Portable Carrier A

TEAM C5:

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ME486c-006
Class Instructor: Dr. David Trevas
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Project Description

▸ What is our project about ?

-The project consist of designing a device to carry 5 medium sized bags that weigh around 10 lbs each and be able to climb the stairs to the apartment if the customer is living on the second or third floor. The device should be controlled easily by anyone between the ages of 7 - 70 years old

▸ Who is our Client?

-Dr. Hesam Moghaddam

▸ Why is this product important ?

-It helps elderly people and people with disabilities or back pain.

-It makes grocery shopping easier.

Customers Requirements

- Safety
- weight (15-25 lb)
- Climb Stairs (7in v, 11in h)
- Portable and Foldable
- Carry 5 bags (50lbs)
- Easy to use
- Half trunk size
- Distance (100-500ft)
- Different Weather

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Design solution - Tracks

-Tracks are chosen over tires

-Tracks will be tilted

-Requirement satisfied:

-Climb Stairs (7in v, 11in h)

-Different Weather conditions

Figure 1: Track 1

Figure 2: Track 2

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Design Solution - The Telescope

Hook

-Hanger: carry 5 bags

-Double steel plate: Withholds 50 lbs total.

-Hiking hooks: each hold 10 lbs at least.
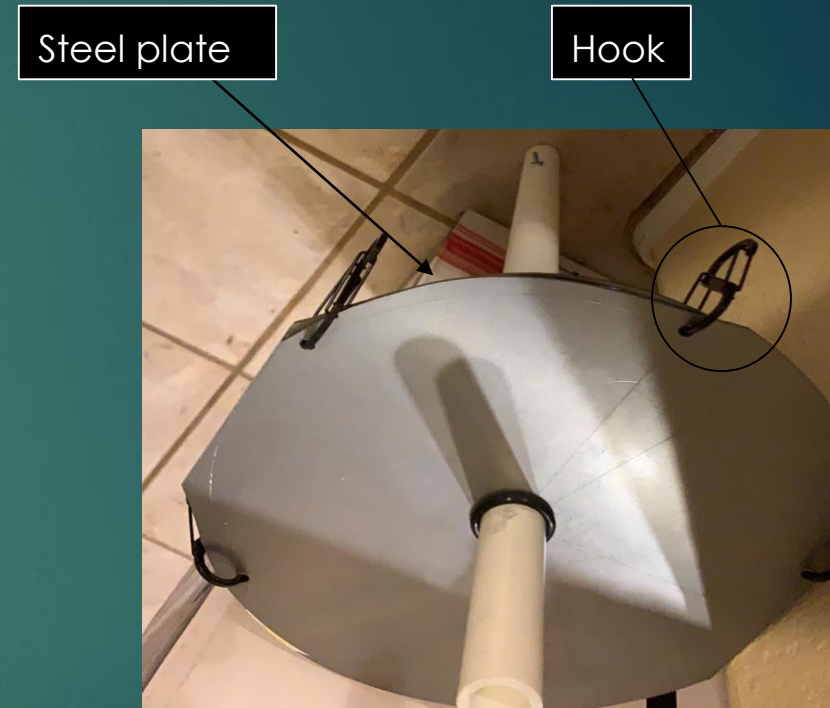
-**Requirement satisfied:**

-Carry 5 bags.

Steel plate

Hook

Figure 10: Telescope

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Design Solution - Arduino

-Control remotely

-Motor and Joystick

-Pneumatic (solenoid) and sensor

-**Requirement satisfied:**

-Easy to use

Figure 3: Arduino

Figure 4: Sensor

Figure 5: Joystick

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Design solution – Pneumatic System

-The system consists of : Solenoid, blower, air tank, hose, fittings and the cylinder.

