

Team Crumbletech Infrared Sensor Experimental setup

1) Circuit set up

For hooking the sensors up to the Arduino, the steps are as follows:

- a) You will notice that there are two plugs coming out of the holes on either side of the box. Connect a sensor plug into each one (only fit one way, screw-tight seals are water-tight but probably not necessary for preliminary data collection). The holes are numbered 1 and 2 to keep track of which sensor is where.
- b) Plug the USB cable into an available port on a computer with LabView Software.
- c) Open the Application.exe file. The file will open and immediately run, click the "Stop" control on the panel and wait for the program to stop running.
- d) Once the program has stopped running, use the drop-down menu to select the correct COM port that the unit is connected to. If you are unsure as to which COMport is the correct one, you can find it in the device manager on your computer under "Arduino Mega".
- e) Once you click run, the sensors should begin collecting data at the rate you specify.

2) Experimental Setup

a) Placement of the sensors in relation to the prototype crumbler head

For the sensors to get an accurate reading, they must be placed 1-2 inches away from the crumbler head surface in the middle of the length of the drums pointed perpendicular to the drums.

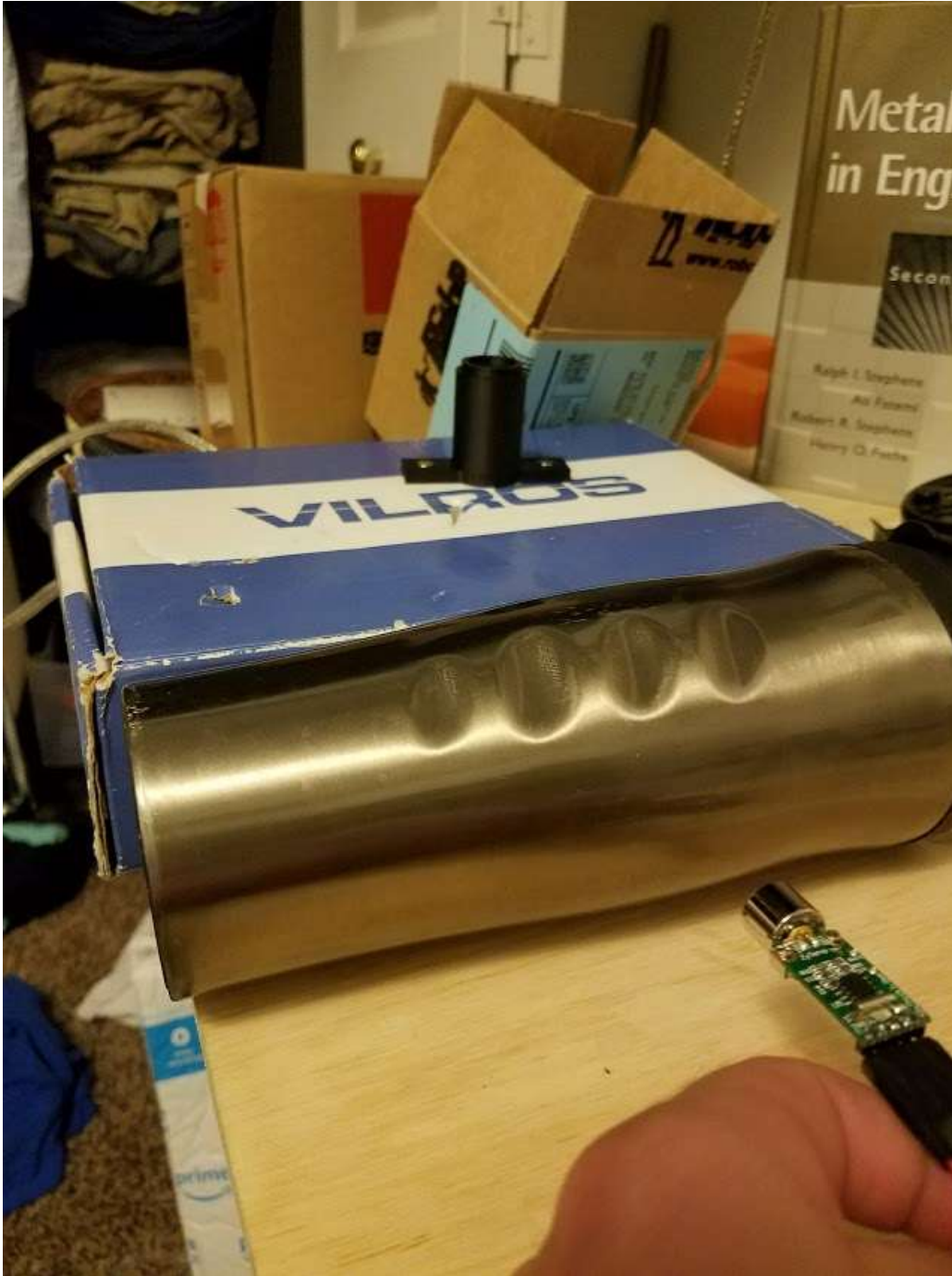


Figure 1 Relative positioning of the temperature sensors along the crumbler head

a) Holding the sensors in place

For holding the sensors, we have also shipped you two housings (one prototype one, white, and our idea for the final design, black w/ magnets). The sensors will fit into either one, but only with the **Wires on the sensor and sensor housing square-side down**. The sensors themselves will need to be held in to the sensor housing as there are no set-screws in these early designs yet (i.e. tape etc, preferably removable) but they should remain snug without too much movement.

