Title

Joshua Waugh

Tuan Lam Minh

Lily

Abstract:

Write this after completing the paper.

Introduction:

An embedded system is a combination of hardware and software with a specific function that is physically embedded in a larger device. Embedded systems account for nearly all microprocessor production. The goal of this project is to program an embedded system that can control Pololu’s Zumo robot so that it can perform 3 tasks: fight other robots, follow a black line, and navigate a maze with obstacles.

Materials and Methods

For this project, the ‘CY8CKIT-059 PSoC 5LP’ prototyping kit from Cypress Semiconductor has been used to control the Zumo robot. Code is written to the PSoC by connecting it to a computer via USB and using PSoC Creator 4.2, also by Cypress Semiconducter. The Zumo robot’s hardware can be broken down into the following individual components: motors, 6 reflectance sensors, an accelerometer, an ultrasonic sensor, an infrared sensor and a Wi-Fi chip. A router acting as an MQTT broker is used to communicate between our computers and the robot. There is also a programmable button on the PSoC hardware itself. The libraries for controlling these components have been generously provided by Metropolia University of Applied Science.

PuTTY was used to see the output of the code written to the PSoC.

Zotero was used to track any sources used during the course of this project.

The three final projects can be divided into their components. Line following requires line following, counting horizontal black lines, infrared, etc.

Results

Completing the goal of the project required getting familiar with the hardware of the robot. To that end, 3 smaller tasks were laid out on a weekly basis.

Built into the hardware of the PSoC is a programmable button.

Two solutions to counting black lines. A variable can be defined that stores whether the sensors were reading black on the previous iteration of the while loop. It is more elegant to create a function that is entered when the sensors see black and is exited once they see white.

Discussion

Acknowledgements

Barr, Michael (1 August 2009). "https://www.embedded.com/electronics-blogs/barr-code/4027479/Real-men-program-in-C”. *Embedded Systems Design*. TechInsights (United Business Media). p. 2. Retrieved 2009-12-23.