-Requirement satisfied:

-Portable and Foldable

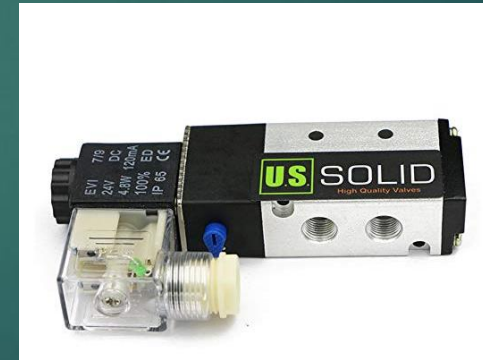-Carry 5 bags

Figure 6:Pneumatic cylinder

Figure 7: Solenoid

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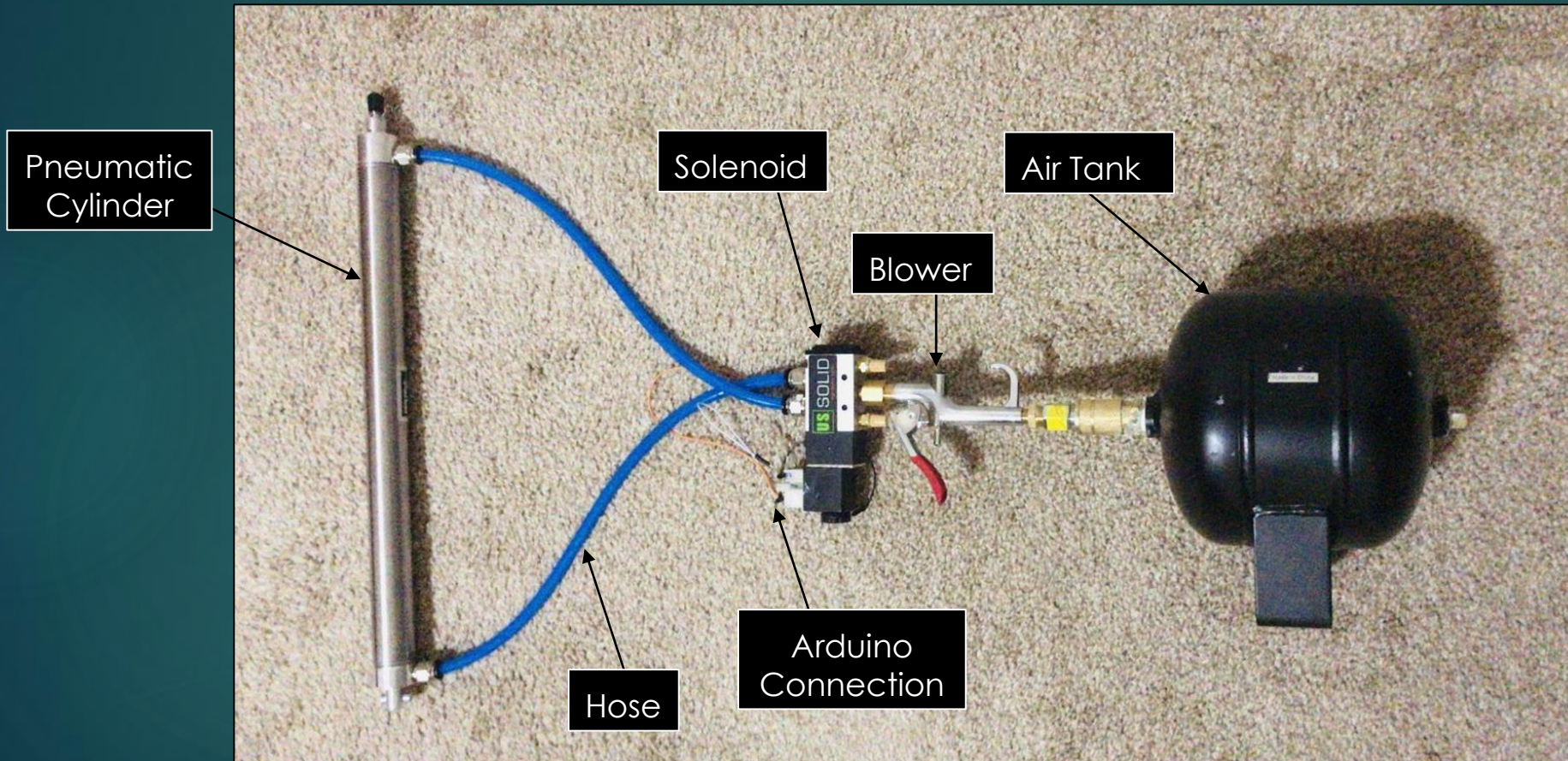Portable Carrier A
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Design solution - Pneumatic System

