

Parth Chopra

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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 **Movel** 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 SUPERIOR TÉCNICO - IRSG | 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**.