Eric Newhall

Team G, Bobs the Builders

Teammates:

Guillermo Cidre, Christian Heaney-Secord, Michael O'Connor

IRL01

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Individual Progress

I worked with Michael and Christian on the construction of the frame. Twelve pieces of 80/20 Aluminum have been cut into four 20 inch sections and eight 18 inch sections. Then twelve brackets were cut out of Acrylic using a laser cutter. With these pieces we assembled the frame that was used in our mock up. Also, I created cardboard representations of the part placer, part separator, and vision systems. Additionally, I set up a Git Hub account that the team could use for storing design documentation, code, pictures, and CAD files. The account was set up to allow for it to serve as a website as well. Each folder has a html page that is linked to a main portfolio. I migrated all of the data from the initial design proposal and added some pictures I had taken of the mock up. Then all of the files were moved to my Andrew server space so the files could be accessed easily without the need of going through Git Hub.

For the sensor lab I worked on Sharp infrared sensor as well as helping Guillermo with some of the software and helping Christian and Michael with the circuit design of their sensor systems. The IR sensor is useful as a range finder so I constructed an experiment to test the voltage the sensor outputs verse the distance it is to an object. I measured the voltage while changing the distance of the object to construct a graph of the sensor's transfer function.

Challenges

In the construction of the frame we encountered several issues. To begin with we initially cut six 18 inch and six 20 inch pieces of 80/20 Aluminum when we had intended to cut four 18 inch pieces to be used as verticals and eight 20 inch pieces to be used as horizontal pieces. After noticing this we cut two inches off of two pieces and were able to construct a frame the we believe to still be large enough for our system. At the same time we cut the rails for the tray system two inches too short. This could be fixed by changing the frame to be made out of only 18 inch pieces but since the cost of the rails was low we decided to simply purchase more material. It may be concerning that so many mistakes were made in cutting the pieces. However, I believe the problem was that the parts were being cut with haste at 7:30am so it will not be an issue in the future.

The task we believe to be the most challenging to complete it the part separator. We have prototyped four different shapes that the parts can fall through. This week we will be 3D printing hoppers so that we can test shaking the pieces to see how effectively the system functions. Getting the part to from the separator to the part placer is the most mechanically difficult and requires the most complex software so we are working on that task first.

Teamwork

Michael, Christian, and I worked together on the assembly of the frame. Michael had ordered the parts and had made the CAD design. Also, Michael had made the design for the laser cut Acrylic that we used as brackets. Christian helped operate the saws and laser cutter for manufacturing the pieces. Everyone worked together on the mock up but each person was responsible for different components (see figure 2). Michael worked on the flux and wire dispenser mock up. Guillermo and Christian worked on the mock up for the rails systems. For the sensors Lab Michael and Christian worked on the flex sensor and potentiometer. Guillermo worked on the software including the low pass filter and real time output.

Figures

The IR sensor is designed to be used as a range finder. The sensor functions by transmitting an IR beam and the measuring the amount of IR light the is reflected back. The more light that is reflected back the closer the object must be to the sensor. The sensor has the advantage of built in hardware that converts the magnitude of light reflected into an analog voltage that can be easily read by an Arduino. However, there are several limitations of the sensor. For distances less than five cm the sensor does no preform how we expect (see figure 1). Also, for ranges greater than 60 cm the change is voltage is very minimally making distance readings inaccurate.

