John Greth

Team N: Automators Anonymous

Teammates: Zhiwei Zhang, Tianyu Zhao, Xuesu Xiao

ILR01

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A. Individual Progress

This week, I built the website and worked on the sensors lab. Over the previous week I contributed a substantial amount to the design review.

For the website, I converted our design proposal into a website format and added some additional content including the team page, the tasks list, and the round robin presentation schedule. The website was created on google sites using the Project Work Site template by Sada Systems.

For the sensors lab, I wrote some test code to make sure the sensors were working and I soldered some of the sensor connections.

The values we got from the sensors made me realize that we will probably need to find a better solution to determine how close the robot is to the ground. We need to know the vertical position of the robot within ~1cm and the ultrasonic sensor simply isn't reliable at that resolution. We may need to consider some sort of limit switch that can touch the ground and will operate correctly on the ground surface as the robot moves horizontally along the bottom of the wall.

Also, all the sensors seemed very susceptible to noise from other objects that were close to the sensor but that we were not trying to detect. This may affect our ability to detect the edges of the wall. We will probably need to shield the sensors on the robot from ambient light/interference to make sure they are only detecting the wall.

For the design proposal, I wrote the design requirements as well as most of the defect mapping and motion subsystem descriptions. I tried to make the requirements as well-defined as possible, using quantitative requirements with specific values whenever possible.

B. Challenges

My biggest challenge was designing a website. I have prior experience with php/MySQL development for website features, but I don't have any design experience or knowledge of HTML5 or css. Luckily, the Google sites templates did most of the work for me. I had some difficulty with the team members page because the information required multiple columns. I was able to resolve this by manually inserting HTML code for a table.

In the sensors lab, we had a lot of difficulty soldering the sensors. The first soldering iron we used had a variable temperature and we were not sure how to set the temperature correctly. After several attempts and either vaporizing the solder too quickly or not getting the solder to melt at all, we switched to a different solder, but we still didn't have any luck. Our final solution was to use a soldering iron that did not have variable temperature.

The sensor lab also presented challenges with getting good data from the sensors. We were able to improve the quality significantly by taking the average of the data values within a 200ms time window. This is demonstrated in figure 1. The data shown is 10 seconds of ambient light data captured at ~100 Hz.

C. Fellow Team Members

Zhiwei has been an MVP since the beginning of the project. He is always on time, pays attention to detail, and is always aware of deadlines and what tasks need to be done. For the design proposal, Zhiwei generated most of the figures for the robot design and contributed significantly to the mechanical parts of the motion and attachment subsystem design. For the sensor lab, Zhiwei did some soldering, kept track of what was connected to what in our mess of wires, and helped with the coding of each iteration of the arduino code.

Tianyu was an integral part of the sensors lab. He did a lot of the soldering and wrote most of the Arduino code. Tianyu put in additional time outside of group meetings to program the transfer functions for the IR and ultrasonic sensors and make the code readable. He also created the functional and physical design diagrams for the design proposal.

Xuesu, made many miscellaneous contributions to the design review as well as the sensors lab including making revisions to the design review and soldering in the sensors lab.

Xuesu, Tianyu, and Zhiwei collaborated on the mockup design. Since I did not take an active role in the mockup, I'm not sure how the work there was divided.

D. Figures

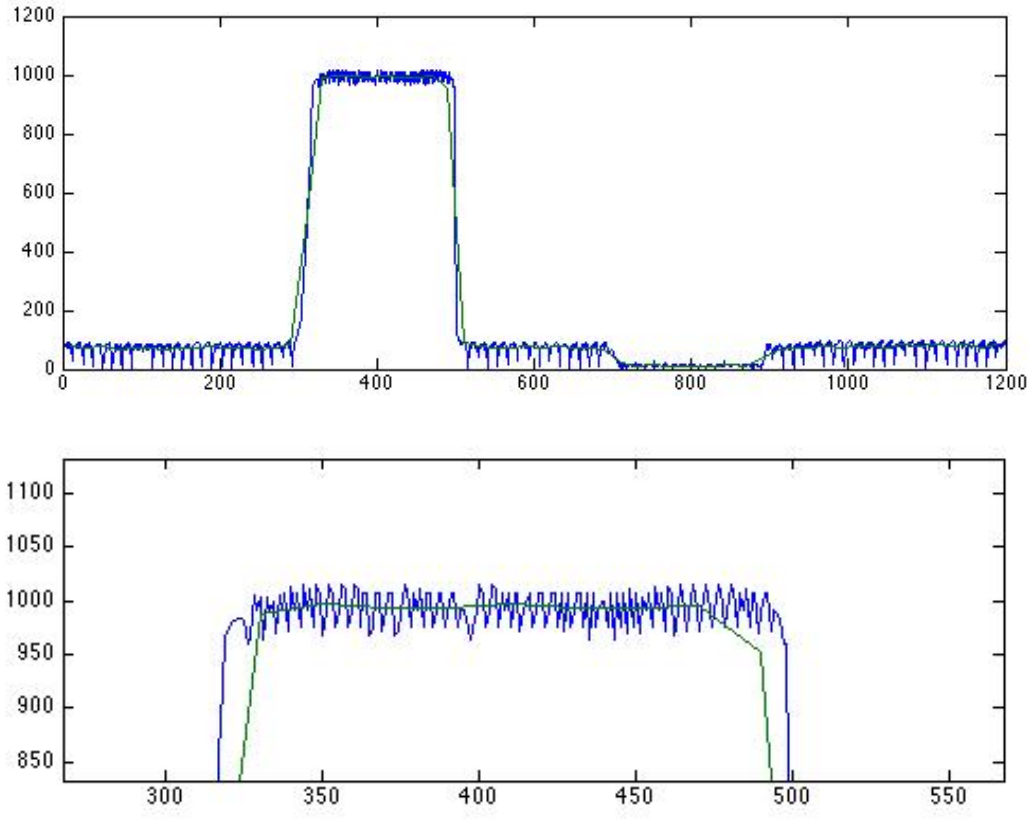


Figure 1. Light sensor data. The green line is the average value taken over a 200ms window.

E. Plans and Goals

Over the next week I plan to spend my time working on the motor control lab as well as experiment with the effectiveness of the IR sensors and Ultrasonic sensors for edge detection on a metal surface. I will also do more research into options for sensing the floor. If I have time I will work on the arduino code.