Trevor Decker

Team B
Teammates: Stephanie Chen, Ian Rosado, Ian Hartwig
ILR number 1
submitted February 5, 2015

Individual Progress

I began to figure out how to program the microcontroller we would like to use for our final robot. I was able to compile code for the stm32f4291 that we plan to use. For the prototype I lasercut parts that my partners designed. Additionally I started to sketch out the control system we will use on the final robot, including selecting and ordering a camera for us to use.

Sensor Lab:
The majority of the sensor lasb was done by the mechanical engineers on our team (Steph, and Ian R). Ian H and I both have experience with sensors and advised as necessary. Any way I wired part of the sensor board and helped with getting live serial reading from the sensors to work with matlab. We did not finish live reading of the sensors in time for the lab, but we got pretty close to finishing and I think that the code we wrote will be useful for debugging later in the project.

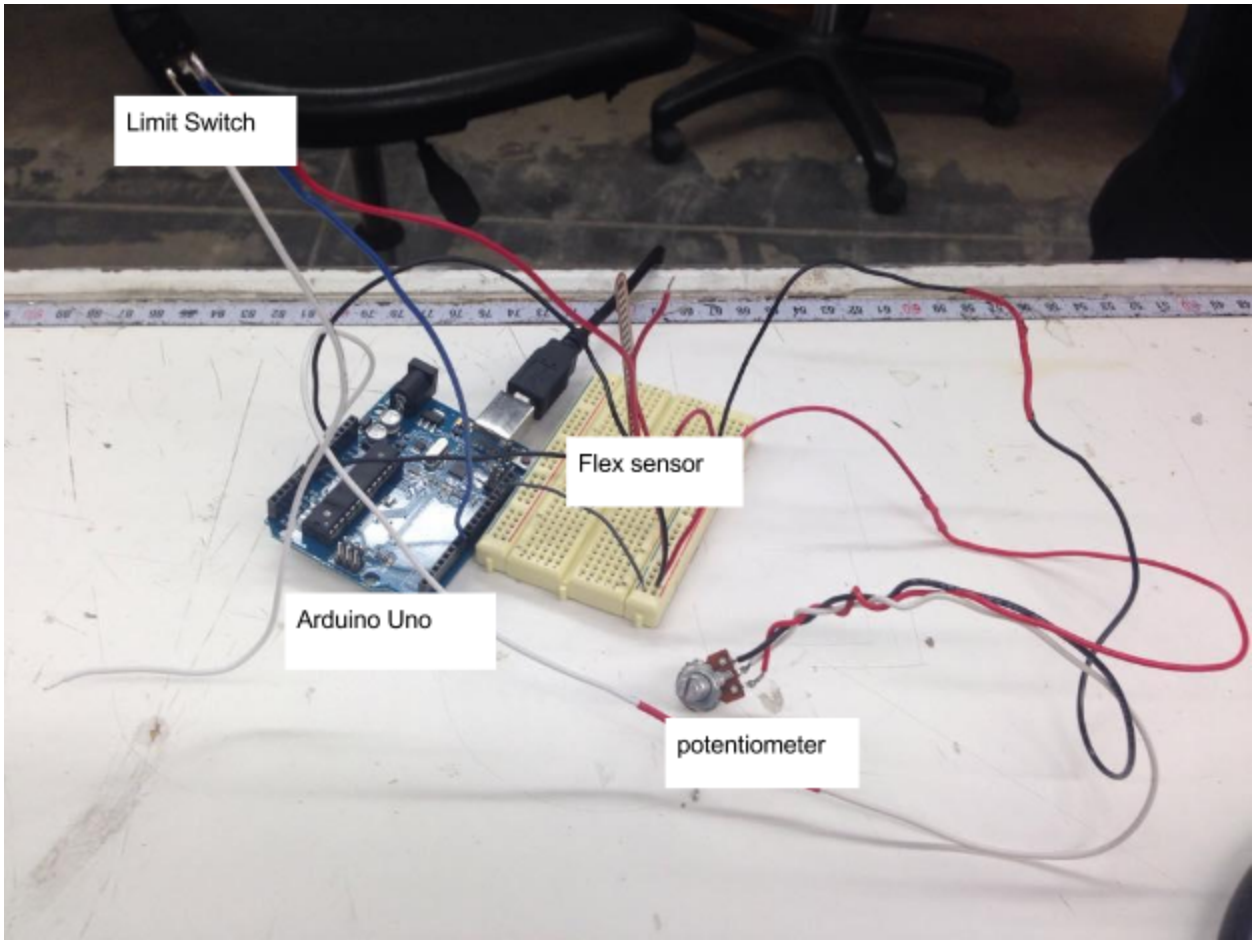


Figure 1

As you can see in Figure 1 for the sensor lab we chose to a potentiometer, limit switch and a flex sensor. The potentiometer was chosen since we plan to use potentiometers to measure

