

**Michael O'Connor**

Team G: Bobs the Builders

Teammates: Christian Heaney-Secord, Eric Newhall,  
Guillermo Cirde

ILR 3 – System Demonstration

February 20, 2015

## **Individual Progress**

### **System Demonstration:**

For this week's system demonstration I worked to design and fabricate the bottom tray that the pieces will ultimately be placed on. Working with Christian, I laser-cut acrylic parts for the tray and machined aluminum angle to use as mounting plates for our stepper motor, idler pulley, and attachment points for our timing belt. I added these components and attached the timing belt with the assistance of my teammates(Figure 1). I also 3D-printed two different hopper designs for the larger of the two parts in order to determine if it is possible to constrain the system such that it will only allow pieces to leave the hopper in particular orientations(Figure 2).

### **Website:**

I have made sure to update sections of the website as I have worked on different parts of the project.

## **Challenges and Issues**

One problem we ran into was that our hopper designs were not as effective at sorting the parts as we had hoped. Ultimately, we would like to have the parts leave the hopper in only four possible orientations as it reduces the amount of manipulation we have to conduct later on, but it seems that it may be a bottle neck point in our system that slows the whole operation down. We are going to work to try to optimize the system and if it still cannot process the parts fast enough we will consider how we can pivot.

## **Cross-Referencing with Teammates**

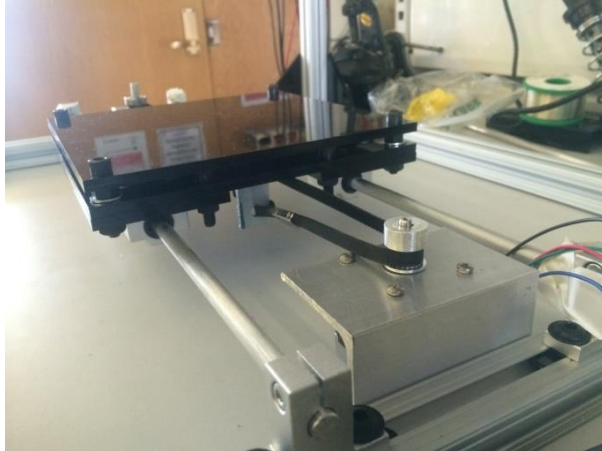
Christian and I worked together to create the components for the tray subsystem. This involved laser-cutting components as well as machining aluminum angles. As a whole team we installed these pieces into our system and attached the motors and timing belt.

Christian also worked to find optimal dimensions to allow the part to fall through the hopper easiest while still only it to fall through in four possible orientations. The hoppers that I 3D –printed were based off of these dimensions.

Eric and Guillermo wired the stepper motor to the stepper motor driver after it was mounted to our system. They then integrated the stepper motor into our GUI and

established a slide-bar within our GUI that allows for positioning the tray, showing its functionality.

## Figures



**Figure 1: Tray positioner sub-assembly attached to frame and actuated via timing belt wrapped around stepper motor**



**Figure 2: 3D-printed hopper designs for larger part, with different wall geometries**

## Plans for Following Week

My plan for next week is to fabricate the majority of the part placer assembly and integrate it into our system. This assembly will slide along a rails system, similar to the tray positioner, but will have a rack and pinion that will function as a vertical linear actuator. At the end of this actuator will be a servo and electromagnet that allows the parts to be picked up, re-orientated, and placed on the tray. Our team also intends to create one linear actuator using a gear-motor and threaded rod which can be used for flux extrusion and can be used for preliminary testing of the part placer or wire cutting assemblies.