *Feb. 2016 - Feb. 2017*
Team Captain

- 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.