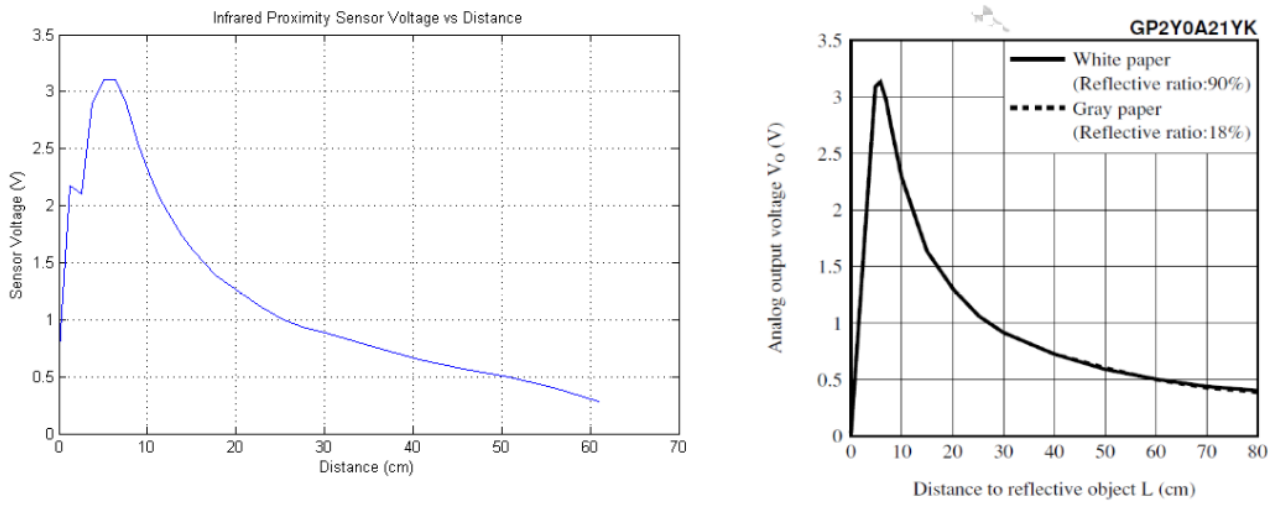

Figure 1. The results of our IR sensor (right). The expected output from the IR datasheet (left).

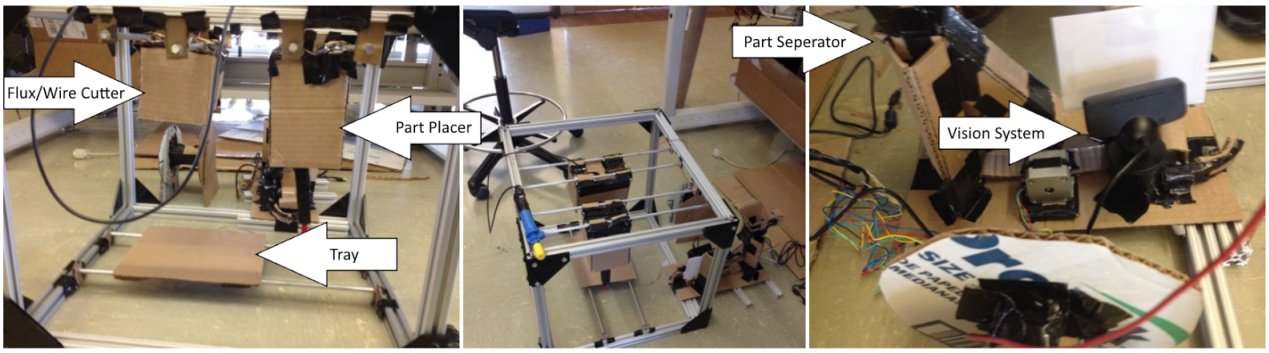

Figure 2. Photos of the mock up taken by Eric Newhall

Plans

For the next week Guillermo and I will be working on creating use cases and sequence diagrams. The overall goal will be broken into smaller tasks (use cases). Each use case has initial and final conditions for each system and the part. Then for each use case the sequence diagram will display the order in which motors and actuators will be fired and it will display the timing on when sensor data and feedback will be received. After completing this task creating state charts for each system will be much easier. Also, I will be working with the stepper motors to determine what motor driver we want to order. Also, Christian and Michael will be 3D printing hopper configurations. Once the parts arrive the group will work together on connecting the rail system to the frame