Parking Assistant System

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The parking assistant system is a small part of a bigger project in an attempt to develop smart vehicles with various additional functionality to assist aged drivers in driving. The goal of the parking assistant project is to develop a real-time system that aids the drivers in different difficult parking scenarios. With the conventional method,the drivers are forced to look back through the rear window to estimate the distance away from the obstacles. Sometimes passengers sitting in the backseat can block this view and the driver's ability to estimate the distance from the obstacles deteriorates. The parking assistant project proposes an attempt to solve this and other similar problems in parking.

The goal of this project is to develop a real-time system that takes in a sequence of images taken at a video rate (30 frames/second) and output a 3D reconstruction of the environment in the parking lot. A video camera with a wide-angle lens is mounted next to the rear window to look over the back of the vehicle. Feature points are then extracted from the images and the correspondence problem is solved to track the feature points along the sequence of frames. Due to the poor quality of the images extracted from a video sequence, most of the algorithms to detect feature points in grey-level images that we have explored do not yield satisfactory results. We then resorted to a color edge detection method that gives a more promising result shown comparatively in Figure 15 and Figure 16.

Geometrical constraints are then applied to compute the distance of the objects in the environment from the vehicle using the disparity of the matching feature points that have been tracked. A sparse depth map of the environment in the parking lot is then obtained. After this step, depending on the applications, we might proceed to plan a path on how to go about parking in the space available. The implementation of the whole system needs to be robust against different lighting conditions in the different types of the parking vs. indoor parking. The accuracy in estimating the distance is also being studied as the acceptable range tolerance of a reliable system should be no more than 10 cm.

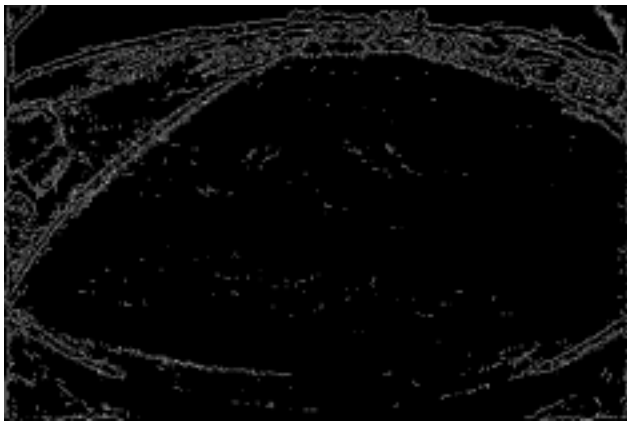

Fig. 15:

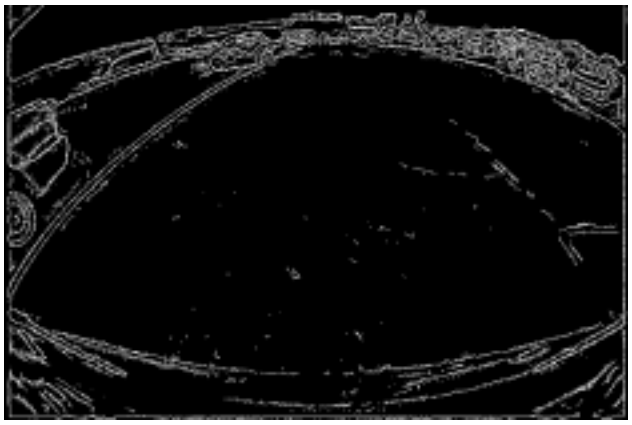

Fig. 16: