Ian Hartwig

Team B: No Name

Teammates: Ian Rosado, Stephanie Chen, Trevor Decker

ILR 01

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Individual Progress

I contributed to the sensor lab, but primarily in a supervisory role. Our mechanical engineers were interested in learning more about interacting with the sensors, so Trevor and I (ECEs) let them take the lead. I added knowledge about using internal pull up resistors, the idea behind a moving average filter implementation, and cleaned up the wiring of our proto board before the Wednesday demo. When the board was originally wired, the conventional colors for ground and Vcc were reversed.

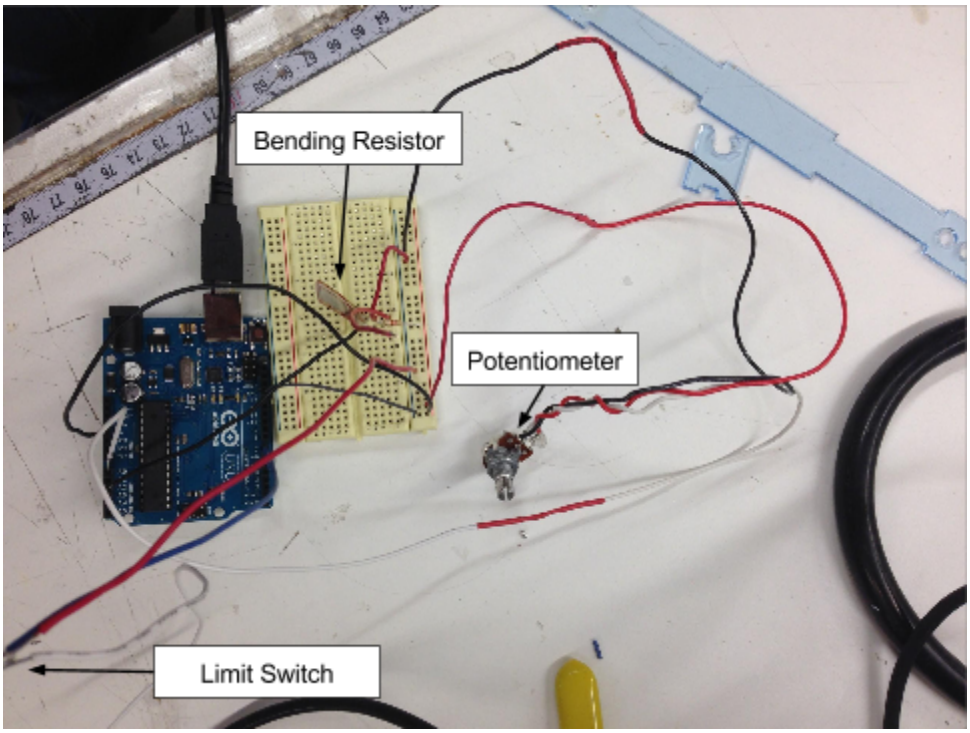

Figure 1: Sensor lab demo before rewiring.

We also had to mock up our system for our Monday system demo. We decided to attempt to build a couple of the ideas we had discussed for the major degrees of freedom in our design. Trevor and I had competing ideas for the telescoping arm and slide. We both made CAD (Solidworks) models for our respective ideas, but only produced mine. To save time, our group decided to target laser cuttable and 3d printable designs for the mock up.

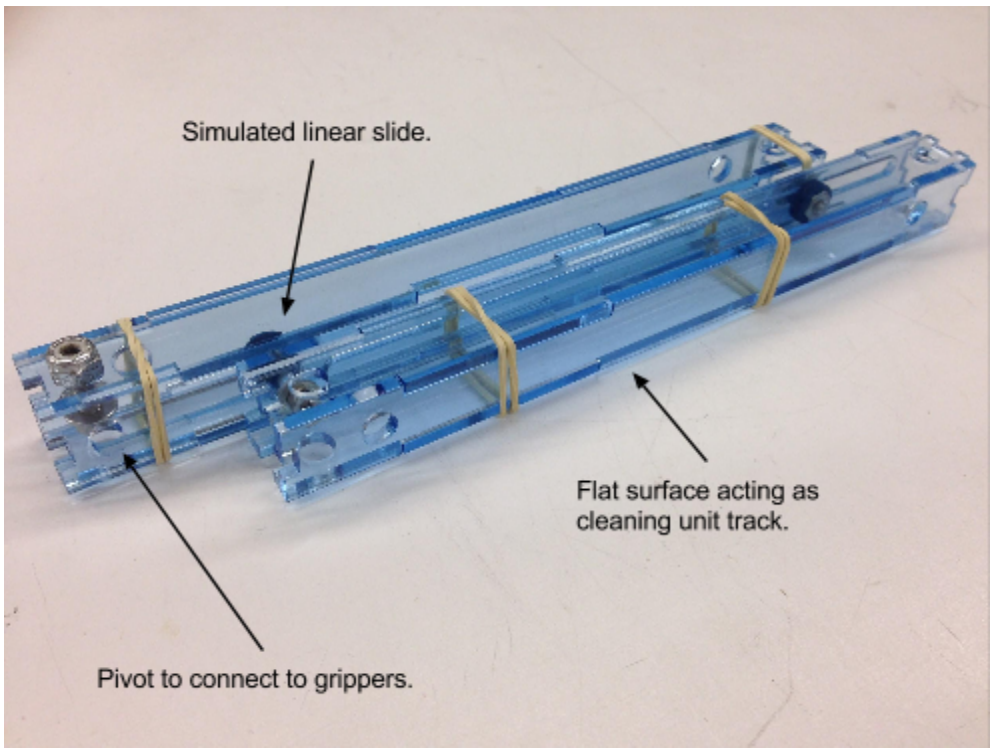

Figure 2: Telescoping arm in our miniature system model.

