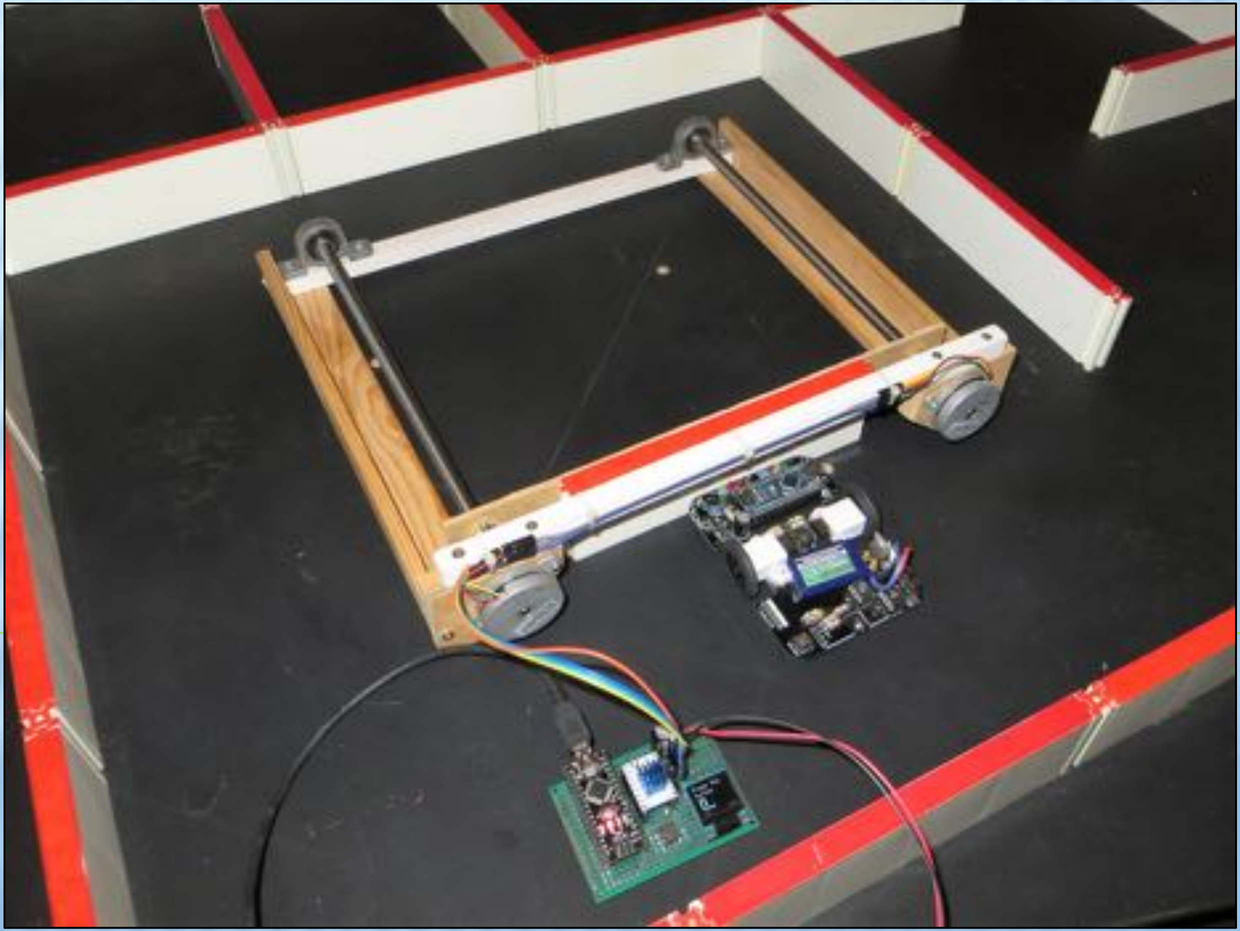
The Calibration Thingy

(a diagnostic tool)

By Derek Hall

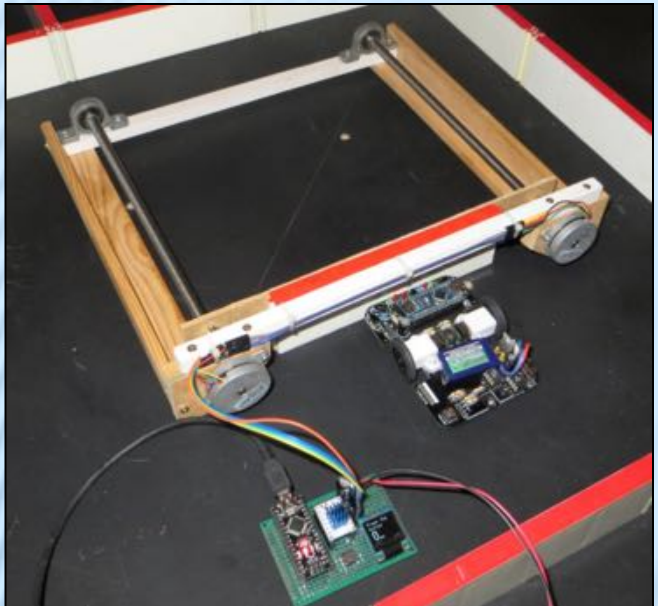
1. The Purpose of the Calibration Thingy.
2. How it was Constructed.
3. Using the Device.
4. Analysing and Using the Results.

