# TARANG SHAH

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## EDUCATION

**Carnegie Mellon University - School of Computer Science (Robotics Institute)** — *Pittsburgh, PA*
MASTER OF SCIENCE IN ROBOTIC SYSTEMS DEVELOPMENT — **Aug 2019 - May 2021**
Electives: Computer Vision, Deep Learning, Visual Learning & Rec, Computer Graphics, SLAM, Image Synthesis; 4.05 GPA

**BITS Pilani (Birla Institute of Technology & Science, Pilani)** — *Pilani, India*
BACHELOR OF ENGINEERING IN ELECTRONICS AND INSTRUMENTATION — **Aug 2011 - May 2015**

## WORK EXPERIENCE

**Argo AI** — *Pittsburgh, PA*
SOFTWARE ENGINEER — **Jul 2021 - Present**
- Working on integrating the core vehicle software with cloud based infra for evaluation and testing
- Building scripts and tools to run various jobs with different datasets and optimize various aspects including compute, storage and time

**CMU – Argo AI Center for Autonomous Vehicle Research– Prof. John Dolan** — *Pittsburgh, PA*
RESEARCH ASSISTANT — **Sep 2020 – May 2021**
- Building datasets and prototyping modeling approaches for scenario level anomaly detection (ITSC 2021)
- Developing pipelines for data collection, visualization in the CARLA Simulator. Including custom controllers and scenarios.

**Argo AI** — *Pittsburgh, PA*
SOFTWARE ENGINEER INTERN — **Jun 2020 - Aug 2020**
- Developed pipeline for associating external map data with internal HD Map format at the Data Science team (geospatial matching)
- Enhanced object-detection pipeline to extract raw results on unlabeled data to estimate data importance (cloud data retrieval and inference)

**HERE Technologies** — *Mumbai, India*
SENIOR DATA SCIENTIST — Jul 2019 - **Aug 2019**
SENIOR SOFTWARE ENGINEER — Oct 2018 - Jun 2019
- Built deep learning based vision models and tools to automate extraction of map data from street images at the Map Creation team
- Trained and deployed object detection models for detecting 300+ traffic signs in street images using TensorFlow Object Detection framework (based on Faster-RCNN, SSD). Helped increase Recall and Precision to 80%+.
- Designed and built cloud-based pipelines for data sampling, annotation, training and evaluation, using cost optimized cloud infra (AWS)
- Developed mobile object detection models for hazard detection as 20%-Time project, now launched as a new product HERE LiveSense SDK

SOFTWARE ENGINEER II — **Apr 2017** - Sep 2018
- Designed, built, and deployed a service for highway sign parsing (OCR, scene text and icon extraction) and reduced human effort by 5X per user

**Octoloop Systems** — *Gurgaon, India*
CO FOUNDER — **Apr 2016 – Mar 2017**
- Octoloop Systems built robots for industries and warehouses. Involved in all aspects of an early stage technology startup.
- Built an industrial robotic arm for automated Pick and Place tasks in factories and warehouses. Y-Combinator W2017 onsite interviewee

## PROJECTS

**Extracting behavior from Traffic Videos & Simulation of Realistic Behavior for Traffic Agents** — *CMU Capstone Project*
SOFTWARE ENGINEERING & PROJECT MANAGER — **Jan 2020 - Dec 2020**
- Extracting visual parameters for learning behaviors from real world video data and simulation in the Carla Simulator
- Built computer vision pipeline for detecting and tracking vehicles from traffic camera videos to bird's eye view
- Managing and tracking the project progress as project manager for 5-member team. Project Sponsored by Auro by Ridecell Inc.

**Resnets for Classification Networks from Scratch in PyTorch with Ensemble Selection** — *Intro to Deep Learning (CMU)*
- Implemented ResNet from scratch and trained multiple models with varying parameters — **Sep 2020 - Nov 2020**
- Stood in top 10 amongst 250+ students by building an ensemble selector for choosing the best set of models

**Multi Label Classification and Weakly Supervised Object Detection on PASCAL VOC Images** — *Visual Learning&Recog (CMU)*
- Built a multi label classifier with different base models (CaffeNet, ResNet) and implemented Mixup augmentation — **Feb 2020 - Apr 2020**
- Implemented Weakly Supervised detection for predicting boxes where the training data only has class labels and no boxes

## PUBLICATIONS & AWARDS

**Robust gesture recognition using Kinect: A comparison between DTW and HMM**, Optik - International Journal for Light and Electron Optics – 2015
**CurbScan: Curb Detection and Tracking Using Multi-Sensor Fusion**, IEEE Conference on Intelligent Transportation Systems (ITSC) - 2020
2019 - **Significant Development IP Award**, Award from Patent board for POC on map and image hybrid deep learning models. *Here Technologies*
2018 - **Innovation Award**, For successful approval of mobile vision deep learning POC to production *Here Technologies*

## SKILLS

**Vision/ML/Data Science:** Pandas, PyTorch, Jupyter, SQL, OpenCV, Carla Simulator, TensorFlow
**Cloud:** Compute, Storage, Autoscaling infra (EC2, EC2 Spot, S3, Lambda, ECS) **Tools:** Git, Jira
**Programming:** Python, C++, C, JavaScript, Java **Web:** HTML, CSS, NodeJS, Express