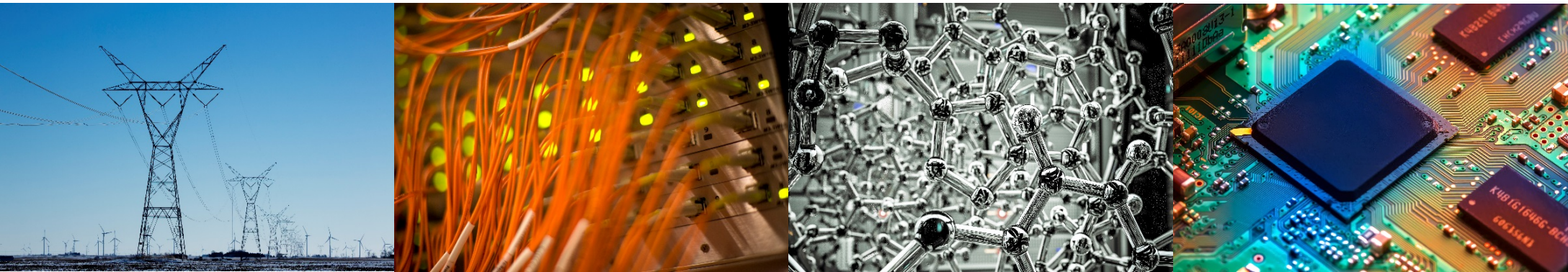


Auto-Open Drawer

Team 52 – Levi Applebaum, David Stone, Jay Yoon

ECE 445 Final Presentation – Spring 2019



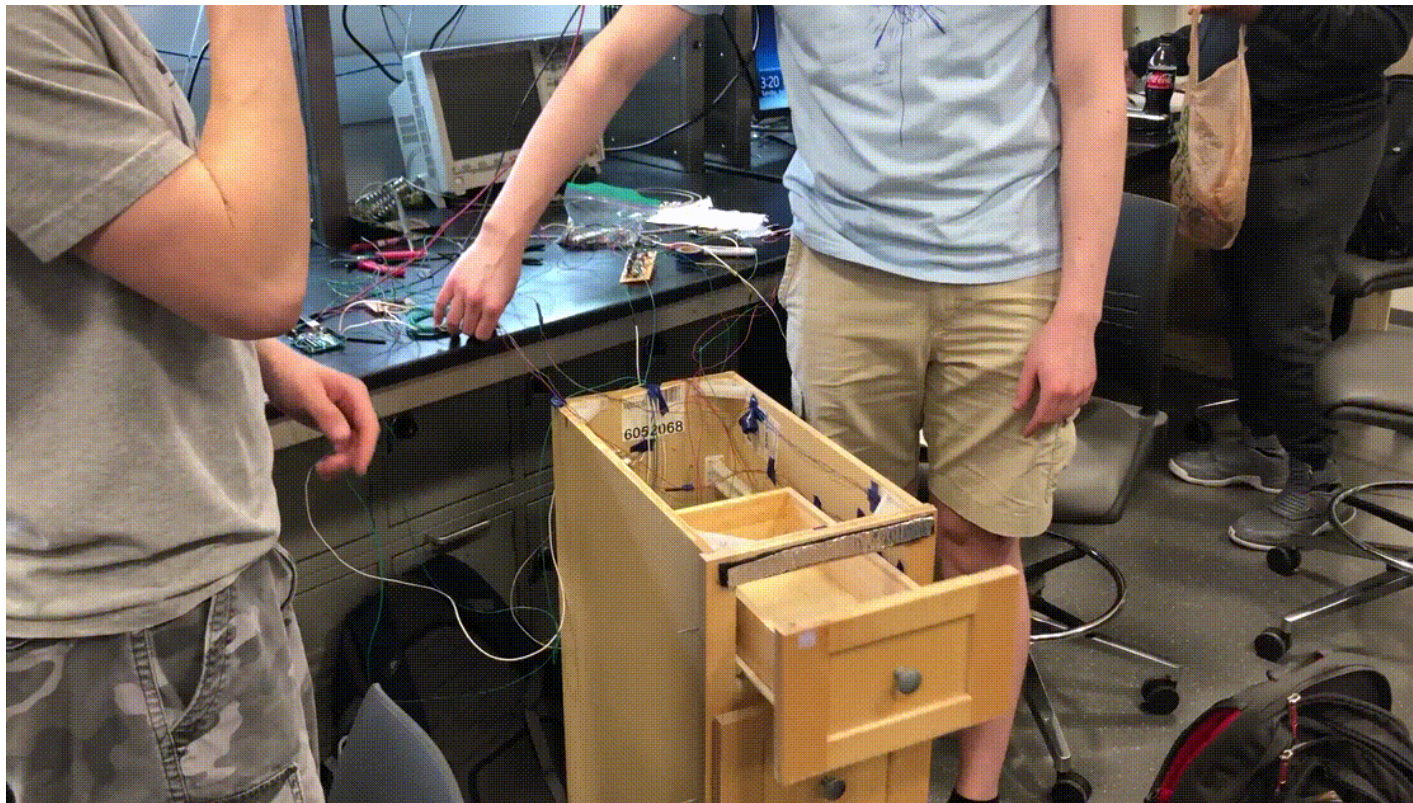