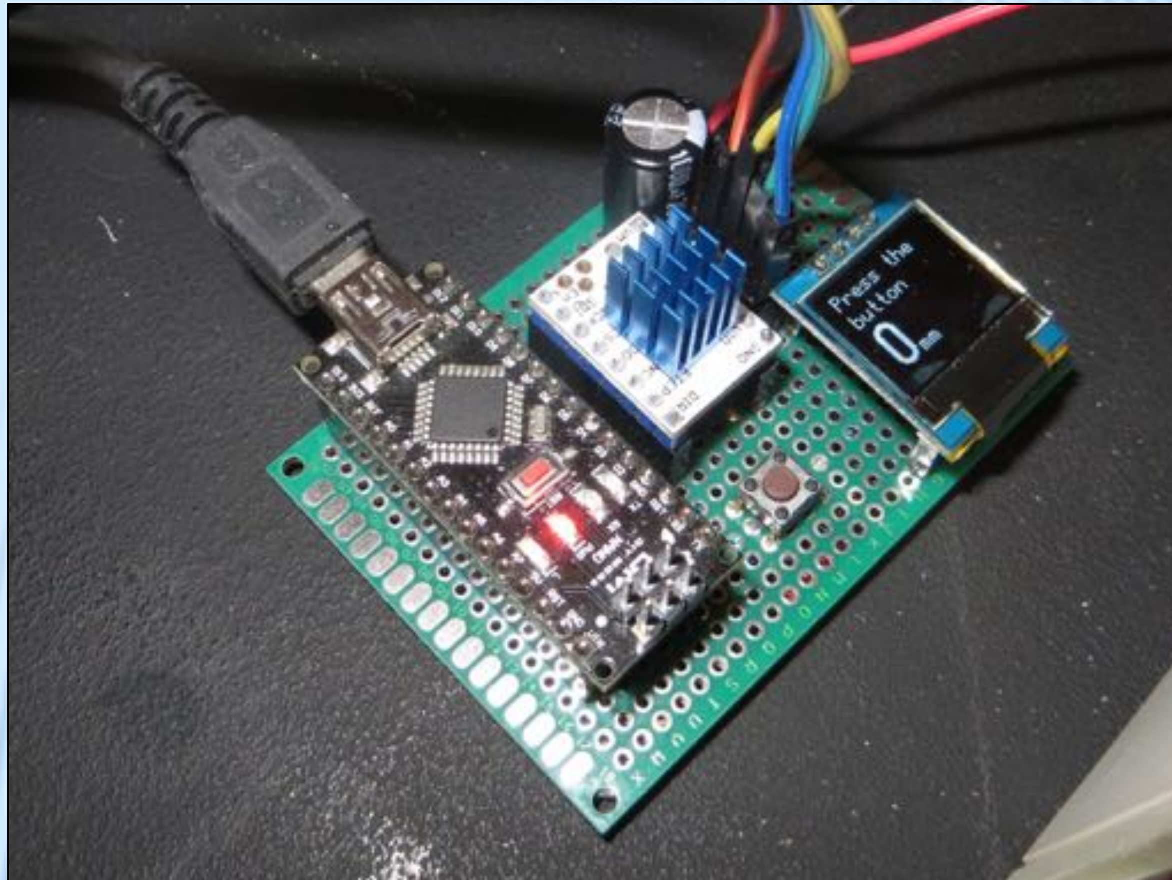


1. The Purpose of the Calibration Thingy

- Understanding in detail what the sensors are seeing.
- Record readings precisely with multiple wall positioning.
- A portable unit that can be placed in any maze.
- Enable precise calibration of mouse wall sensors.
- Compare detailed and graphed sensors readings for different lighting, wall & base types.

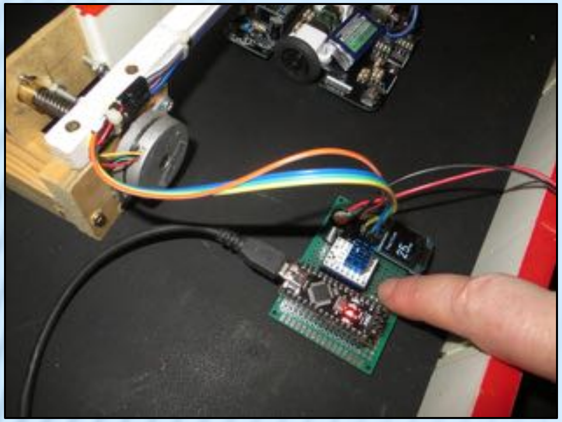
2. How it was Constructed

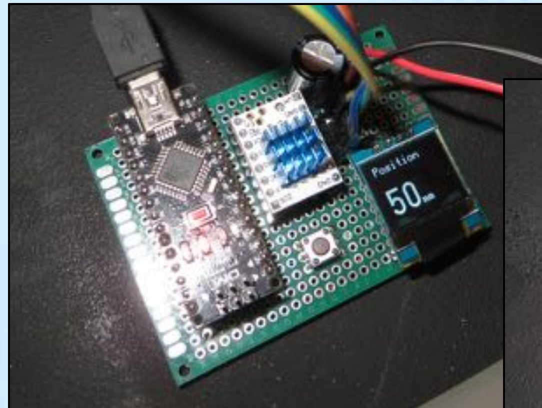


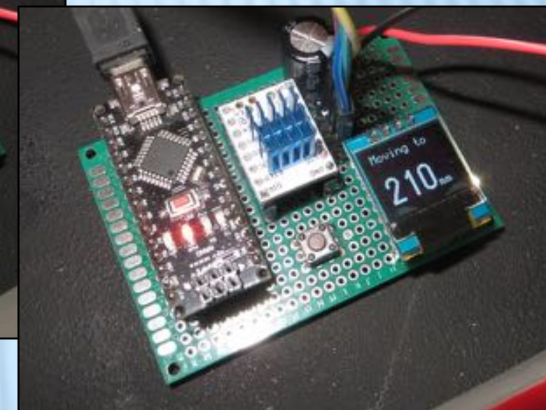


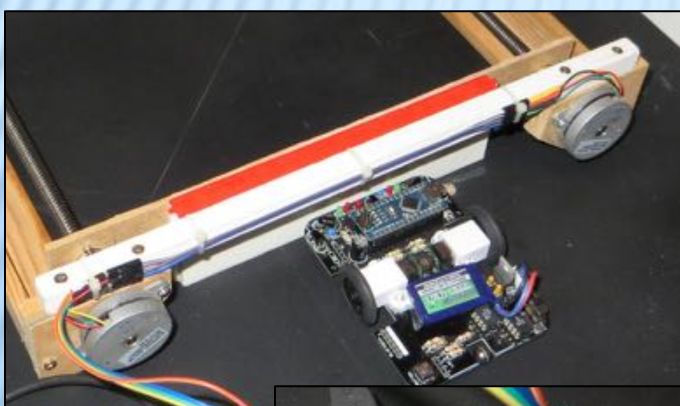
Arduino Nano
.9° Stepper motors x 2
Lead screw gears x 2
OLED Display
TRINAMIC TMC2130 Stepper driver

