ABDELRAHMAN OSAMA ANWAR

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EDUCATION

German University in Cairo *Jan 2020 - August 2021*
M.Sc. in Computer Vision.
Thesis Title: Drivable Area Segmentation in Deteriorating Road Regions for Autonomous Vehicles using 3D LiDAR and Camera Fusion

German University in Cairo *Oct. 2014 - July. 2019*
B.Sc. in Computer Science & Engineering.

SKILLS

Backend	**Python**, Java, **C++**, Golang, PHP, Wordpress, MySQL and Firebase.
AI	**Keras**, **OpenCV**, TensorFlow, **Numpy**, Pandas, Scikit-Learn, **PyTorch**
Mobile	Flutter, Dart,Native Android (Java) and React Native.
Frameworks	**ROS**, **PCL**, **RVIZ**, **Autoware.ai**, **mmdetection3d**, **mmsegmentation**.

PUBLICATIONS

Drivable Area Segmentation in Deteriorating Road Regions for Autonomous Vehicles using 3D LiDAR Sensor. *IV 2021*
A paper representing our work in developing a self-driving module that detects road boundaries and classifies the obstacles and road irregularities within the drivable road area using LiDAR sensor.

Autonomous Vehicle Prototype for Closed-Campuses *SUCI 2020*
A paper representing our work in developing a self-driving vehicle and focusing on the challenge of autonomous driving in areas with high density of pedestrians.

PROJECTS

3D LiDAR and Camera Early Fusion based 3D Object Detection and Classification 2021
Started off from MVXNet network implementation on Open MMLab's mmdetection3d framework. Created a custom-network that takes fused data from multiple Cameras and multiple LiDARs. Trained the new model on NuScenes dataset to expand the class set from 3 classes to 11 classes. **#Python, PyTorch, Numpy, OpenCV, mmdetection3d**

3D LiDAR and Camera Fusion based Drivable Area Detection and Classification 2021
Improved my my previous work in detecting and classifying drivable area. Developed camera-based segmentation module that is based on NVIDIA's SegFormer. Used the idea of Point Painting to project the segmentation classes to the LiDAR point cloud. Used the segmentation result to increase the road drivable area detection accuracy. **#C++, ROS, Python, PyTorch, PCL, Numpy, OpenCV, RVIZ, mmsegmentation**

3D LiDAR based Drivable Area Detection and Classification 2020
Implemented a **LiDAR** based algorithm to detect the drivable area by processing data from the rings emitted by the **LiDAR**. Using this data I was able to detect the road boundaries and road irregularities (unclassifiable/camera detectable objects) within the road boundaries. **#C++, ROS, PCL, Numpy, RVIZ**

Camera Laser Data Annotation Tool *April 2020 - September 2020*
Developed a labeling and annotation tool for Ladybug 5+ panoramic camera, laser crack measurement system data and Velodyne LiDAR data output from a ROMDAS surveying vehicle.
Developed a late fusion object detection tool to detect and classify road objects to minimize the manual labeling effort on datasets. **#Python, PyQt5, Numpy, OpenCV, Pandas**

Self-Driving Car *Jan 2018 - Now*

- Leading a team of 10 people working on developing a self-driving car.
- Worked on several low level control modules including throttle, steering and brakes control.

· Had the vehicle running its first full self-driving demo in November 2018

3D Printed Robotic Prosthetic Arm 2018
Created a 3D printed robotic prosthetic arm that is controlled by a Myo Armband. `https://www.youtube.com/watch?v=HvWfLV5GVaE&t=2s`

Custom made 3D Printer 2017
Built a custom made 3D printer based on the original Ultimaker during my summer vacation.

EXPERIENCE

Brightskies Technologies April. 2021 - Now
Computer Vision Engineer *Cairo, Egypt*

· Developing early camera-LiDAR fusion algorithm for detecting and classifying road objects.
· Developing visualization and annotation software for camera and LiDAR data

Namaa Co. April. 2020 - April. 2021
Computer Vision Engineer *Cairo, Egypt*

· Worked on developing data annotation and processing tools using PyQt5 framework as front-end.
· Worked on developing several object detection and classification models detecting light poles, potholes, road cracks and other road objects.
· Worked on developing computer vision algorithms to get accurate distance measurements between the vehicle and road objects using Camera and **LiDAR** sensors.

German University in Cairo Jan. 2018 - Now
Research Assistant *Cairo, Egypt*

· Worked as a researcher leading the autonomous driving research cluster.
· Refined and worked with several multi-sensor calibration techniques with combinations like Camera-LiDAR, Stereo-Camera-LiDAR and camera radar fusion.
· Trained several LiDAR based 3D object detection pipelines based on popular backbones such as SECOND and PointPillars.
· Developed monocular camera and LiDAR early fusion network based on SECOND and MVXNet that works for 11 different classes.
· Improved and tuned NDT-Matching localization module from Autoware.ai to work on our vehicle platform reliably.
· Developed path planning module based on pure pursuit controller that would translate the control signals from the pure pursuit controller to throttle, steering and brakes control signals.
· Developed a Camera-LiDAR fusion based ground segmentation module that was the core contribution of my master thesis and my IV 2021 paper.

German University in Cairo Sept. 2019 - Jul. 2021
Teaching Assistant *Cairo, Egypt*

· Courses: CSEN1094 Deep Learning for Self-driving Cars, CSEN301 Data Structures and Algorithms, CSEN909 Human Computer Interaction, CSEN1001 Computer and Network Security.

Udacity March. 2019 - January 2020
Mentor, Part-time *Cairo, Egypt (Remote)*

· Worked as a mentor at Udacity for students enrolled in the Self-Driving Car Engineer Nanodegree.