I ILLINOIS

Electrical & Computer Engineering

COLLEGE OF ENGINEERING

Project Overview

- Automatically extends and retracts
- Replace, not augment

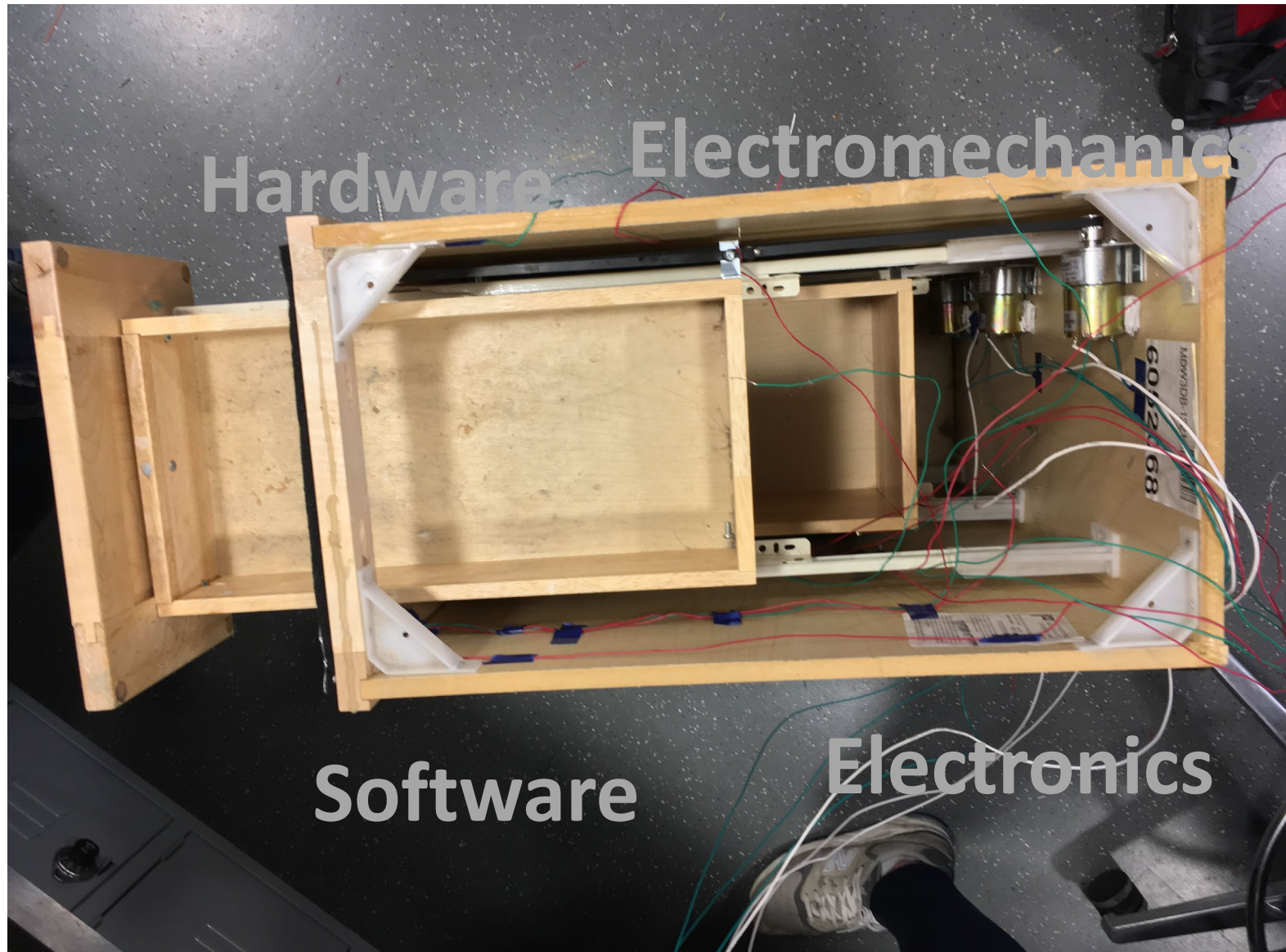




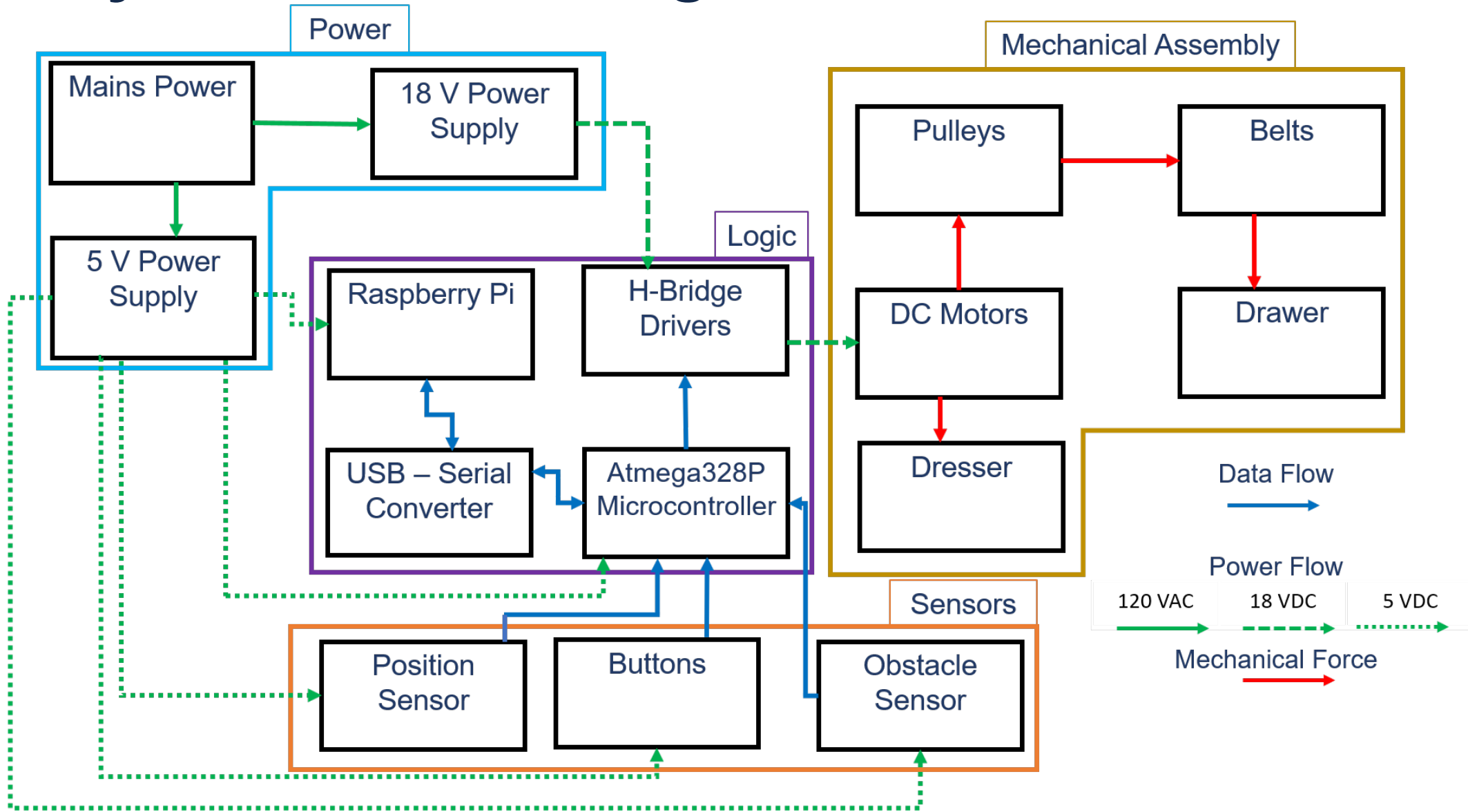
Objective

- Provide autonomy [1]
- Alleviate weight of drawer [2]
- Improve ease of access

