

# Parth Chopra

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## EDUCATION

### UNIVERSITY OF MICHIGAN

#### MS IN ROBOTICS

Expected Apr 2019 | Ann Arbor, MI

### DELHI TECH. UNIVERSITY [DTU]

#### BTECH IN ENGINEERING PHYSICS

#### MINOR IN ROBOTICS ENGINEERING

June 2016 | New Delhi, India

## LINKS

Github:// [parthc-rob](#)

LinkedIn:// [parth-chopra](#)

AngelList:// [@parth-chopra-2](#)

## COURSEWORK

### GRADUATE

Probabilistic Robotics SLAM [current]  
Advanced Artificial Intelligence  
Self-Driving Cars: Perception & Control  
Computer Vision  
Machine Learning  
Motion Planning[audit]  
Computational Data Science[audit]  
Robot Systems Laboratory  
Robot Kinematics & Dynamics

### UNDERGRADUATE

Biophysics  
Communication Systems  
Digital Electronics  
Engineering Mechanics  
Microprocessor Interfacing  
Numerical Methods  
Signals & Systems

### COURSERA/EDX

Aerial Robotics  
Intro to CS using Python  
Machine Learning  
Probabilistic Graphical Models

## SKILLS

### PROGRAMMING

Over 5000 lines:

Python • C++ • Matlab • ROS •  $\LaTeX$

Over 1000 lines:

OpenCV • PyTorch • JavaScript • Java  
Point Cloud Library

Familiar:

TensorFlow • Docker • AWS  
NodeJS • Arduino • Solidworks

## AWARDS

- **Honda Mobility Hacks 2019**

First Place - Project InsurCent

- **AUVSI SUAS 2014**

Third Place / 33 international teams  
Best Oral Presentation

- **AUVSI SUAS 2013**

Sixth Place / 35 international teams

## EXPERIENCE

### MAGNA INTERNATIONAL | ROBOTICS ENGINEERING INTERN, CORPORATE R&D

May 2018 – Aug 2018 | Troy, MI

- Developed and evaluated safety-critical real-time software pipeline to control industrial manipulators for manufacturing processes primarily using ROS2.0, DDS communications, PCL and ROS-Kinetic libraries in a Linux Environment.
- Wrote ROS packages in Python/C++ for sensor-fusion, obstacle detection and rule-set execution to interface with ABB robots in a factory setting.
- Coordinated code development in team of 5+, performed Git repo maintenance and code documentation using Scrum and Kanban techniques.

### INSTITUTO SUPERIOR TÉCNICO - INTELLIGENT ROBOTS AND SYSTEMS GROUP

#### RESEARCH INTERN, SOCROB@HOME TEAM

May 2017 – Jul 2017 | Lisbon, Portugal

- Developed a ROS - Gazebo-based simulation for the IDMind MOnarCH mobile robot, worked with team of 5+ graduate students to integrate packages used for mobile navigation and task execution for RoboCup@Home competition challenges.

### BUBBLEFLY TECHNOLOGIES | R&D ENGINEER & DRONE PILOT

Jun 2016 – Feb 2017 | New Delhi, India

- Developed product, concept of operations, design requirements for ground-surveying multirotor applications.

## RESEARCH

### LAB FOR PROGRESS | GRADUATE RESEARCH

Oct 2018 – Present | Ann Arbor, MI

- Adapted PointNet architecture to implement deep learning classifier to use Light-Field View [plenoptic] images of translucent objects to detect graspable handle-like features.
- Implemented PyTorch-based classifier for a probabilistic Depth-Likelihood Volume structure to correlate volume features for translucent objects with corresponding ground truth point-clouds for opaque objects.

### GRADUATE COURSE PROJECTS

#### SELF-DRIVING CARS: PERCEPTION & CONTROL

- Implemented algorithms for point cloud registration, visual odometry, stereo perception and SLAM
- Implemented and trained ensemble-based Deep Learning models in PyTorch on GPU-based AWS EC2 instances to classify images, optimized performance for >99% validation accuracy on photorealistic simulation data.
- Implemented LQR, MPC and Quadratic Programming based methods for trajectory generation and control of simulated vehicle.

#### ADVANCED ARTIFICIAL INTELLIGENCE

- Implemented a Kenken puzzle solver with various discrete search methods; Implemented Monte Carlo sampling methods for inference on Probabilistic Graphical Models.

#### COMPUTER VISION: MICHIGAN GO

- Adapted Amazon Go's concept, developed vision pipeline to detect, label and track grocery-style objects and people from training data using transfer-learning with pre-trained convNet, segmentation and SIFT features.

#### ROBOT SYSTEMS LABORATORY

- Programmed computer vision pipeline for RGB-D sensor to execute pick-and-place tasks using 4-DOF manipulator with custom gripper.
- Executed IMU-based motion control, odometry, A\* path planning on 2-wheel segway robot using Cascaded PID control.
- Programmed sensor model, occupancy grid map for SLAM execution and map-building on robot.

#### ROBOT KINEMATICS & DYNAMICS

- Used a Fetch Robot simulation in JS/Three.js to implement Forward Kinematics, Inverse Kinematics, Grid & Sampling-Based planning algorithms (RRT-Connect, RRT\*).

### LOCKHEED MARTIN-DTU - UNMANNED AIR SYSTEMS STUDENT TEAM

#### AVIONICS DIVISION LEAD, FLIGHT SAFETY OFFICER, AVIONICS ENGINEER

Oct 2012 – Jun 2015 | New Delhi, India

- Developed avionics for three design-development-test cycles for Unmanned Aerial System (UAS) platforms with Intelligence, Surveillance & Reconnaissance capabilities.
- Led multidisciplinary team of 20+ undergraduate students to compete in AUVSI Student UAS Competition hosted at NAVAIR base, Maryland – 3rd in SUAS 2014, 6th in SUAS 2013.