Omni-Directional Vision System for Mobile Robots

Biweekly Report

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by
The A Team

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In the last two weeks, the omnivisional group has made significant progress. We have implemented software to build on the already existing obstacle avoidance software. This new software was used in a demo for our weekly meeting. The software tested the ability of the camera to recognize a previously locked on color. The software also tested the camera's ability to communicate with the robot. The robot basic stamp received data from the camera and responded accordingly verifying that we have communication between the two components. We have also come across some problems with the modified version of the CMUcam. Our goal is to download an image onto a PC via a serial connection. However, the modified CMUcam for our BOE-Bot has had the components for this task removed. We ordered the chip and components but we are still having difficulty with the image dump.

Camera Issues

We have two main issues concerning the CMUcam. First, the CMUcam lens is not straight with the camera. The camera does not see the object straight in front of it. We verified this with our previous rotating object detection demo. Apparently the manufacturer made this error with several cameras and did not catch the errors. There is a fix on the Internet posted by Carnegie Mellon University, but it has not been implemented because we have not been able to dump an image on the PC. This is our next issue. After careful scrutiny of the camera schematics and documentation, we attached the extra chips and components to the camera board according to instructions we received from the manufacturer and designer of the camera. However, we still have not been able to obtain an input/output serial connection between the camera and the PC. We

are currently troubleshooting this problem by communicating with both Carnegie Mellon and Seattle Robotics.

Demonstration

We performed a demonstration for our weekly meeting. This demo required the robot to continuously rotate in a circle until the camera detects a color that it has previously locked onto. The camera first locks onto a color during initialization. The camera will beep when it locks onto the color. After a small delay specified in the software, the robot will begin to rotate in a circle. Once the camera sees the previously locked on color, the robot will stop and face the object. We accomplished this by measuring the confidence level and the x-coordinate supplied to us from the camera. When the confidence level reached a specific value hard coded at 20 and the x coordinate was within the range of 67 and 77, the basic stamp sent a command to the servos to quit rotating and stop. The demo worked but was not 100% efficient. We speculate that the slanted lens camera issue discussed earlier is the source of the problem.

Conclusion

Our most immediate and critical concern is to get the CMUcam working satisfactorily. We need to get an image dump from the camera to the computer monitor so that we can see what the camera is seeing. Without being able to see the camera's view of the world, we will be unable to focus the lens or determine its field of view. Both of these elements play a crucial role in placing the light bulb above the camera to function as an omni-directional mirror. We would like to use the logic analyzer to test the connections on the

camera board, and we are pursuing further help from the manufacturer and designers of the CMUcam via email. We are continuing to implement pieces of the object tracking code, but we cannot ensure that they work until the camera is functional. We are going to focus on getting the camera to work as soon as possible.