AEV Project

Team P

Team Introductions

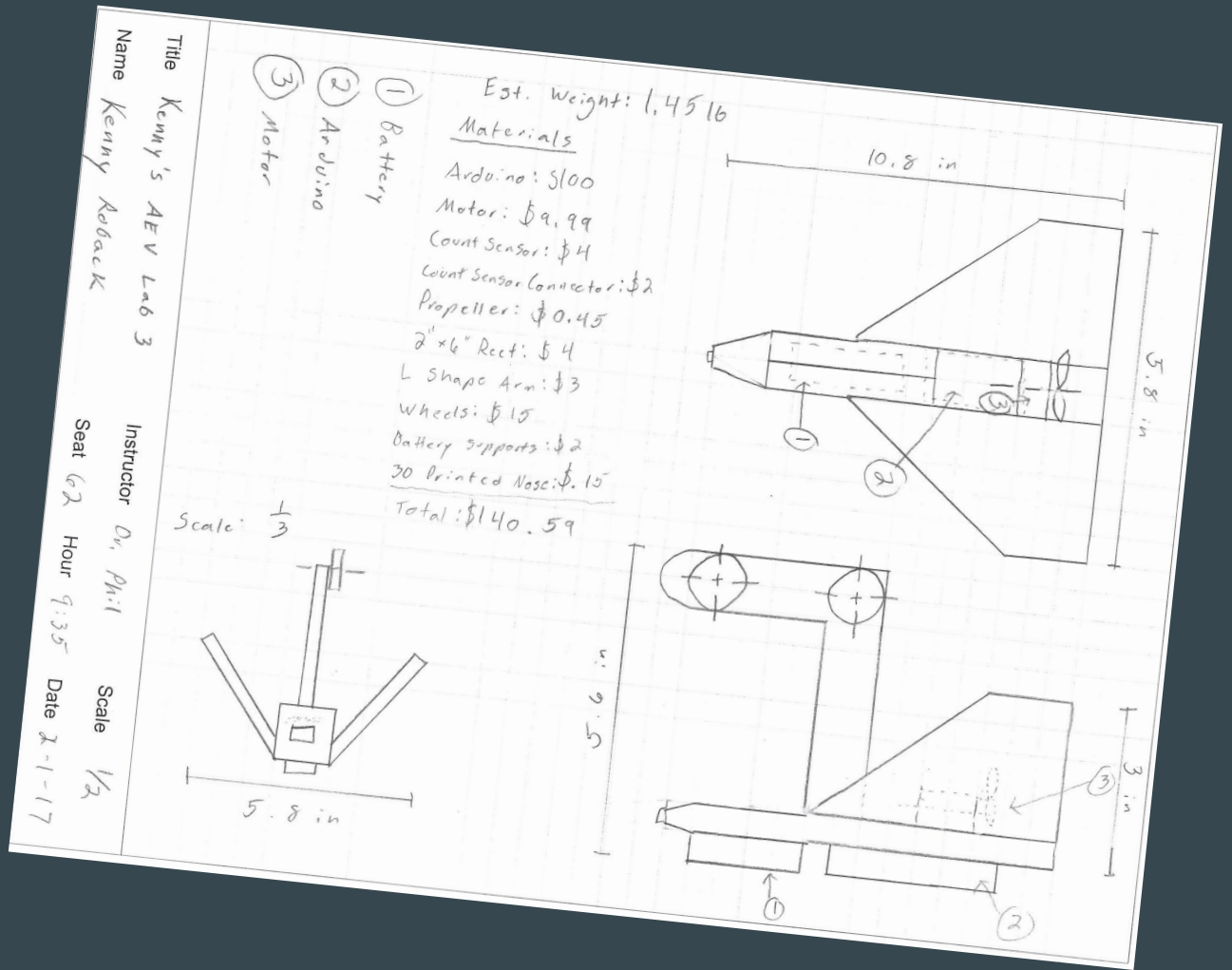
- Sam - Lead Documenter/Anything asst.
- Caleb - Designer/Testing mechanic
- Matt - Designer/Testing asst.
- Kenny - Lead Coder/Testing asst.