The arm model helped reinforce our idea of what clearances will be important in the final design, and helped bring our group on the same page. It also may impact the orientation of our arm towards the window. My model accidentally turned the arm 90º from the planned orientation. Originally, the arm slides were to be stacked along the plane perpendicular to the window. However, we might be able to simplify the gripper design by stacking the arm segments in the plane of the window. Adding Ian Rosado's cleaning mechanism model confirms that this orientation will work.

I have also started investigating the movement (slides/motors) mechanisms that we will need to order for our design. See the two week goals for more details.

Challenges

As we have discussed with the course staff during our system demo, the device that we have proposed faces a few challenges. The first, and more immediate to me, is that we need to build a system that can deliver enough torque to spin the robot 180º starting from the fully-extended, highest torque position. Within the next 2 weeks, I need to specify what motor and speed controller we can use to do this. The going plan is a brushed DC motor[1] with a high reduction gearbox[2] (likely planitary, 1:250 or higher) with a high current DC motor controller[3].

[1] http://banebots.com/p/M7-RS775-18
[2] http://banebots.com/pc/P60K-S7/P60K-4444-0007
[3] http://www.vexrobotics.com/217-9090.html

Another major challenge is designing a mechanism to prevent our grippers from slowly pulling away from the window. We listed this under the risks in our design proposal. However, we are not planning on designing any motions to fix this at the moment. We plan on measuring the impact of this risk after our first round of prototypes.

Teamwork

As mentioned above, Ian Rosado and Stephanie Chen worked on most of the sensors lab. They also added the gripper and cleaning unit models and construction to the system model. We divided the mockup components by what area each person was interested in. Trevor and I took the telescoping arm, Stephanie took the grippers, and Ian worked on the cleaning unit.

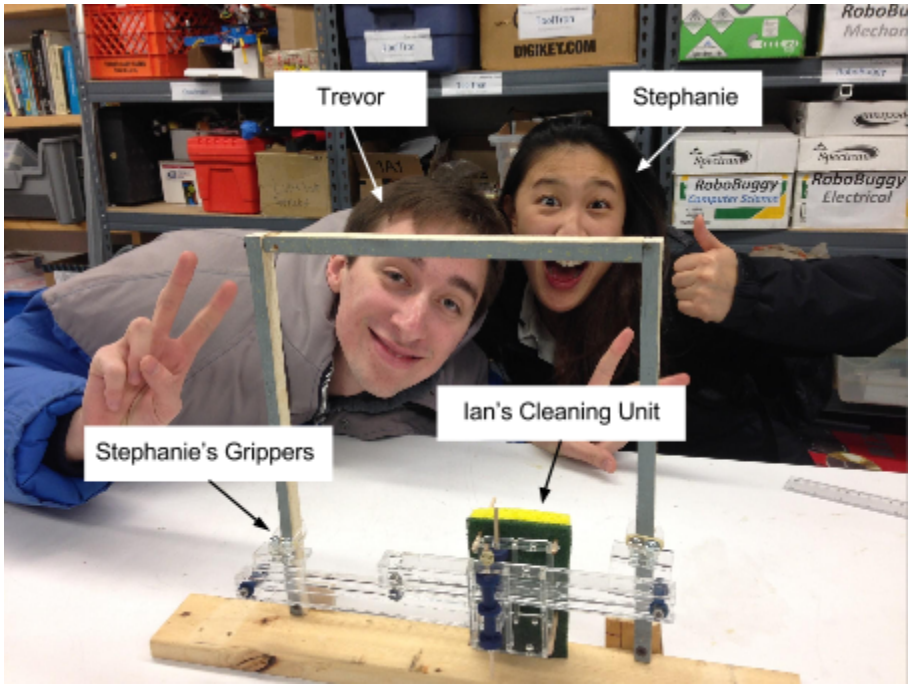

Figure : Teamwork in our system mockup.

Plans

In the next week, we need to prepare our motor lab. We have a strong sensor lab to build off of thanks to Ian and Stephanie. Although our GUI is currently printing the sensor values out in a serial console, Stephanie and Trevor have already started working on reading this data in to MATLAB so that it can be plotted in real time. We also need to assemble the DC motor driver kit.

Our team has also set two week goals to specify and design the first revision of each sub-system. In particular, I need to specify the power system (batteries, motors, controllers) and have the parts ready to order. As discussed in the challenges, this includes a motor with high enough torque drive to spin the arm when fully extended and have enough battery capacity to drive this motor while we clean one whole window.