System overview

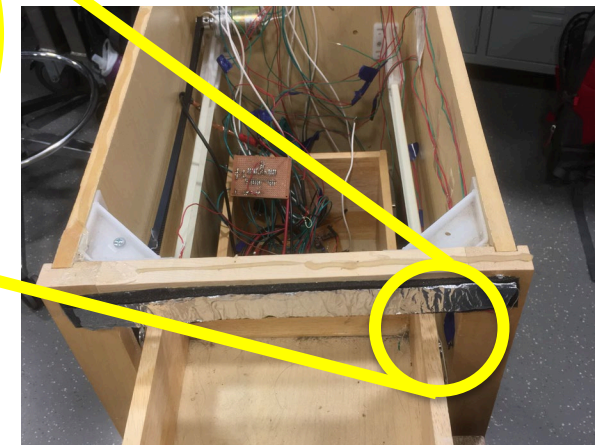
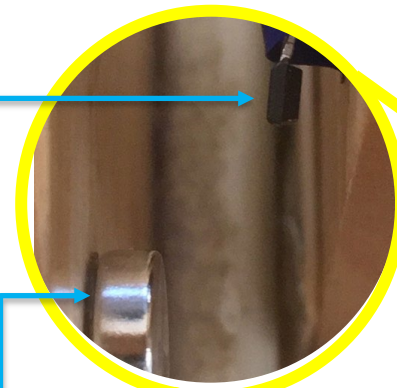
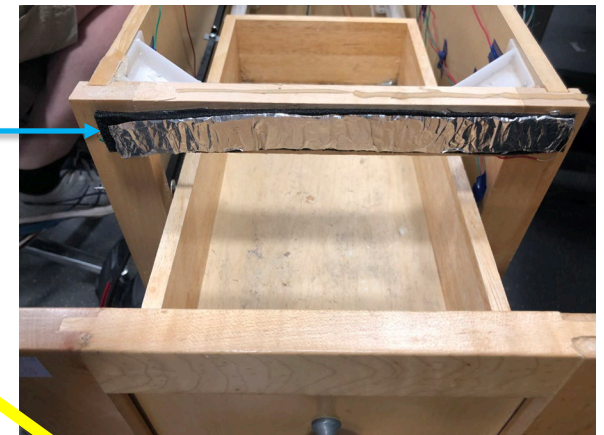
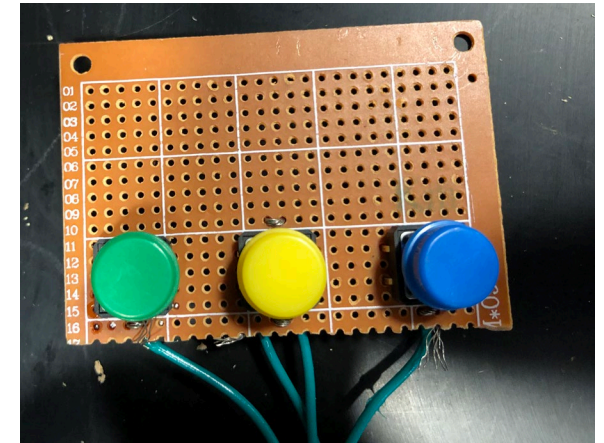