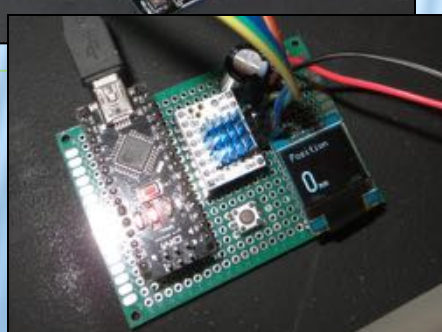
3. Using the Device

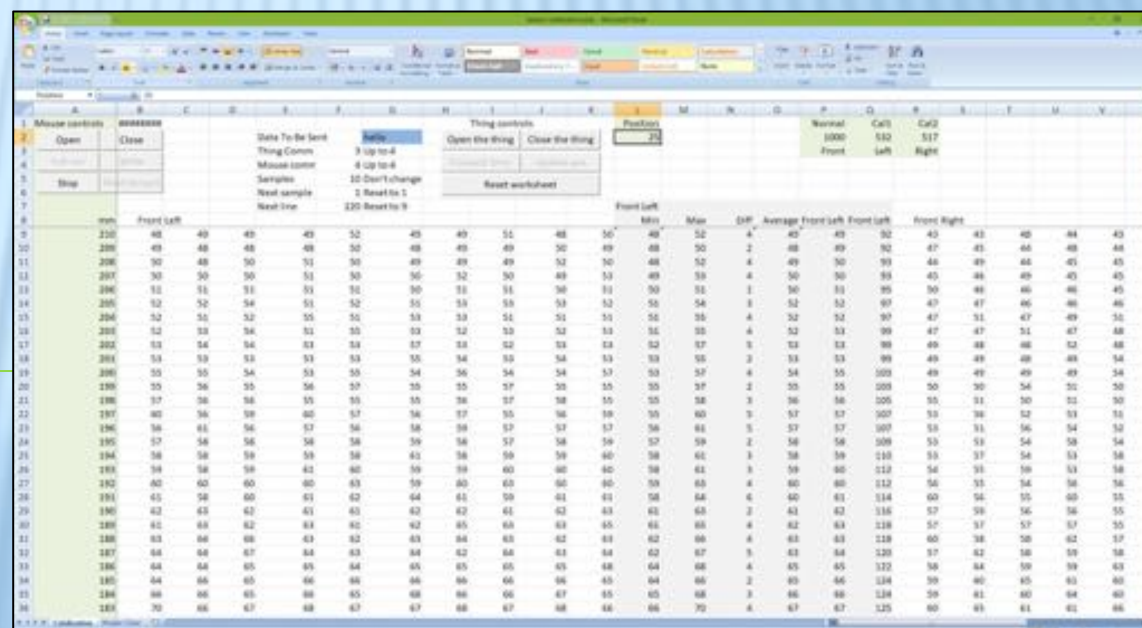




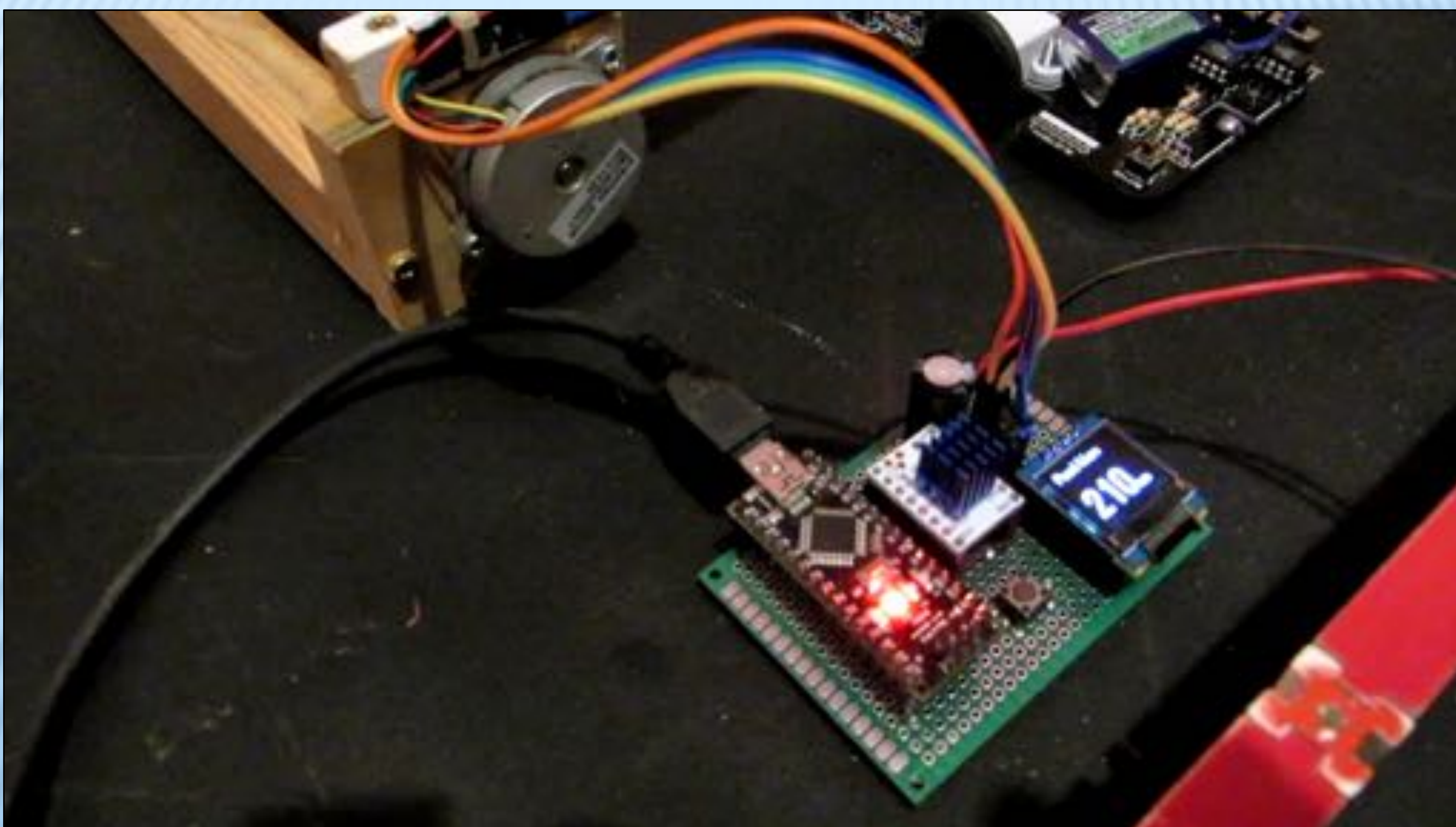




