
Robot Code Description

Group 9 – Project 2 – 31 March 2003

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Introduction

Goal of the project is that the robot is to find and approach a lamp avoiding rocks and buckets and turn the lamp off by touching the base of the lamp. Turning off the lamp causes another lamp lit and the robot should orient itself to the lamp and move toward it avoiding obstacles, rocks and buckets. This is repeated until the time expire, which is 10 minutes. It was tried to make the code as simple as possible since due to the lack of processing power the Handy Board can not handle threads more than a few. Also each threads used, which are three, are made as short as possible to reduce the possible interference .

There are four important global variables in this code.

- 1.light and lightreading
- 2.range and bucketlocation

Two for the light seeking and two for the bucket seeking . The global variables, light and range are to store value from sensor reading. The variable, bucketlocation is to store the direction where a bucket is.

Algorithm:

This program has basically three processes and one endless loop. Each of three processes represent three different behaviors.

lightIntensity - Find light intensity.

bucket seeker - See if a bucket is near the front of the robot and try to avoid it if there is a bucket.

Bumping – See if the robot makes contact with a rock and if the robot approaches a bucket. If it hit a rock or is near a bucket, it calls appropriate function to avoid it.

The endless loop keeps the robot move forward and check light intensity.

At beginning, the light sensors, there are three light sensors mounted on the servo, sweeps from left to right to find the direction giving that readings from the sensors are smallest and the minimum sensor reading value which is the sum of readings from three sensors and represents the highest light intensity. Then the servo brings the sensors to see straight forward. Based on the direction information, the robot starts to rotate itself right or left until the reading from the light sensors matches the minimum value found during initial sweep within the tolerance specified. If the matching value can not be found, the robot stops rotating after one and half rotation, move forward a little and sweeps again to find new minimum sensor reading value and the direction giving the value. A few changes were made after first two demonstrations

1. The one and half rotation was changed to half rotation
2. It was eliminated that the turning right or left after moving forward

Once the robot finds the matching value it starts moving toward the direction for four seconds. After four seconds the robot stops and does sensor sweep again to find the direction toward the lamp.

The range sensor is mounted high so that it can see only the buckets. It sweeps left to right and right to left continuously as long as the robot is activated. When the sensor reading is higher than specified threshold the robot stops, move backward for one second and turn left or right based on that direction giving high sensor value. A few changes were also made during demonstration

3. It was found that the light from the lamp interferes with the range sensor. To minimize the interference, a visor was attached.
4. Range threshold was changed a few times through out the demonstration

While activated two touch sensors attached in front of the robot is always monitored. The robot stops what it is doing, whether the robot is moving forward or backward, or turning right or left, it turns right or left based on which touch sensor is activate and moves backward. If either touch sensor is activate and the sum of the reading form light seniors are below the specified threshold this means that the robot makes contact with the lamp but the circuit is not completed to turn light off. This situation calls for the function turnOffLight. What it dose is that it turns the robot right to lest a few times so that the circuit can be completed. Only one change was made regarding code during demonstration. The change is that it is described above that the robot moves backward and turn but original design is to turn first and move backward.