System Block Diagram



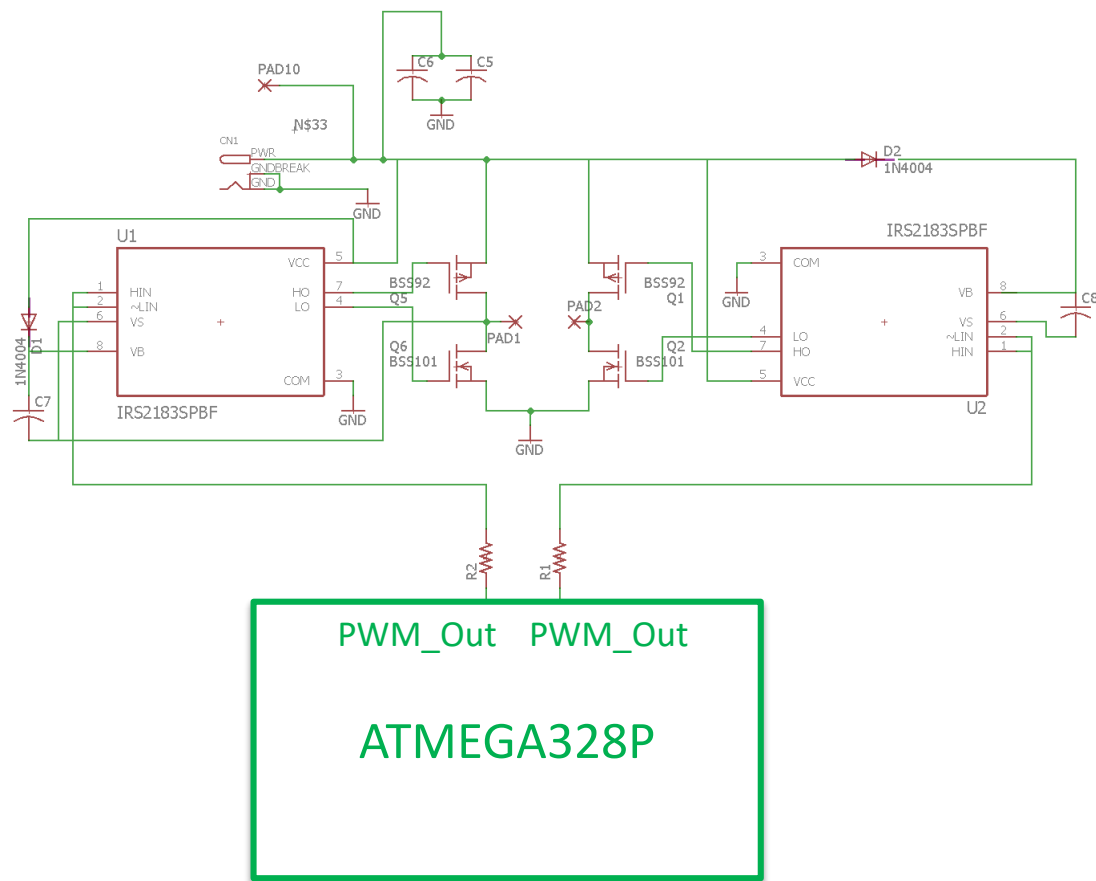
Sensors

- Activation sensors
 - Buttons
- Obstacle sensor
 - Static-dissipative foam [3]
- Position sensors
 - Hall effect sensors
 - Magnets