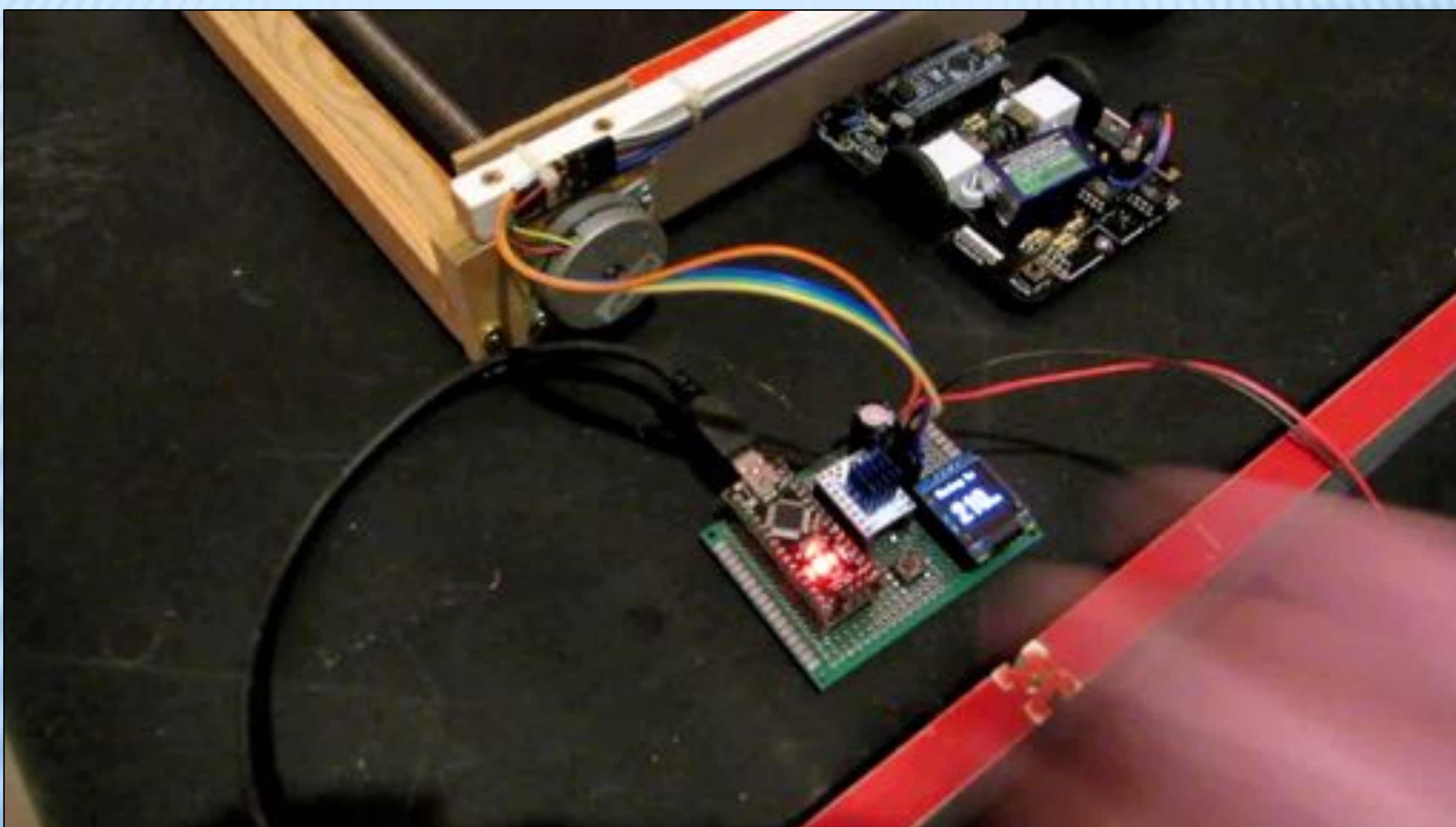




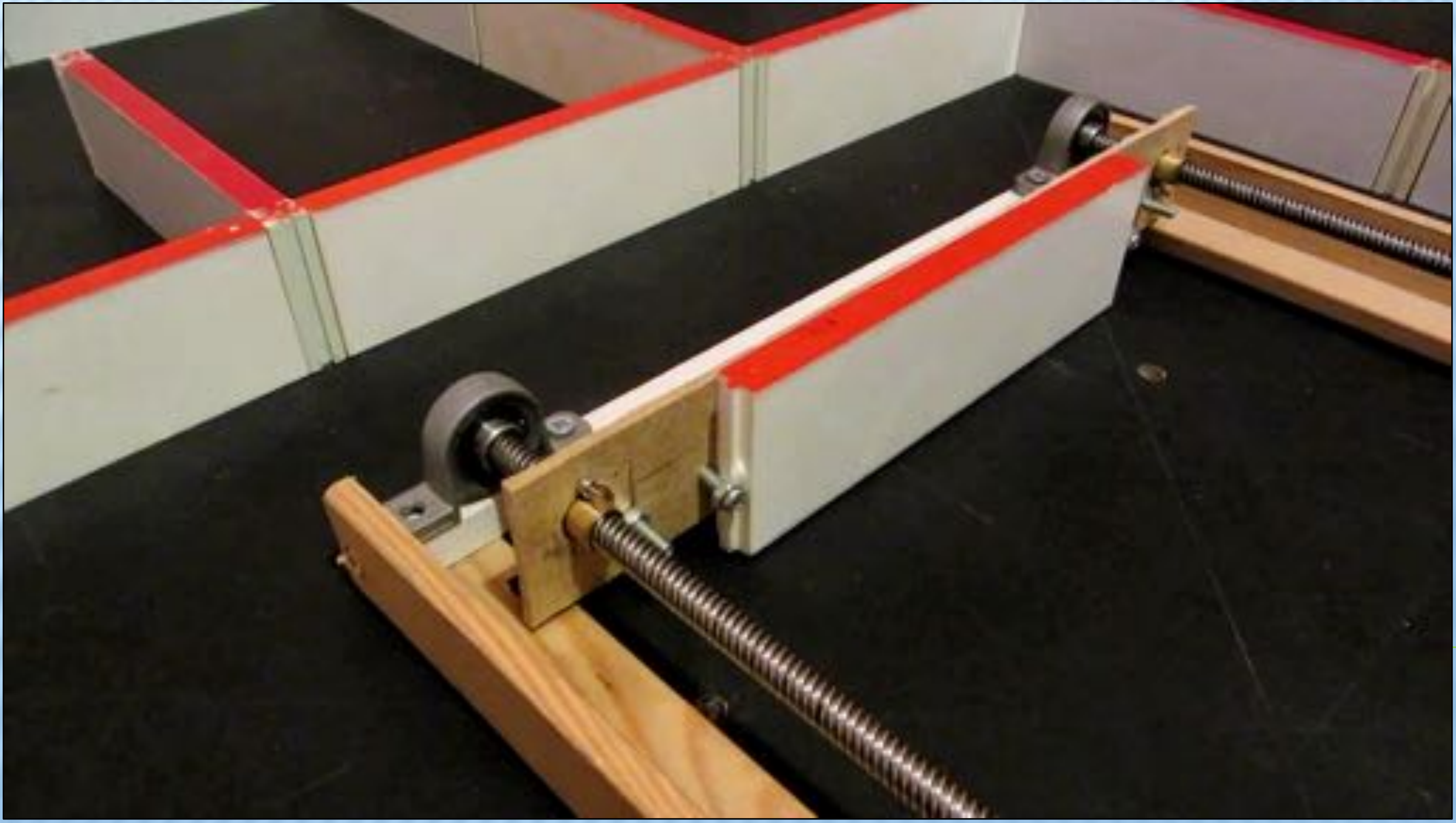