Figure 8: Pneumatic Cylinder system

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Design Solution - Motor

-DC motor: better with tires in general that other motors

-Used to move design by controlling the tracks

-**Requirement satisfied:**

-100-500 feet

-Climb stairs

Figure 9: Motor

Manufacturing: Telescope

Parts:
-Two PVC pipes.
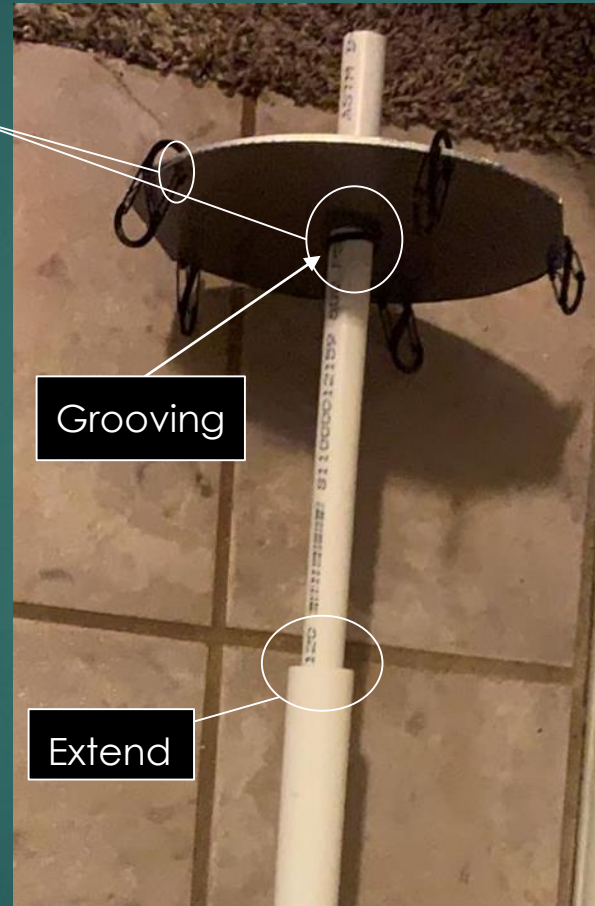-Bolt and nut.
-5 hiking hooks.
-double steel plate

Holes

Grooving

Extend

Figure 11: Telescope

Bolt and nut

Figure 12: Telescope

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Manufacturing: Pneumatic system
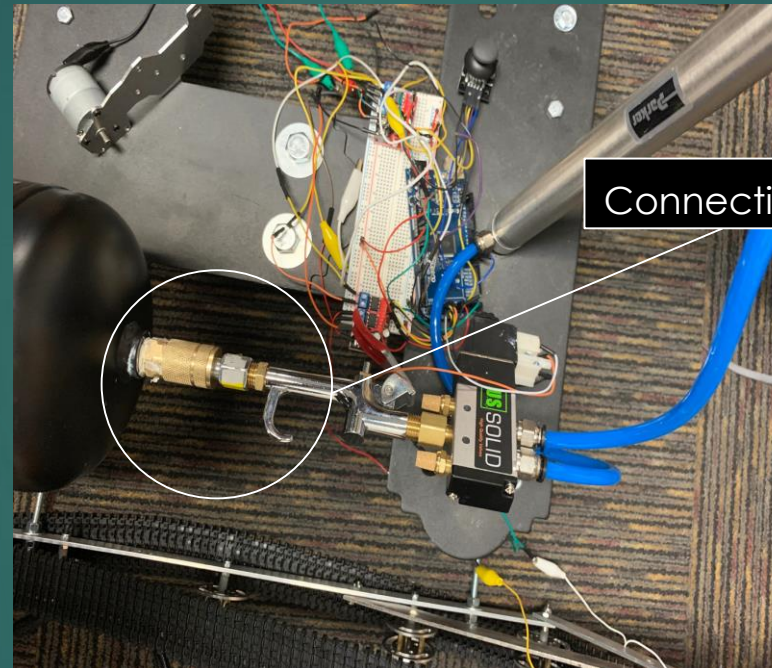