Brainstorming

- Nosepiece
- Double push
- Long “L” arm

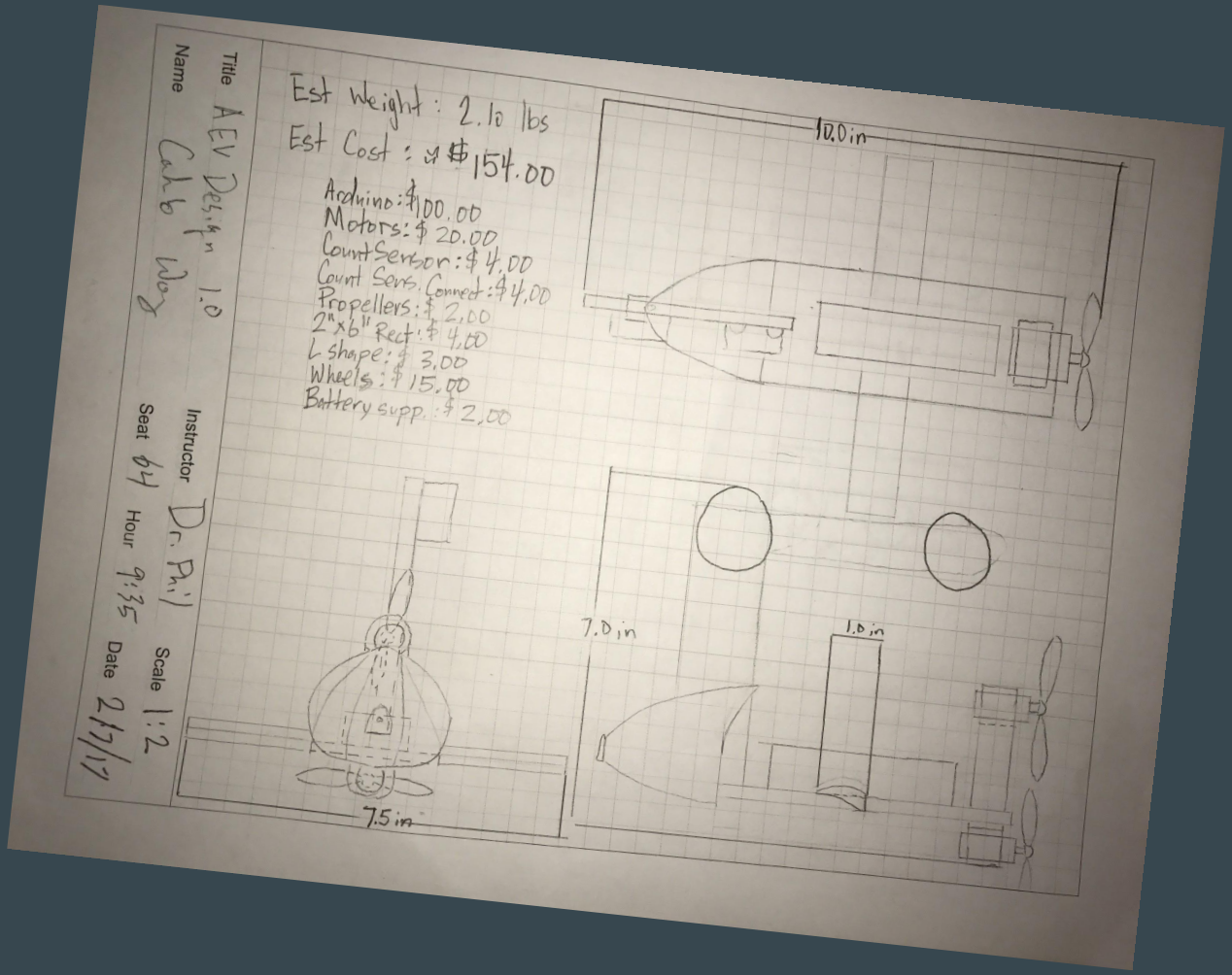
Brainstorming

- Single Motor
- Unique Wing Design