Setting the zero position for calibrating the front sensor



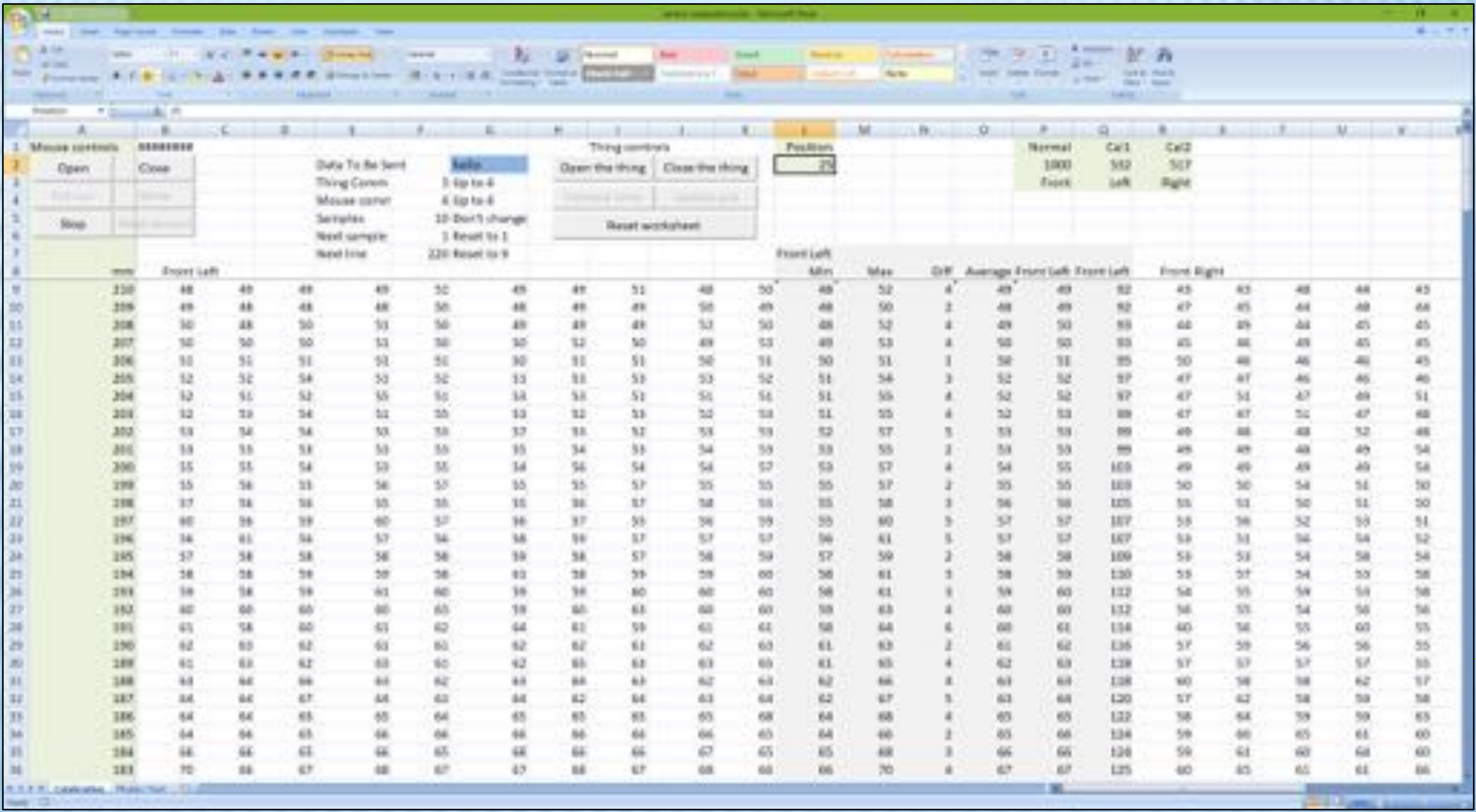
Setting the distance of the wall to 210mm