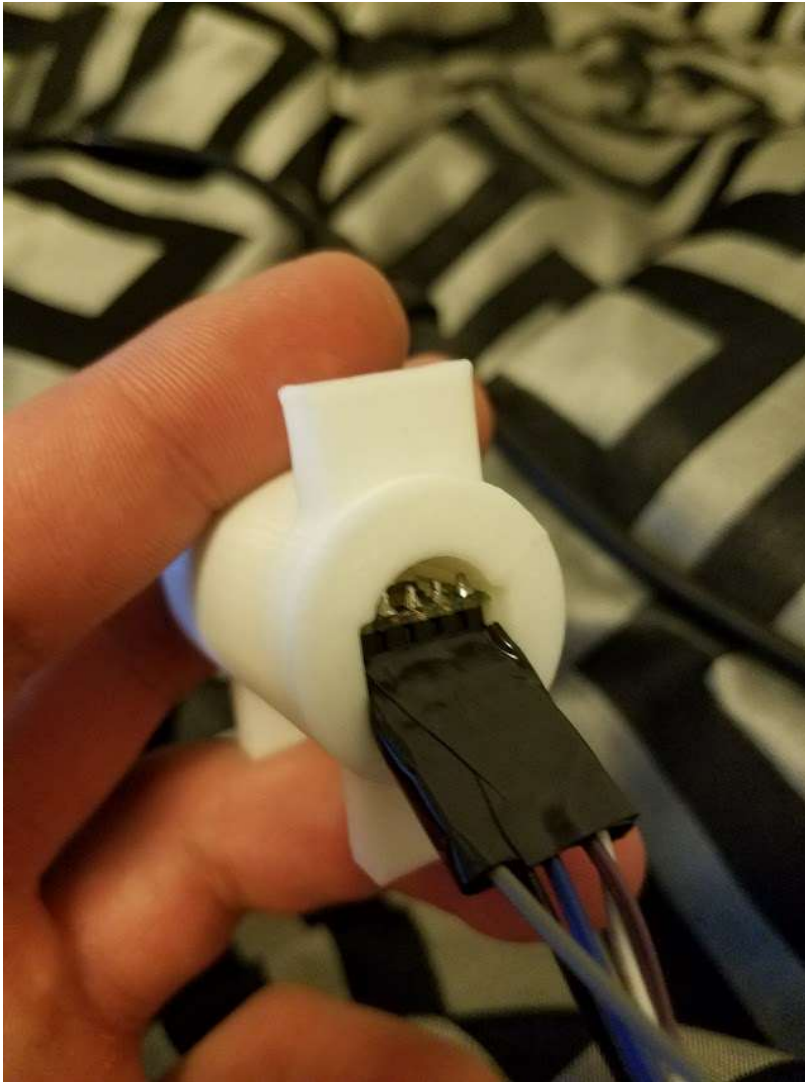


Figure 2 Correct Sensor Insertion

b) Using the Labview code

The Labview code we sent you is fairly straightforward to run. Open the application (make sure you have the VISA add-on for Labview just in case), click STOP on the dashboard (ignore the error) and once the Arduino is connected to the computer via the cable provided, select the correct COM-PORT that is specific to your computer for the Arduino connection. Make sure and use the STOP button on the Application dashboard to stop running the program before you switch the COM-PORT.

c) Collecting Data

For this initial run, we would just like to see if our sensors can accurately measure a change in temperature comparable to that of the Thermal Imaging Camera used for temperature measurements. Once you begin collecting data and graphing in the Labview Application, the data will remain in the graphs for the duration of the experiment.

To record data, at the end of each run, stop the application, right click on each graph, and go to export>export data to clipboard. If you could just past the data into an excel file with labels that would be ideal.

d) Experimental Parameters

Experiment one: does it work?!

For these experiments, it would be best if you could run these at different times:

- while you know the crumbler head is warming up
- at the hottest point that you will be running the crumbler head

Essentially, at this point we are trying to see if our sensor both accurately monitors temperature change rate as well as if it can keep up at the hotter temperatures.

At each of these phases, you can collect data for as long as you see fit but our objective was for roughly 20 min during each part (warming up, hottest temp).

Experiment two: Discrepancies with thermal imaging camera over time

For this experiment, we would like you to take the average readings of a thermal imaging camera over 1 minute intervals (15 seconds between readings). If you can use the thermal imaging camera to check the readings of the crumbler head every 15 minutes or so and record the readings from the camera we can then double check our readings with that of the thermal camera.

Please feel free to call at any time if there are any questions about the setup!