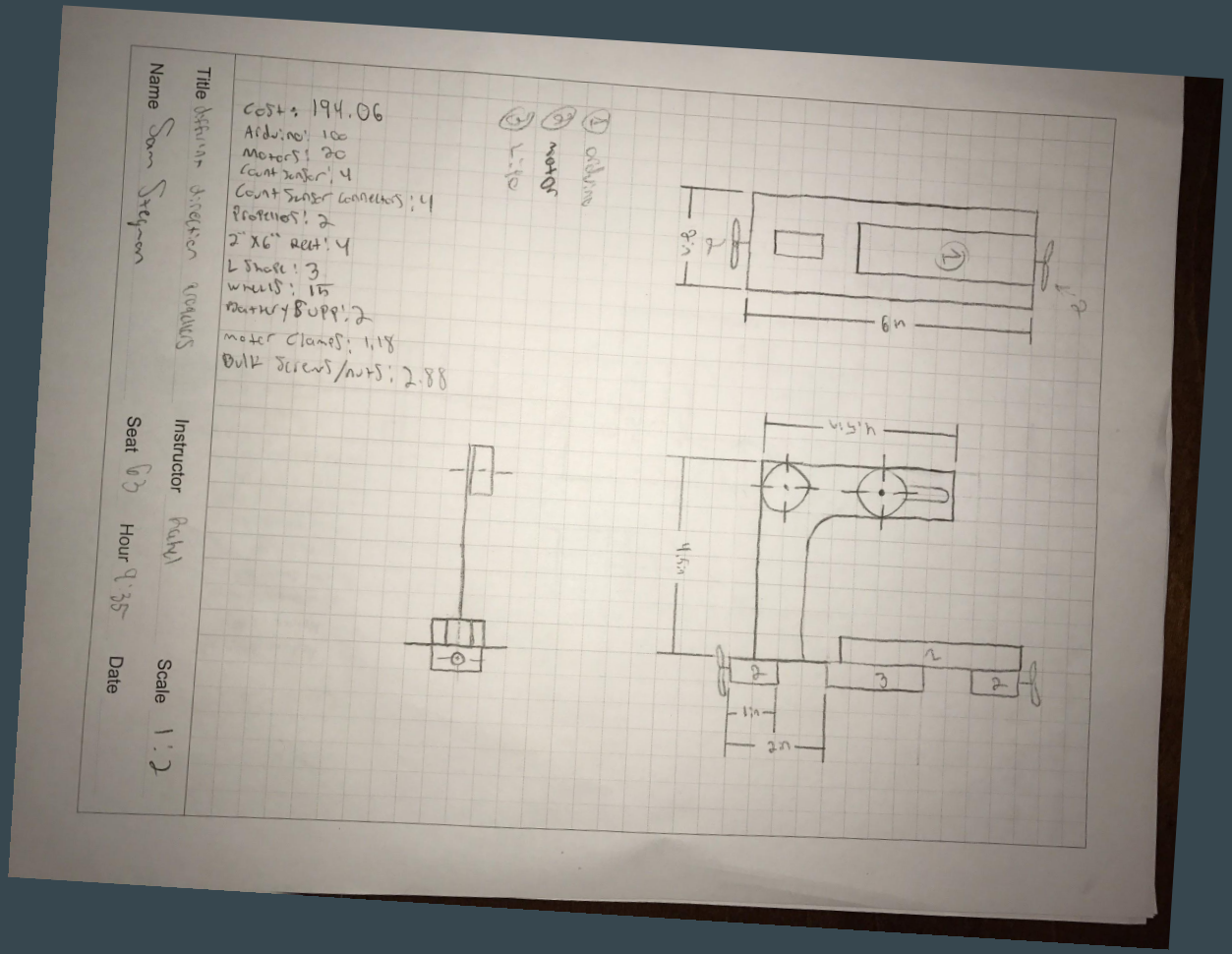
Brainstorming

- Wing
- Nosepiece
- Double Push/Pull



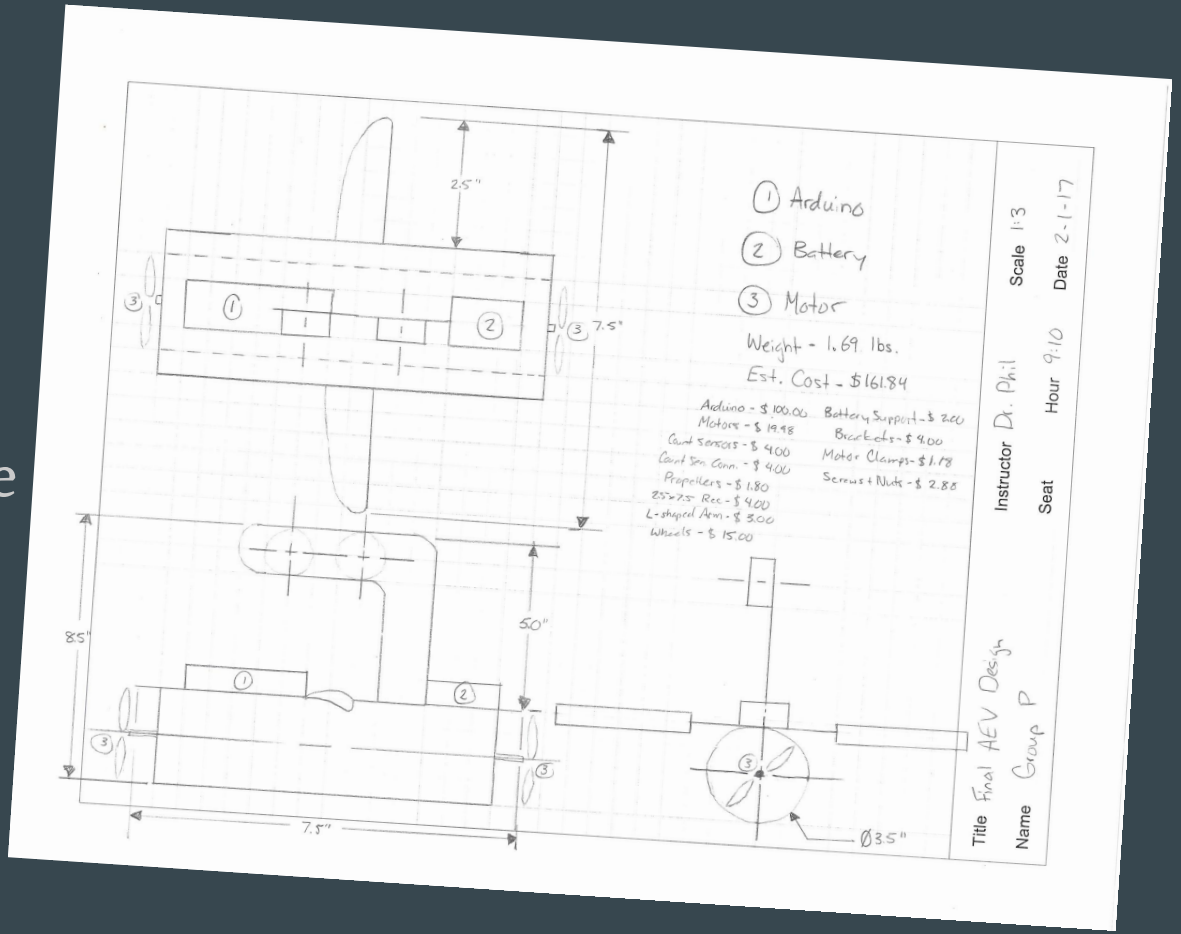
Brainstorming

- Push/pull combo
- Minimal weight
- Long “L” arm



Initial Prototype

- Decided to use push/pull motor and wing design but 3D-Printed parts were needed.
- Wind tunnel