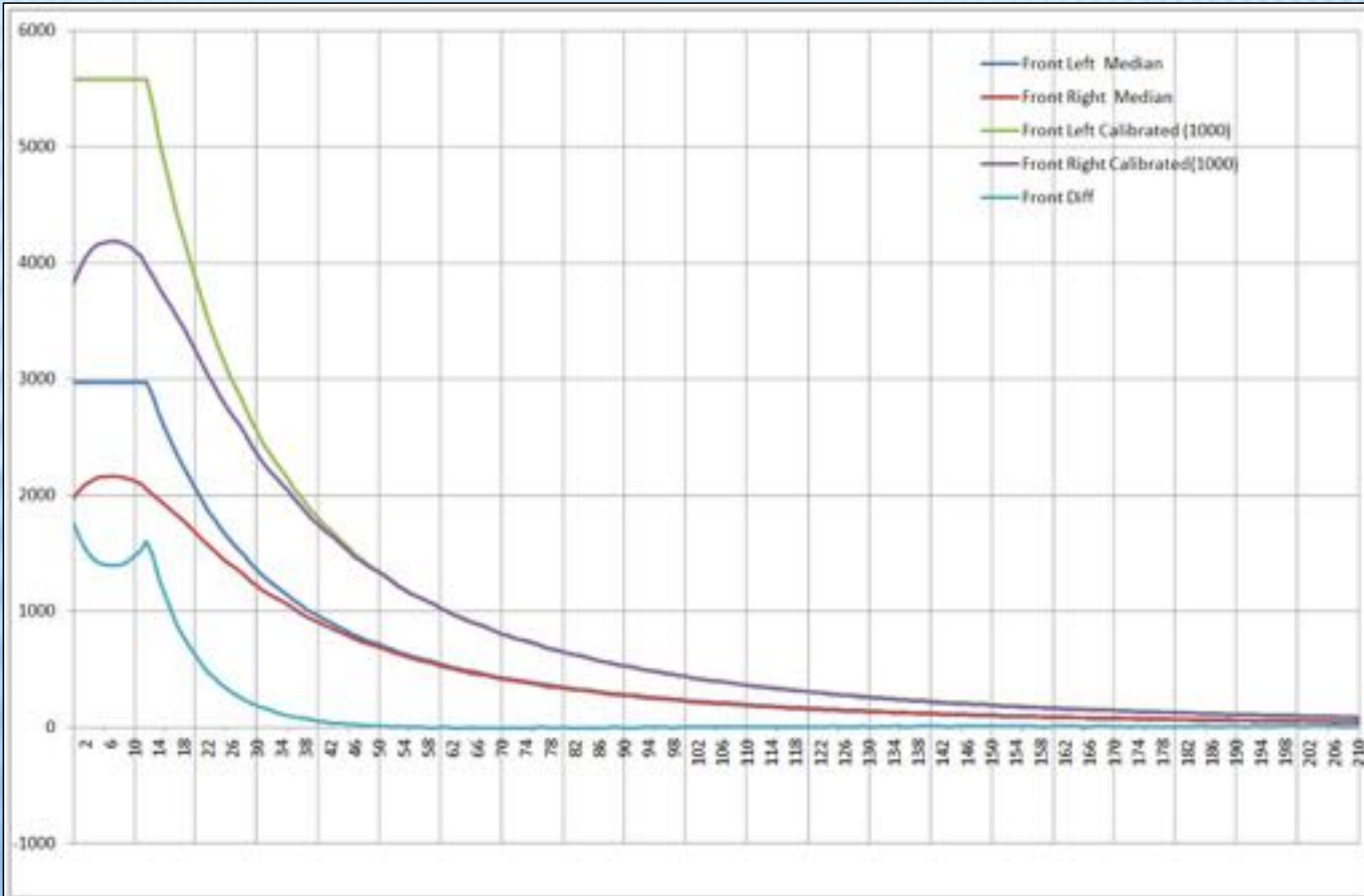


Moving the wall 1mm at a time

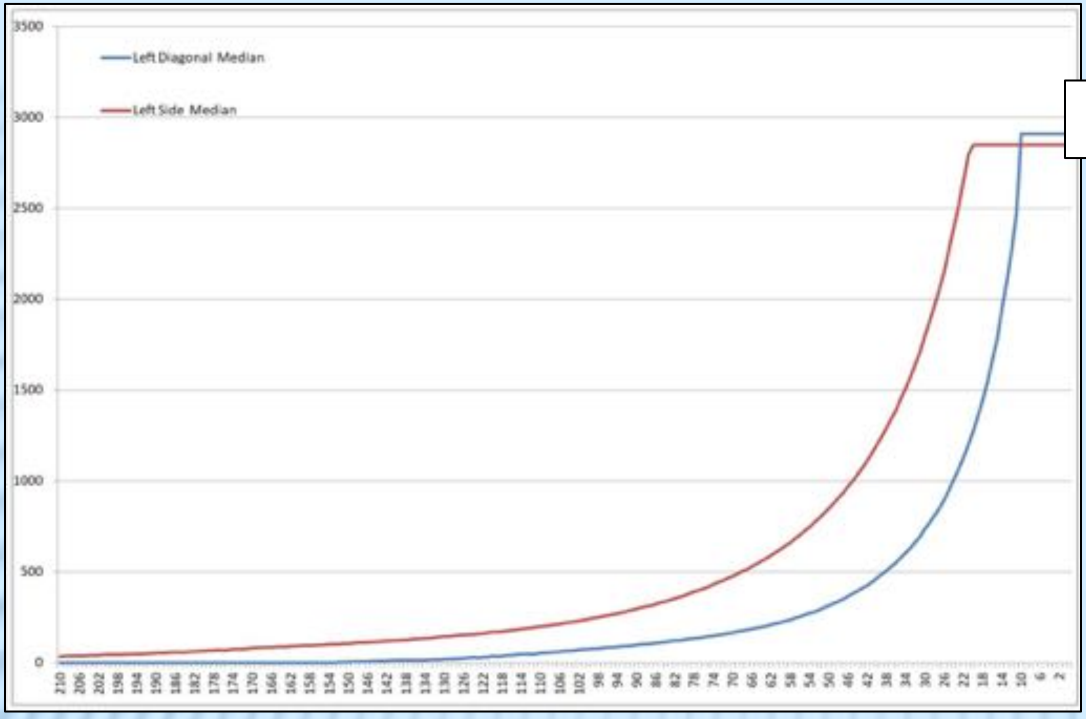


PC interface control sheet