Figure 13: Air tank

Connection

Figure 14: connection between solenoid and air tank.

Figure 15: connection between compressor and air tank

- The air tank fittings have been changed, so it can connect the tank to both the compressor and solenoid
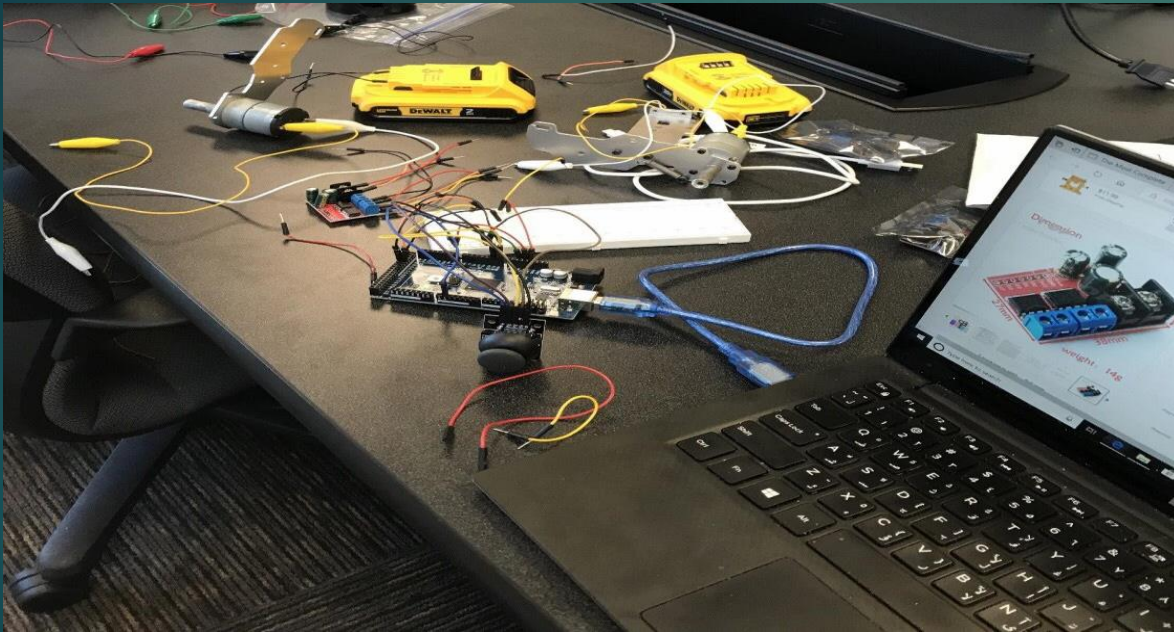
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Manufacturing: Arduino

