ECE 221 – Digital Circuits II

Lab 6 – Programming the LafBot Line-Following Robot

Alex Villalba **(Scribe)**
Maurice Otieno

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1. Introduction

In this lab, we worked with a small microprocessor called PIC32 that is integrated into the Microstick II microcontroller. The objective is to program our microcontroller in C using a loop to sample the sensors and adjust the speed of the two motors depending on our left and right sensor values. As part of the lab, we worked with a software called MPLAB X.

The ece212_lafbot_setup()

We are going to need this library as it contains the analog input functions for our robot's engines.

2. Design

We are going to modify the speed of both engines as when the sensor of the LafBot reads black then it will decrease the speed of the engine on the same side as the sensor is located and in that way, our car can change directions following the black line. We also set a threshold for our sensors so they can understand what is black and white. In practice, we had to change the code design several times to improve the time of the car in the sample track, while we also figured out the optical speed for our motors so that it could get good timing, but also be able to follow the black line in edgy curves. Some specifications of our code were:

- Black Threshold = 340; (We lowered from 371)
- White Threshold = 320; (We increased it from 248)
- Engine Highest Speed= 0XFFFF;
- Engine Lowest Speed = 0X33FF;

3. Conclusion

This lab turned out to be more challenging as we had to constantly troubleshoot better ways to improve our performance in the cars, especially tweaking values such as the max/min speed of the engine and the rate at which the sensor updates to a new conditional statement.

This is our lab's GitHub:

https://github.com/otienomaurice1/ece212_alex_maurice/tree/main/lab6/lab06.X

4. Time Spent on Lab

4H