

Erick Kinyage, Cole Pochedley, Cameron Swietlik, and Timothy Vrobel

ABSTRACT

Microcontrollers, despite their name, play a huge role in the world of electronics. Almost all electronics require the use of a microcontroller. From smartphones to weather stations, and even cars, microcontrollers are virtually everywhere. By applying a microcontroller, or in our case, an Arduino to measure weight, we can prove the capacity a microcontroller has for everyday use.

OBJECTIVES

By designating microcontrollers to handle the small tasks we are faced with everyday, we can increase the efficiency of completing mundane everyday tasks.

MATERIALS

- Arduino
- Breadboard
- LCD Screen
- Wires
- HX711 amplifier chip
- Strain gauge Loadcell
- 3D Printer Filament and screws

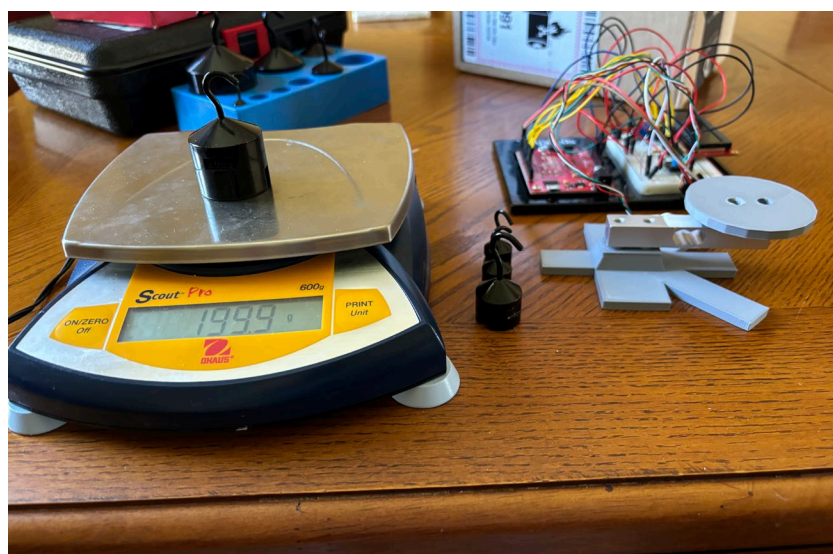


Figure 1. Calibration of the scale using known weights

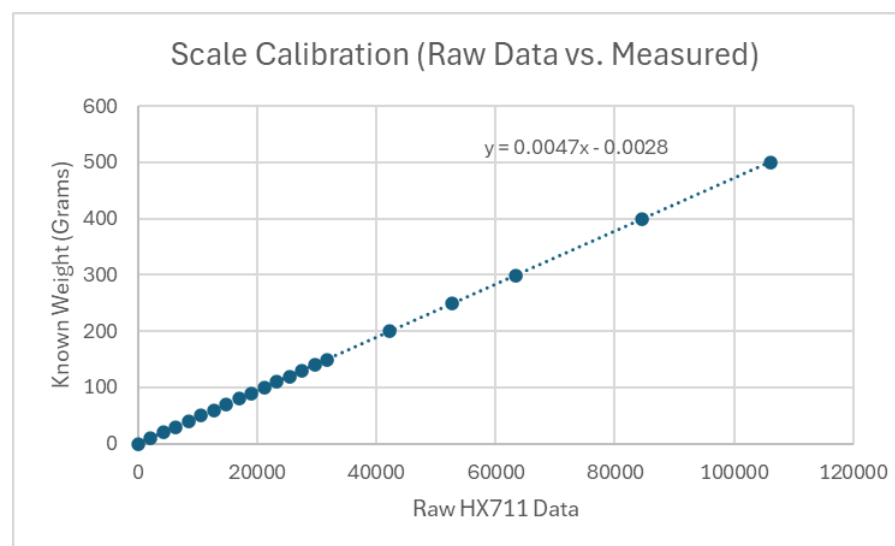


Figure 2. Graph used to calibrate scale

METHODS

- First, we measured and modeled the dimensions of the loadcell.
- Using Tinkercad, we created the support stand and a platform for the weights, then attached it to the loadcell.
- Wired Arduino with HX711 Amplifier and loadcell.
- Calibrated the Arduino scale by using known weights, measured by a laboratory scale.
- Graphed the values produced by the HX711 according to the actual weight.
- Finally, using the graph's equation, we converted the readings from the Arduino into grams.

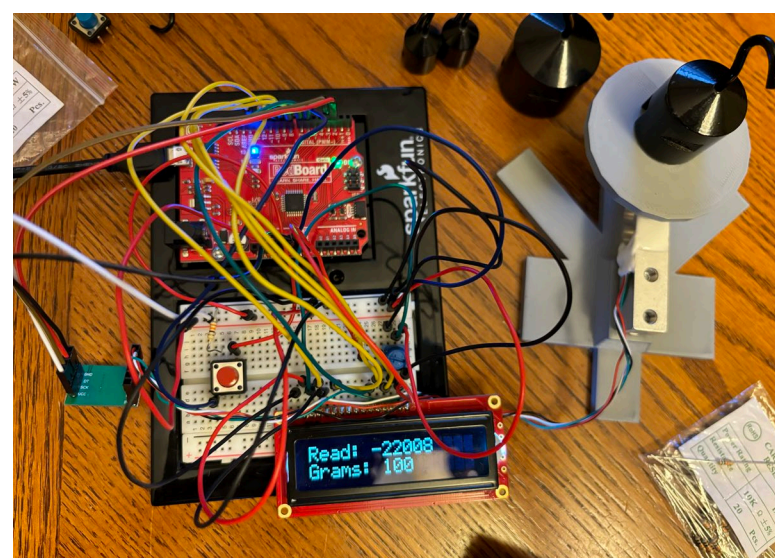


Figure 3. Working scale displaying value of weights

RESULTS

The Arduino scale successfully displayed the values of the weights in grams on the LCD screen. It was accurate up to a whole gram. However, it was limited when measuring the weight to the decimal places. The platform also limited the weight that could be placed on the scale as it tipped over whenever anything above 500 grams was placed on top of the scale.

CONCLUSIONS

Overall, the Arduino performed well when calibrating the results of the weights. Some of the error we saw could be attributed to electronic interference or improper balance with the support platform. With the experience we have now, if we were to do this project again, we would look into adjusting the design of the scale to allow more support for heavier weights and change loadcell type/kind of deformation to get more accurate results.

FUTURE WORK

Our research showed the capability of an Arduino to function properly as a scale, in future works we hope to see the Arduino utilized for other tasks with different sensors.

REFERENCES

- Al-Dahiree, Omar Sabah et al. "Design and Shape Optimization of Strain Gauge Load Cell for Axial Force Measurement for Test Benches." *Sensors* (Basel, Switzerland) vol. 22,19 7508. 3 Oct. 2022
- Bogdan, N. (2022, March 17). Bogde/HX711: An Arduino library to interface the Avia Semiconductor HX711 24-bit analog-to-digital converter (ADC) for weight scales. GitHub. <https://github.com/bogde/HX711>

ACKNOWLEDGEMENTS

- Dr. Woldering – *Faculty Advisor*