Figure 16: Motors - Arduino

Figure 17: Solenoid - Arduino

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Manufacturing: Body

- 2 Arms.
- 14 Wheels, each side has 7.
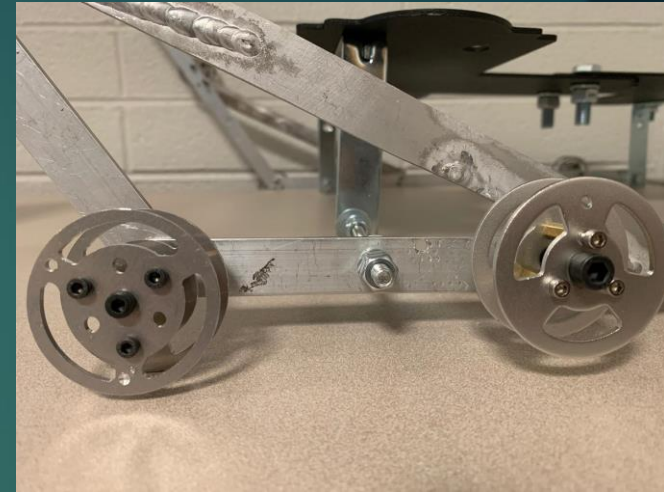- 4 Motors, each can provide 12 volts.

Figure 18: Body

Figure 19: Body

Figure 20: Body

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Manufacturing: Process

Figure 21: Machine shop

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Final Design

- Design has been assembled and the parts are connected.
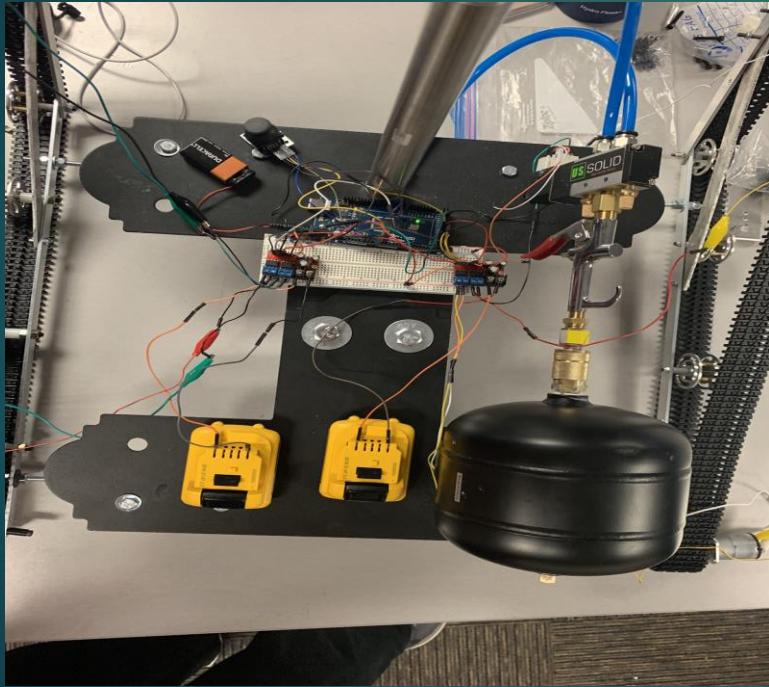
Figure 22: Final Design Top View

