Path planning for paths that keep object in sight

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Contents

Chapter 1

Introduction

1.1 Overall description

The present report contains the description of the project "Path planning for paths that keep object in sight" developed as a part of the course RoVi2: Robotics and Computer Vision 2. The aim of the developed system is to enable the existing setup consisting of a PA10 with a tool mounted stereovision system to safely plan the required three-dimensional trajectories for keeping a specific user-controlled target within the field of view of its cameras at any moment.

1.1.1 Report structure

The project has been divided into two well differentiated parts. On one side the computer vision part, under which the recognition of the target, its tracking and location and the modeling of its physical behavior are treated. On the other side the robotics part, which gathers all the processes in charge of the trajectory planing and collision detection for the robot.

The described structure if applied to the report as well ***.

Section

1.2 Feature extraction

1.3 Stereovision

1.3.1 Introduction

In this section, the solution adopted for the location of the target in the 3D space through the vision system, the reasons that led to this approach, the assumptions made and the obtained results are presented. A more detailed explanation of the 2D image processing performed for the target tracking can be found in the next section.

1.3.2 Stereopsis

Due to the fact that two vision systems were available on the setup, the first step was to decide which one to employ and the method to compute disparity. After a slight evaluation of resources the chosen one was the stereo rig, utilized to carry out sparse stereo with a single well-defined point.

Through the acquired pairs of images, the pixel coordinates of the center of gravity of the target are extracted by the algorithm presented in section 2*** and they are used to calculate its 3D coordinates referred to the camera reference frame by means of triangulation.

1.3.3 Camera model

1.3.4 Calibration

1.3.5 Triangulation

1.4 Prediction

1.5 Path planning

1.6 Discussion

Chapter 2

Conclusions