Abstract

With the aim of achieving safety in the automotive field, there is a focus on designing and developing the autonomous vehicle. Car manufacturers have been pushing the research of autonomous vehicles to be available in the near future. To achieve the task of autonomous driving, vehicles are equipped with sensors which perceive the surrounding environment in order to avoid collision with surrounding obstacles and to drive smoothly. Since the surrounding environment consists of stationary and dynamic obstacles, the focus in this work is to find out the moving obstacles around the vehicle. In order to differentiate between the dynamic and stationary obstacles, object tracking has to be performed. This work has focused on the use of ScaLa LiDAR, wherein after this work, the output will be fused with other sensors' outcome to achieve a more robust and accurate representation of the surrounding environment. With the wide horizontal field of view and ability to acquire the shape of the obstacles, LiDAR delivers its output in the form of a point cloud. There is a big challenge in processing the point cloud to extract meaningful information.

This work proposes a multi-object detection and tracking approach using ScaLa Li-DAR. To implement the method, a raw point cloud is used as input. Segmentation is then applied on the point cloud using the modified connected component labeling algorithm. These segments are then tracked to get the dynamic objects. Finally, the dynamic objects are classified using Naive Bayes classifier, with the loan of geometric moments’ algorithm from image processing field for extracting features to use as classifier input.

This work has been performed at IAV GmbH, where the proposed approach has been examined in real recorded scenes by test vehicle. The output has been evaluated and compared with the output of the validation algorithm which was executed on ScaLa objects list. The output of the proposed approach showed good results which can be a base for future work that can deliver excellent results.