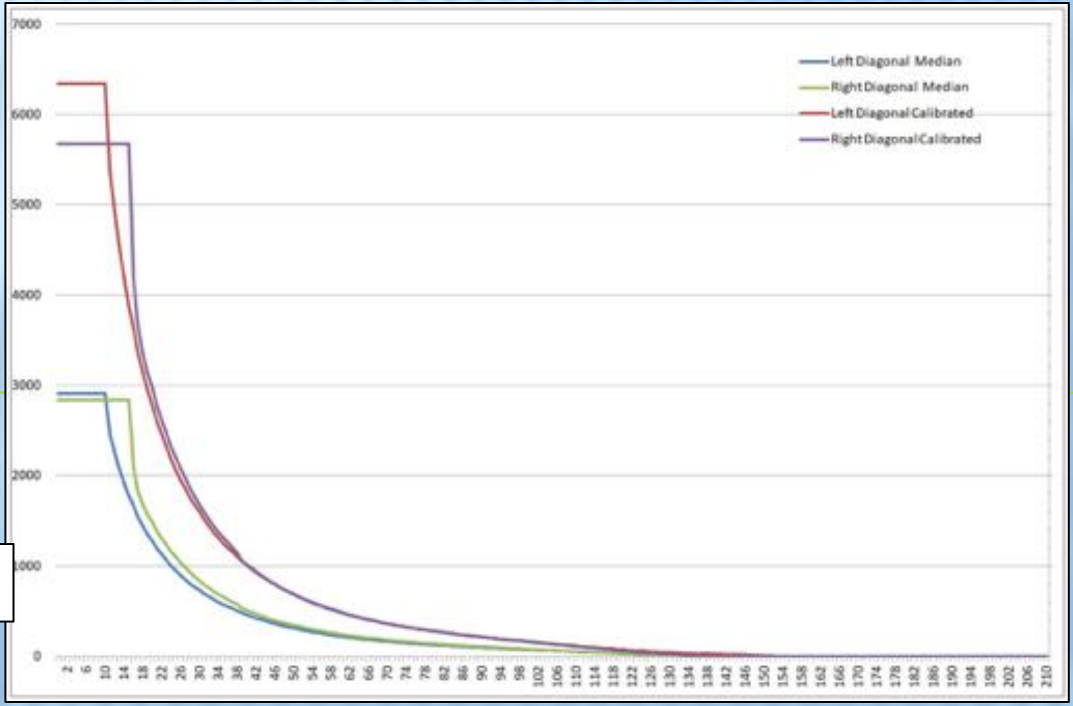




Front Left Median
Front Right Median
Front Left Calibrated (1000)
Front Right Calibrated(1000)
Front Diff
6000
5000
4000
3000
2000
1000
0
-1000