Telescope

Air Tank

Arduino

Battery

Motor
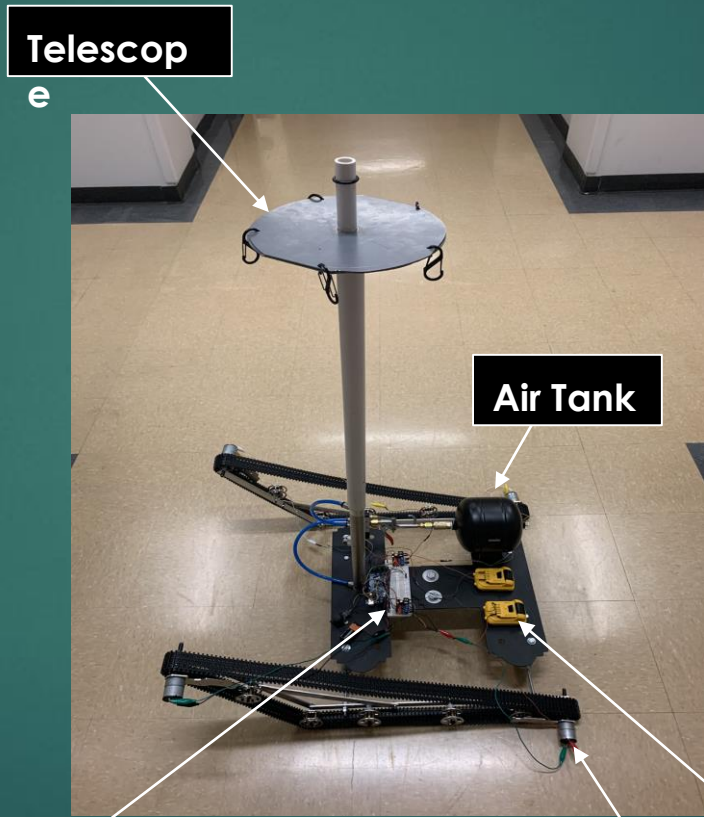
Figure 23: Final Design

Figure 24: Final CAD

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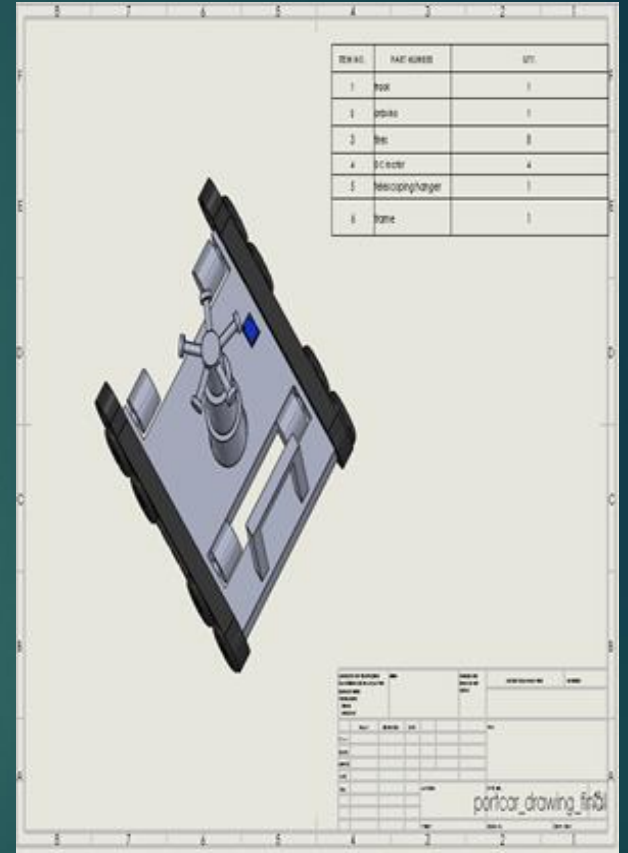Page 14

Final Testing Project Solution

-Telescoping can hold 50 pounds.

-Pneumatic system can carry +50 pounds, but still having leaks in the system. (as shown in video 2)

-Arduino system can control the project, but can't reverse the air cycle. (as shown in video 1)

-Motor was working properly.

-The body was assembled, but still not functioning.

-The wheels are connected to the motors, but they are not producing enough power.

