

The Detection of Obstacles Using Features by the Horizon View Camera

Ayami Iwata, Kunihiro Kato, Kazuhiko Yamamoto

Department of Information Science, Faculty of Engineering, Gifu University

aya@yam.info.gifu-u.ac.jp

Abstract

In this paper, we propose a new camera system called Horizon View Camera (HVC). The HVC is a system in which the optical axis of a camera is directed at the horizon with a mirror so that obtained image contains objects on the ground without including the ground itself. Therefore, by using the HVC system, separating objects from the ground becomes very easy. In this paper, we measured the distance to the object by using the obtained image actually and easily. Moreover, there are many other useful features in the HVC system. In order to improve the processing cost and accuracy, we propose a new idea whereby the detection of objects becomes easier and the results are more accurate by the experiment.

1 Introduction

Nowadays, many researches of autonomous robots has been proposed. According to researchers, the visual information from a camera is useful for an autonomous robot because the autonomous robot has to recognize surrounding scenery using the visual information [1]. For example, when the robot moves, the robot has to recognize objects such as obstacles that limit action.

In methods of detecting objects, a single camera or a stereo camera is usually used. However, these methods have some problems. In the case of using the stereo camera, two or more cameras are needed which increases the cost. Also the processing tends to complexify [2][3]. On the other hand, in the case of using the single camera, while cost becomes low because only one camera is needed, it is necessary to keep the camera at a higher position in order to acquire higher accuracy [4]. Therefore, the height of the system becomes inevitably tall. So, we propose a new camera system called the Horizon View Camera (HVC) for constructing a small size robot [5].

2 HVC System

2.1 Outline of the HVC System

In the case of using a single camera, it is necessary to keep the camera at a higher position in order to acquire higher accuracy, but this strategy has the problem that the system becomes tall. To remedy this, we came across a different viewpoint to this method. Our new idea is to keeping the camera at a low position, i.e., the camera is put on the ground. By this method, the obtained image contains only surrounding objects without the ground because the system position is too low. For this paper, therefore, the camera was put on the ground, and the system was made so that the optical axis of the camera was directed to the horizon. This system is named the Horizon View Camera (HVC). The obtained image by the HVC system contains objects on the ground without including the ground itself. Therefore, the HVC system has advantages that separating objects from the ground becomes very easy, and the calculation time for that can be reduced. By moving forward, the HVC system can easily measure the distance to an object.

We tried to make the HVC system, but we have to bury half of the camera in the ground to make the optical axis of the camera direct to the horizon, an impossibility in actual

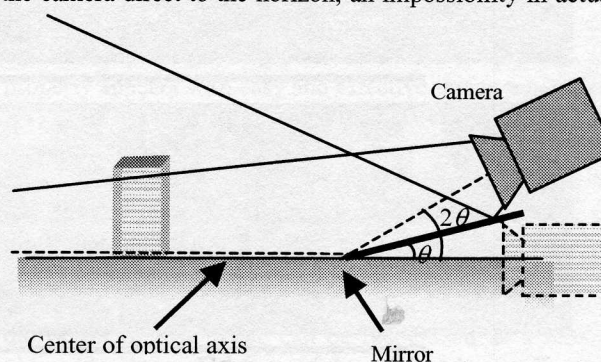


Figure 1: HVC system

