

Requirements Document

Project: Liberty

Task: Capturing

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2.0 CAPABILITIES

2.1 PURPOSE

Design and implement an autonomous flag capturing system that is able to meet the following requirements:

- a. Drive to the blocks at defined speed. [*REQ - CPT-2.1.1*]
- b. Seek the specific coloured block. [*REQ - CPT-2.1.2*]
- c. When meet an obstacle (i.e. blocks of other colour or other robots), avoid it. [*REQ - CPT-2.1.3*]
- d. Indicate the status of the flag capturing system as on or off. [*REQ - CPT-2.1.4*]
- e. Beep for three times after get to the target. [*REQ - CPT-2.1.5*]

2.2 SCOPE

For the Capturing system to perform as designed, the ranges of the condition it operates in are as following:

- a. The operating range of the robot is required. [*REQ - CPT-2.2.1*]
- b. The operating speed of the robot must be defined. [*REQ - CPT-2.2.2*]
- c. The direction and the distance of the nearest block should be given from the sensors. [*REQ - CPT-2.2.3*]
- d. The colour of the starting zone and the target colour are required. [*REQ - CPT-2.2.4*]
- e. The colours of the blocks are needed. [*REQ - CPT-2.2.5*]

2.3 CONSTRAINTS

There are certain constraints during the process of designing and implementing the flag capturing system.

Hardware: a. Materials available are three sets of elements from the LEGO kits.

b. Fixed number of the slots form the brisk, which means limited amount of sensors and motors available.

c. Inaccuracy of the data from the sensors.

Software: The lower time complexity, the better the program is.

Engineering Resource: Limit time of 6 weeks with 9 hours working per person available.

2.4 USER FUNCTION

The starting zone and the targeted colour should be given at the beginning of the implementation of the project. The colour is derived from a colored spot on the map, which is made by the user.

2.5 OPERATING ENVIRONMENT

The zone in which the flag can be found is a 2 x 1 block of tiles.

See *REQ - GEN*; 2.2.1

2.6 PERFORMANCE

The system should be able to implement following tasks:

- a. Drive to the blocks within the implementing range.
- b. Identify the colour of the blocks and choose whether to capture (beep for three times) or avoid it.
- c. Be able to pause and resume.

3. COMPATIBILITY

3.1 COMPONENT RE-USED

A series of software components are reused to minimize the budgets. The use of these components will not bring additional cost to the project. They are shown below:

1. Odometer, navigation programs are reused for the system. They are developed internally during the lab phrase by Bill Zhang
2. Odometer display program that show the positioning information is reused. It is provided and developed by the teaching assistants at Faculty of Engineering, McGill University

3.2 COMPATIBILITY WITH THIRD PARTY PRODUCTS

According to the Project Description (Version 1.0) provided by the client. There are no third party products is required for this system regarding both software and hardware

4. GLOSSARY OF TERMS

1. Odometer refers to a program to compute and update the value of x, y coordinates and the heading of the robot
2. Navigation program refers to a program that drives between 2 points
3. Odometer Display refers to a program that visualize the positioning information of the robot