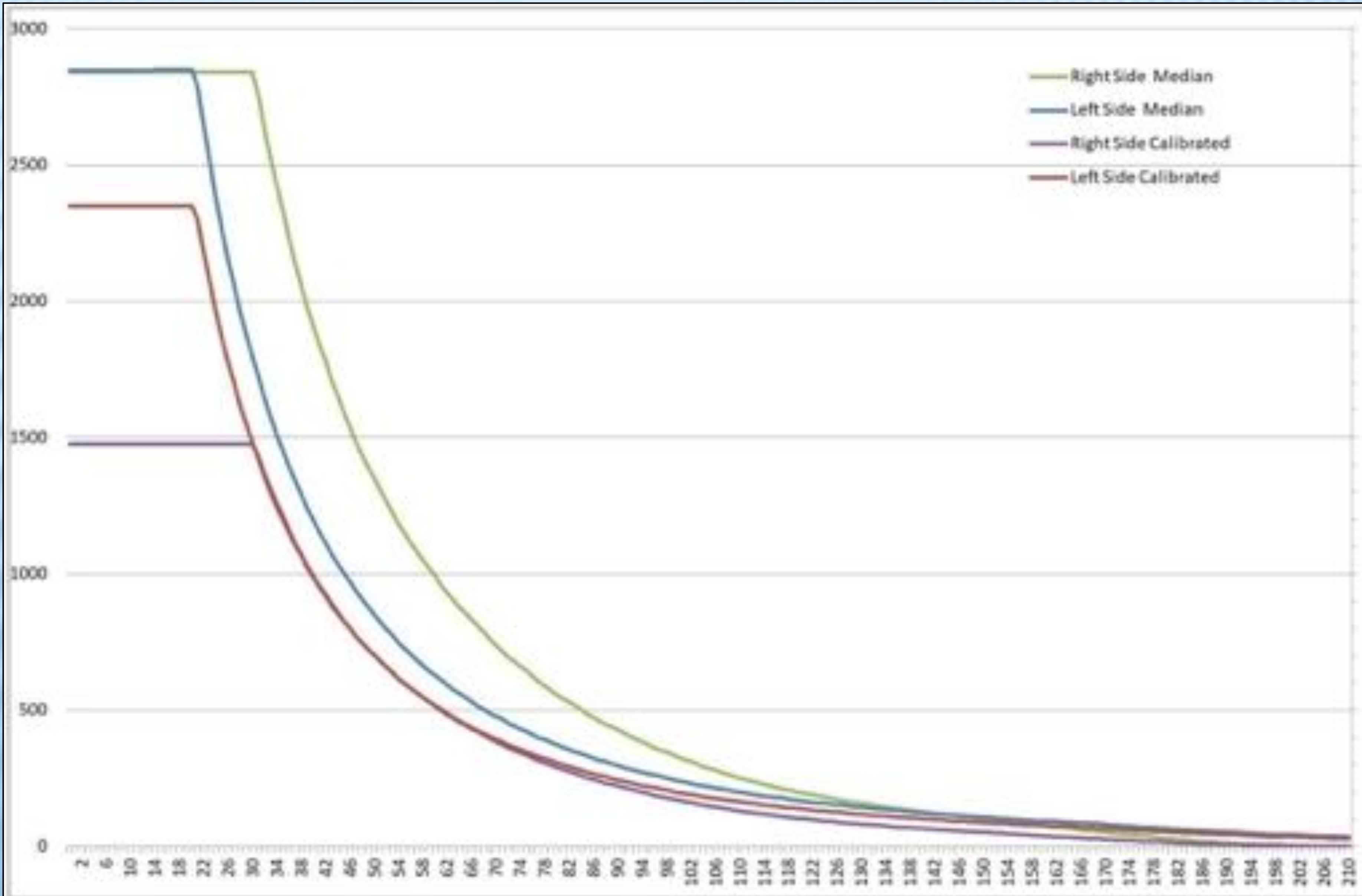


Here we can see....



Here we can see....

Affect of calibration

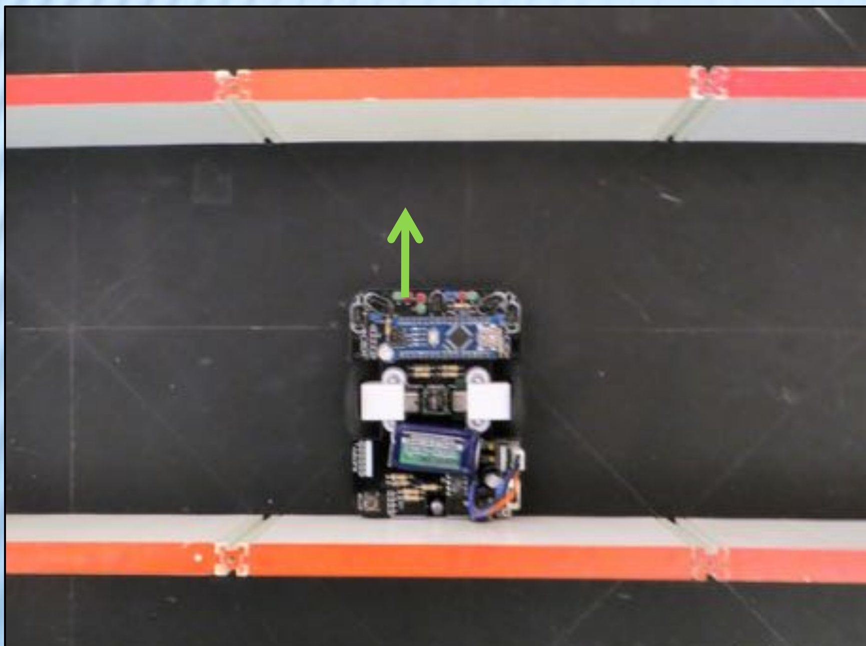


4. Analysing and Using the Results

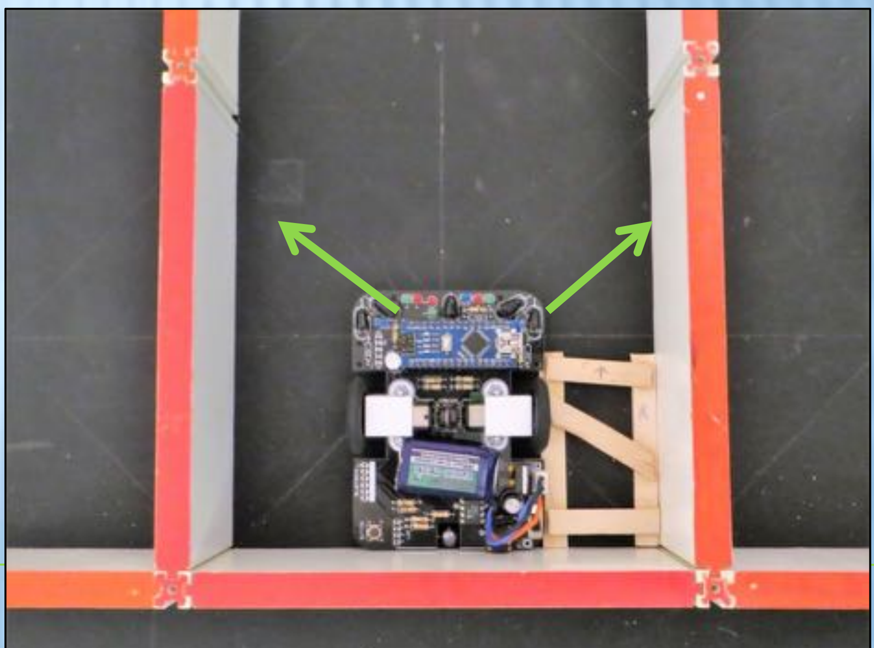
Removing sensor sensitivity issues by calibrating the sensors using the following formula:
SENSOR VALUE x NORMAL VALUE ÷ CALIBRATION VALUE

The *sensor value* is the direct reading from the sensors.

The *normal value* is set at whatever you want it to be.



The *calibration value* for the front sensor is recorded from a front wall, with the mouse against the back wall.



The *calibration value* for the side sensors is set with the mouse in the centre of the corridor.

Summary

By using the formula: sensor value x normal value ÷ calibration value, only a calibration value has to be determined in each new maze. Adjusting the scale means the “Calibration Thingy” is not required for each calabration as the recorded curve stays the same for each individual sensor.