Parth Chopra

parthc@umich.edu | 361.510.0788 | parthc-rob.github.io

OBJECTIVE

Seeking full-time Software Engineering roles in Autonomous Robotics, Computer Vision & ADAS starting May 2019, especially relevant to the domains of multi-modal perception / scene understanding, AI-ML, & Mobile Robot and Manipulator motion planning.

EDUCATION

UNIVERSITY OF MICHIGAN | Master of Science : Robotics — Expected Apr 2019 | Ann Arbor, MI

Coursework : Probabilistic Robotics, Motion Planning, Computational Data Science, Machine Learning

DELHI TECH. UNIVERSITY [DTU] | BTech : Engineering Physics, Minor : Robotics — Jun 2016 | New Delhi, India

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, **Point Cloud Library** and **ROS-Kinetic** libraries with **MoveIt** in a **Linux** Environment.
- Wrote **ROS** packages in **Python** & **C++** for **sensor-fusion, obstacle detection** and rule-set execution to interface with **ABB robots**.
- Coordinated code development in **team of 5+**, performed **Git maintenance**, **code documentation** using **Scrum** and **Kanban** techniques.
- **Docker**-ized ROS installations & packages, using **containers** to create **deployable codebase** versions.

INSTITUTO DE SISTEMAS E ROBÓTICA | Robotics Intern, SocRob@Home Team — May 2017 – Jul 2017 | Lisbon, Portugal

- Developed a **ROS - Gazebo**-based **URDF** simulation for the IDMind **MOnarCH Service Robot**, worked with **team of 5+** graduate students to integrate packages used for **perception, mobile navigation** and **manipulation** 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 intelligent **multirotor UAV** applications.

PROJECTS

LAB FOR PROGRESS | Graduate Research : Computer Vision — 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 based on **Plenoptic MCL**.

GRADUATE 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 **GTA 10k simulation dataset**.
- 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 using **Java**; Implemented **Monte Carlo** sampling methods for inference on **Probabilistic Graphical Models** using **Python** and **PGMPy** libraries.

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 and customized **AlexNet CNN, segmentation** and **SIFT features** using **MATLAB, Python TensorFlow**.

Robot Systems Laboratory

- Programmed Computer Vision pipeline using **OpenCV** for **RGB-D sensor**, programmed **Finite State Machines** to execute **pick-and-place** tasks using **4-DOF manipulator**. Designed & **3D-printed** custom gripper in **Solidworks**.
- 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 **JavaScript / 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 Director, Avionics Engineer, Test Pilot — Oct 2012 – Jun 2015 | New Delhi, India

- Worked on **Pixhawk / Ardupilot-based autopilots, avionics, imagery, RF** and **embedded system** integration for **3 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 – **Third Place**/33 teams in **AUVSI SUAS 2014**, **Sixth Place**/35 teams in **AUVSI SUAS 2013**.

InsurCent : Honda Mobility Hacks 2019 - Winning Entry — Jan 2019 | Ann Arbor, MI

- **Web-app** based gamified instant Insurance Incentives for drivers choosing **safer driving routes** and following healthier habits to **enhance pedestrian, driver** and **emergency responder safety**. Used **NodeJS, MapQuest** API, **Leaflet Maps** API, **JSON**, **Python** and **AWS Cloud9**.