

Project Proposal

Camera sensor and Bluetooth control

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Project Abstract

The final version of my project is a Wall-E robot. It has motor, cube body and camera eyes. It can be controlled on mobile phone, communicating by Bluetooth. For semester project, I want to implement the phone-Zneo communication and real time image taking. Say, after taking picture, transmit the pic to cell phone by Bluetooth and cell phone control commands to Zneo.

Strategy

The project includes three parts: camera sensor, Bluetooth communication and LED display (which shows the command got from cell phone). The microcontroller will be ZNEO and I will use timer, interrupt, LED, serial ports. The micro-controller uses timer interrupts to trigger the camera to take pictures and grabs the images into ZNEO. Then, send image data to Bluetooth port (maybe a serial port, depends on component) and external device. On the other hand, application control commands are received at Bluetooth port, and sent to microcontroller, which is supposed to control the motor, but, in this project, just show on LED arrays.

The external hardware is camera and cell phone (blackberry 8310). I have not decided which camera sensor I will use. The SparkFun has some, but part of them have no breakout board. I think I need something with low resolution and small size of image data. <http://www.sparkfun.com/products/10061> . I tested BB 8310 and ran a simple testing J2ME application. The “synchronize” statement seems not working properly. I’ll try the Blackberry API. But I don’t know whether it can detect a non-phone Bluetooth device.

First, I need a Bluetooth communication module (protocol) and a simple application on 8310 to show images and send commands. The mobile app is running a thread, which keeps grabbing image, and another thread sending the control command. These are handheld programming problem. Bluetooth communication module should guarantee that the image and command is sent and received correctly, though the small amount of loss of image and command is tolerant, I think.

Second, use timer to control the collection of images. The ideal situation is that, as soon as we get a fresh image, send it to Bluetooth port and ready to send. EI() and DI() may help.

Third, display commands on LED arrays, or, if time permits, control a motor.

The hardware diagram looks like below.

camera
Microcontroller(Z16)
Bluetooth component
Bluetooth enabled cellphone (j2me)
Serial bus
Bluetooth
communication

Unknowns

1. In what kind of format the image will be put into ZNEO. A sequence of binary number? Or any known data format? Does the image need to be buffer in the ZNEO? How to manage the memory of ZENO when we store the image?
2. How to design the protocol of Bluetooth communication?
3. The connection between the camera and ZNEO. Need another converter to shift the level.
4. How to test the mobile application is a problem. If the Bluetooth is using a serial bus, like UART, may be possible to use dongle to simulate and test the communications.

Implementation Plan

1. Get familiar with the Bluetooth port and design the mobile app.
2. Test the app with the dongle and putty. Send and receive stuff under the control by Bluetooth.
3. Find a proper camera. No need of a converter is better. Read the datasheet to figure out how to deal with the image in ZNEO.
4. Combine the two parts and make the image and command transmission work.

Resources

The ZNEO development kit, a Bluetooth device and a camera. A bb8310 I owned.
Dongle and putty to test the different component.