Figure 25: 5 bags w/ telescope

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Testing Proof: Arduino
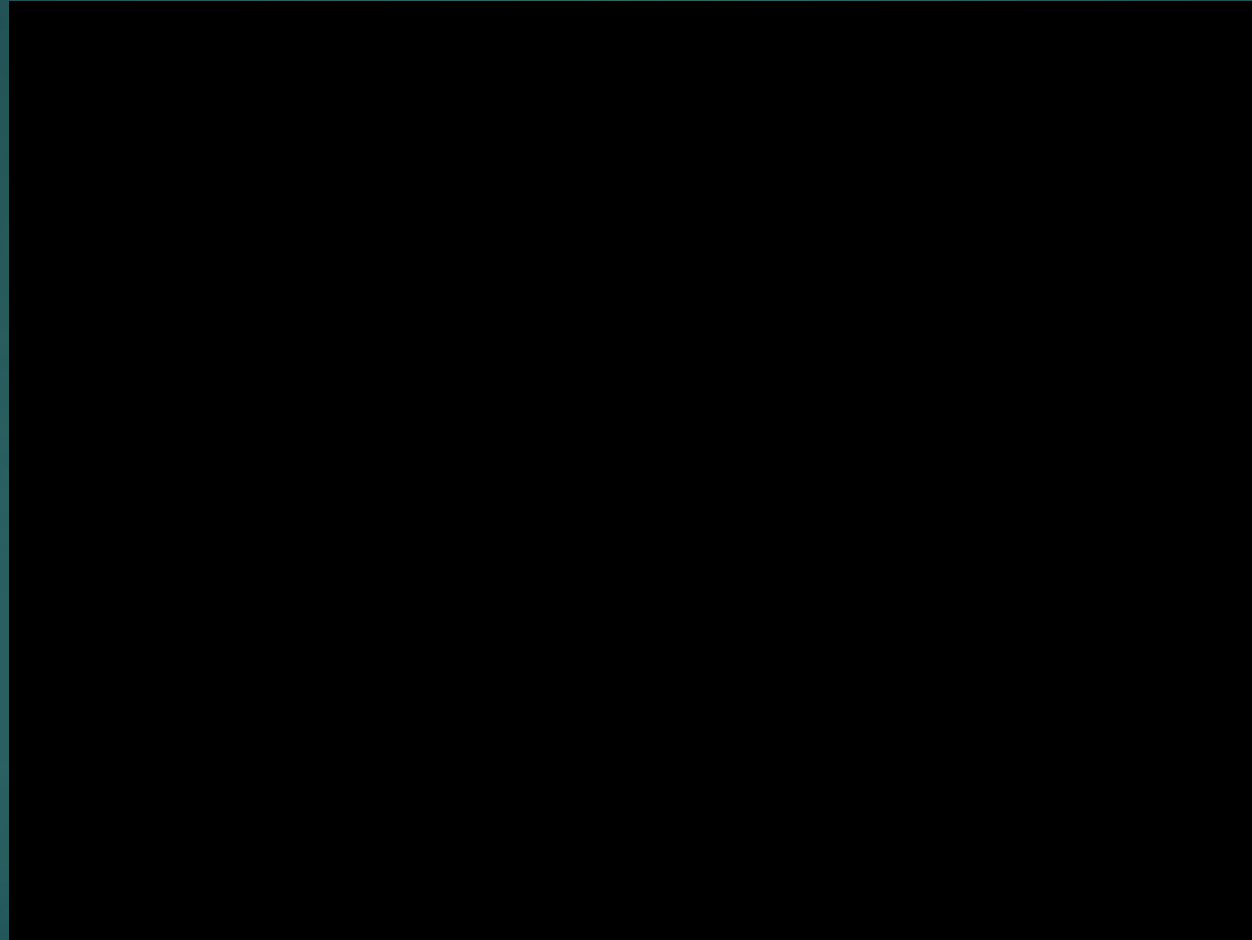
Video 1: Arduino testing

Testing proof: Pneumatic cylinder

Video 2: cylinder testing

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Conclusion

- The team has learned and implemented concepts about Engineering during the period of this class:
  - Manufacturing
  - Machine shop
  - Arduino
  - Technical writing
- Future improvements:
  - Power
  - Solenoid
- The device aims to provide the user with an effective and convenient solution to the problem.

Acknowledgments

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▸ HomeCo staff

▸ NAU Machine Shop

▸ Arduino Club

▸ US Solid

▸ Brandon Begay

References

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[4] https://en.wikipedia.org/wiki/Continuous_track

Questions?