System Design Project

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Individual Report 1

Introduction

The goal of this report is to describe my present individual achievements and contributions to the work of group 12.

Group Organization

At the very first meeting it was agreed that the team will show most progress and productivity if we split into subgroups which should meet individually to work on their part of the project. Regular general meetings were also held in order to keep everyone updated on the progress of the other subgroups. The team was divided into three subgroups: Construction, Motion and Behavior, and Vision. I decided to join the Vision subgroup as I had mainly worked on the vision part of last semester's Introduction to Vision and Robotics course.

Vision Subgroup Progress

It was decided that the OpenCV library should be used to develop the vision system for the project and the language of choice is C. We started work immediately and gathered some test images as we could not at that time test our code on the DiCE machines. An initial system was developed to find the two robots and the ball based on their distinct colors and contours were used to get each desired object. However, under different lighting conditions this did not always produce the correct result and I explored a template matching method to reliably detect the black circles on the robots in order to get a better estimate of the orientation of the robot. It proved to be rather slow compared to the other method but I tried several optimizations which significantly reduced the runtime. Converting the image to grayscale and focusing on a small region around the robot after detecting the T-shape on it made the algorithm fast and reliable. However, there is still room for improvement and I have started refactoring and optimizing the initial code in order to make it more readable and more extensible for future changes and tests.