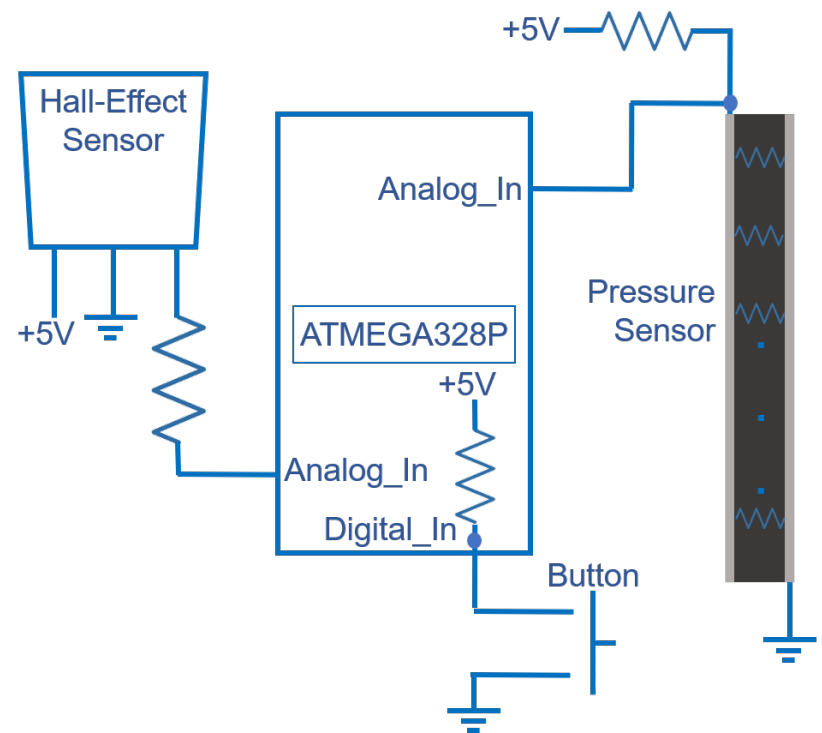


Circuit Design

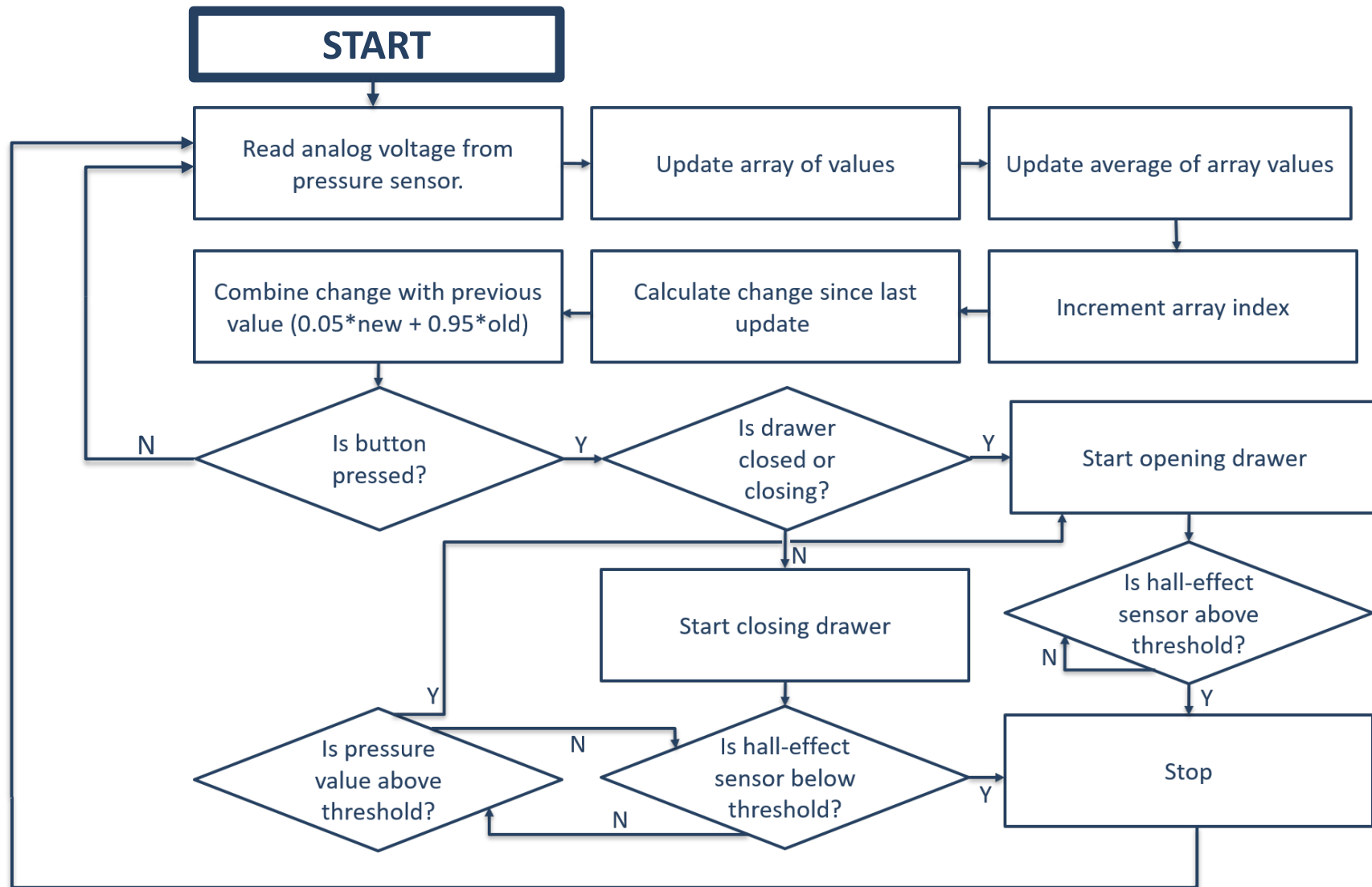
Output



Input



Flowchart





Project Build and Functional Tests

- Bolts to mount motor
- Screw shafts as pulley axles
- Screws to tighten belt
- Hall effect sensor tests
- Pressure sensor speed tests
- Drawer speed tests



Tests Not Explicitly Required

- Weighted drawer
- Different shapes of the foam and wire (obstacle sensors)
- H-bridge failures



Successes and challenges

Suceses	Challenges
Drawer activation	Dresser dimension
Sensor sensitivity	H-bridges
Motor quality	Serial communication



Recommendations for further work

- Surrounding obstacle sensor
- Use Serial/USB protocol for activation
- Reduce noise
- Design dresser shape for specific cases that limit mobility



Significant relevant ethical issues

- IEEE Code of Ethics #8 [4]
 - Avoid terms that could be discriminatory
 - "People with limited mobility"
- People who can benefit most
- Does not imply need nor exclusivity



Conclusion

- Individual aspects
- Full assembly
- Expandability
- Reflection

References

- [1] E. Stone. Personal interview (January 21, 2019).
- [2] R.R. Kalyani, M. Corriere, & L. Ferrucci, "Age-related and disease-related muscle loss: the effect of diabetes, obesity, and other diseases," *PubMed Central*. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4156923/>. [Accessed: February 6, 2019].
- [3] Instructables, "How to Make a Ridiculously Cheap Analog Pressure Sensor," *Instructables.com*, 06-Nov-2017. [Online]. Available: <https://www.instructables.com/id/How-to-Make-a-Ridiculously-Cheap-Analog-Pressure-S/>. [Accessed: 17-Feb-2019].
- [4] IEEE.org, "IEEE IEEE Code of Ethics", 2019. [Online]. Available: <http://www.ieee.org/about/corporate/governance/p7-8.html>. [Accessed: February 6, 2019].