Description

Title of the Invention: System and Method for Multipath Auto-labeling in High-Resolution Radar Point Cloud

In this patent, a comprehensive method and system is devised to automatically label the multipath points in radar point cloud with the help of images collected by a camera system that is synchronized with the radar.

This method consists of three main components. The first component aims to pre-process the point cloud which is called point cloud segmentation. In this stage, the radar point cloud is segmented into static and dynamic points. The segmentation can be achieved by evaluating the doppler distribution of the point cloud. The second component is designed for image segmentation. During this step, the objects in the image are classified into two broad categories, i.e., static objects and dynamic objects. Each category may consist of many classes. For example, the static category may include classes such as roads, traffic signs, poles, trees, grass, etc. that are relevant to the car-driving or other applications. Dynamic category in general consists of all the objects that can move around such as cars, trucks, buses, pedestrians, cyclists, animals, etc. The third component conducts the automatic labeling wherein first, the radar point cloud will be overlapped with the camera image. Then, the dynamic multipath is classified according to the overlapped results. Finally, the static multipath is classified according to physical constraints, which depends on the relative geometry between the radar and its surrounding environments.

Claims

Claim 1: A system and method for auto-labeling of multipath points in the radar point cloud is designed as depicted in Figure -1, consisting of sub-systems which processes point clouds and camera images, along with labeling of multipath points

Claim 2: The point cloud processing system of claim 1 conducts the segmentation of dynamic points and static points by evaluating the distribution of Doppler velocity.

Claim 3: The image processing system of claim 1 conducts point cloud overlay with the image after image segmentation.

Claim 4: The multipath labeling system of claim 1 makes use of the overlapped point clouds and the images to label each and every point.

Claim 5: The system of claim 4 first labels the dynamic multipath based on whether the dynamic point in the point cloud is overlapped with any dynamic object in the image domain.

Claim 6: The system of claim 4 thereby the system labels the static multipath based on physical constraints that any static point behind another point is a multipath point.