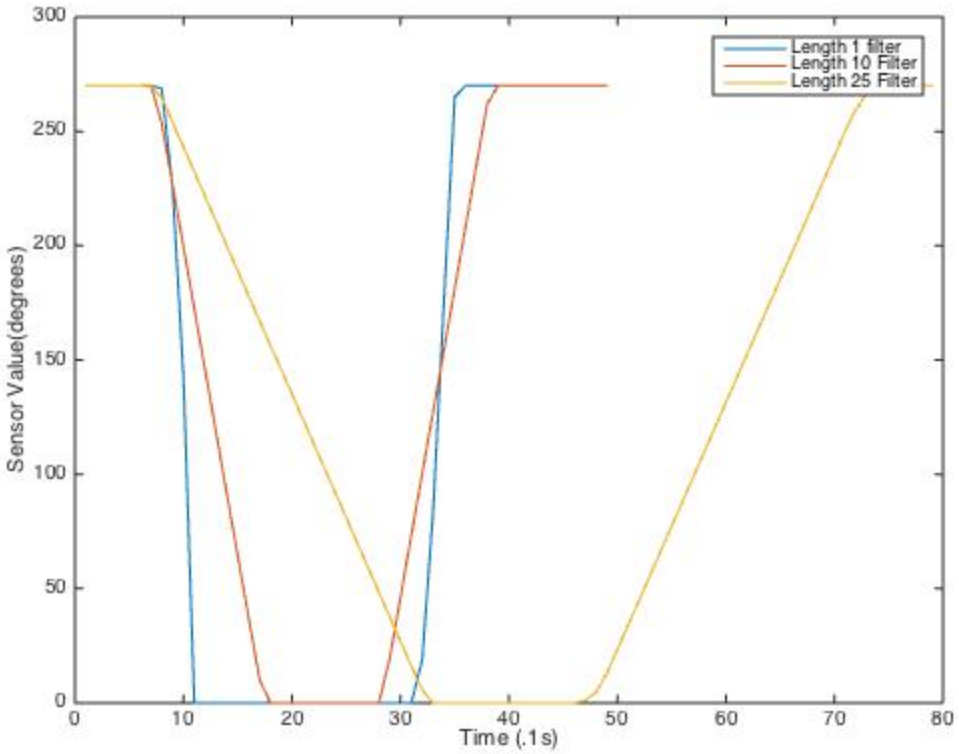
the angle between our grippers and the arm of our robot. The limit switch was chosen since we plan to use limit switches for homing our final robots joints.

The arduino was running the following code:

```
/*------- Hardware configuration -------*/
const int  PotIn = A0;
//const int  BendBefore = A1;
const int  BendAfter = A2;
const int  LimitIn = 7;
const byte debugPin = 13;
double PotVal=0;
double BendVal=0;
double LimitVal=0;

/*-----------------------------------------*/
/* Initializization code (run once via call from Arduino framework) */
void setup() {
  // establish direction of pins we are using to drive LEDs
  pinMode(PotIn, INPUT);
  //pinMode(BendBefore, OUTPUT);
  pinMode(BendAfter, INPUT);
  pinMode(LimitIn, INPUT_PULLUP);
  pinMode(debugPin, OUTPUT);

  Serial.begin(9600);
}

/* Main routine (called repeated by from the Arduino framework) */
void loop() {

    PotVal=analogRead(PotIn);
    BendVal=analogRead(BendAfter);
    LimitVal=digitalRead(LimitIn);

    Serial.print(PotVal);
    Serial.print("  ");
    Serial.print(BendVal);
    Serial.print("  ");
    Serial.print(LimitVal);

    Serial.println();
```

} // end loop()

We copied the output from a serial viewer into matlab so that we could plot it. We then did a moving average filter of the output to reduce the effect of noise in our measurements.
The filtered results from different length filters is shown in figure 2.



fitler 2

Challenges

1. Learning how to program the microcontroller we chose to use.
2. Making sure our robot can handle the extreme stress that the robot will be under when it is being helped up by only one gripper.
3. Designing a control system when the robot is not completely built.
4. We are planning to use 7 total actuators, so the system is very complex and we need to make sure that we can quickly and precisely control the entire robot.

Teamwork
Steph: Steph has been focusing on the mechanical design of the grippers for our robot. She has also been working with **Ian R** to develop a cad model of our robot.

Ian R: Ian has been focusing on the mechanical design of the cleaning unit. He has also been working with **Steph** to develop a cad model of our robot. Ian and Steph did the majority of the sensors lab. Ian H and I being ECE chose to let the mech E who have had less experience with sensors take the lead on the lab so that they could learn. Ian R also designed the prototype cleaning unit for our mock up.

Ian H: Ian H did a lot of work this week on the mechanical design of the prototype. He caded up the main structure of the robot's arm and built us a test mini window to work show how our robot would work. He also began to select motors for the final robot.

Plans

Two weeks: have system completely speced out. At this point I would like for us to have a mini design review where we show our design to several experts around CMU. (TODO talk about why)