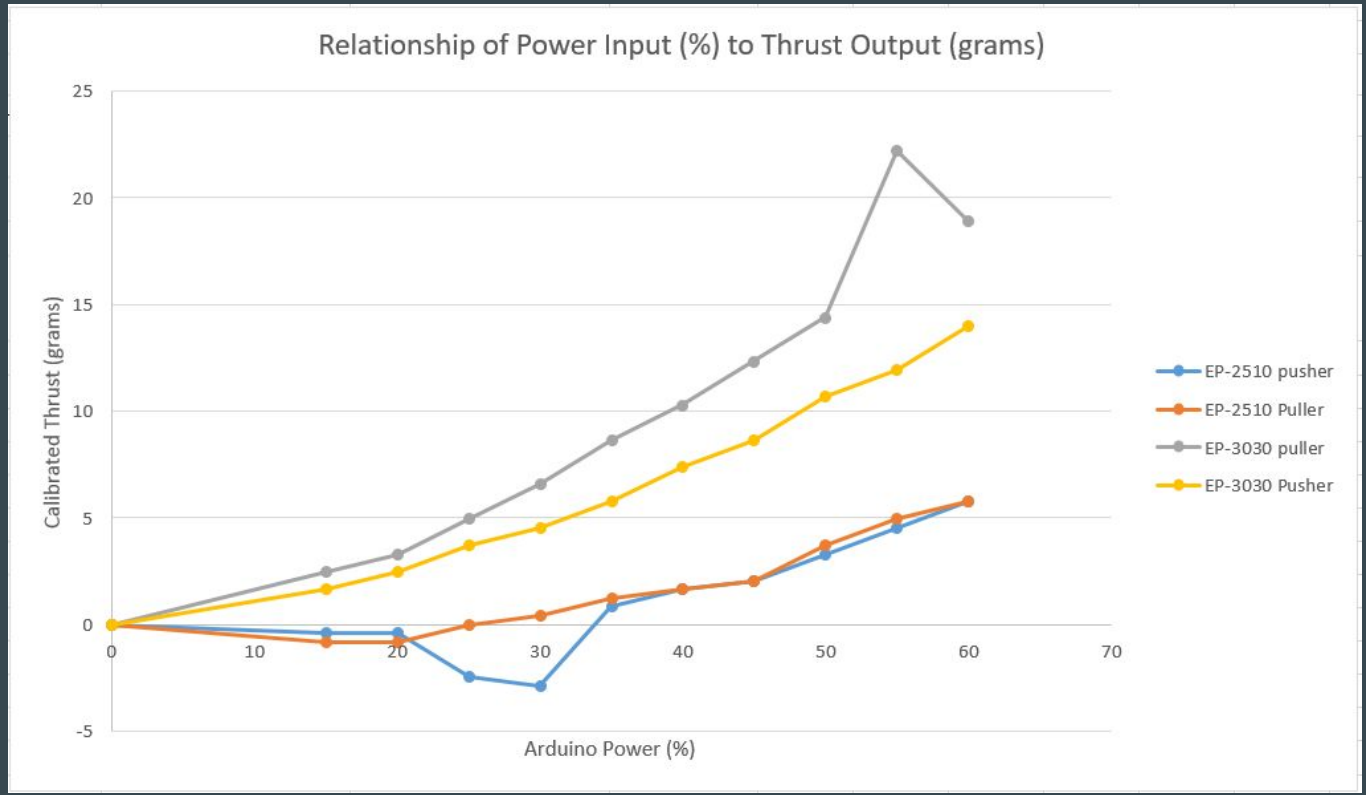


Thoughts on the Prototype

- Motors in the pull configuration are most efficient
- AEV will have to travel two directions so it can't always be pull
- Wings would be used to decrease friction
- Wind tunnel should help increase wind velocity and therefore thrust

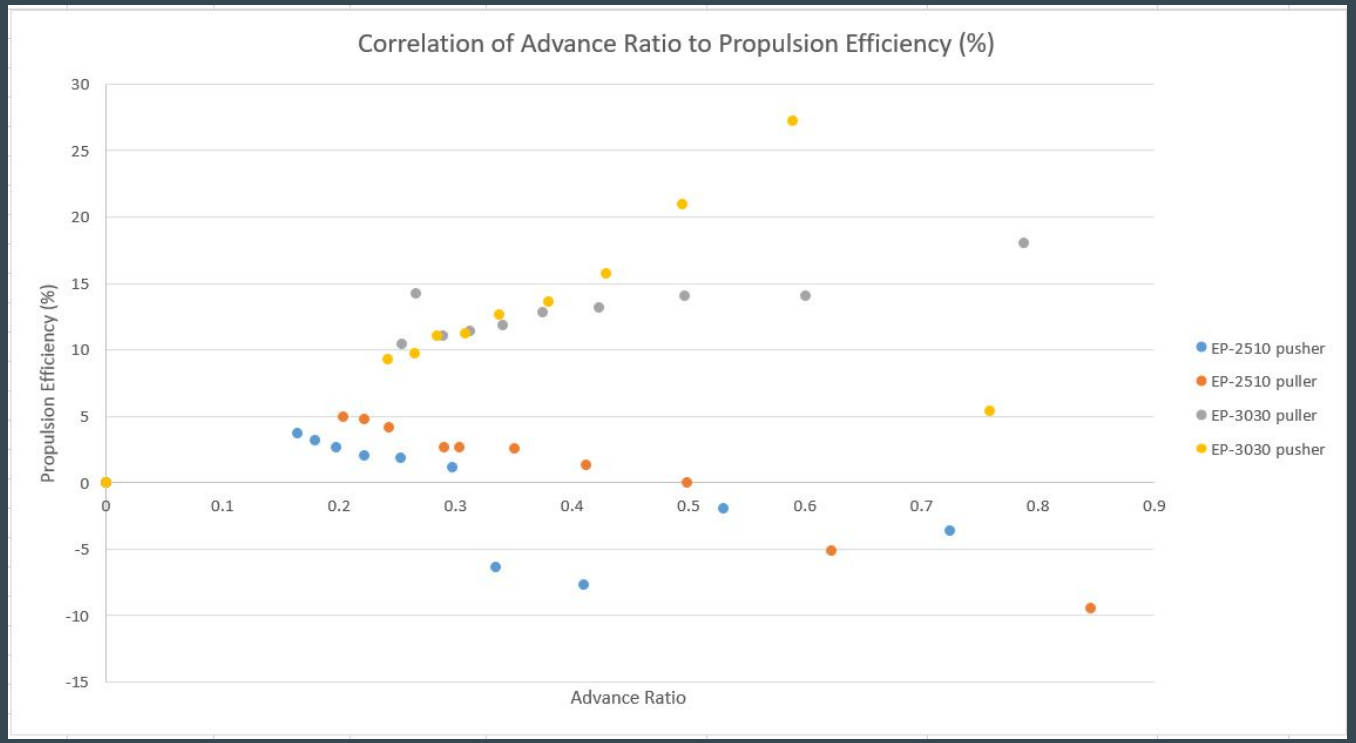
Thoughts on the Prototype

- 3030 puller has best thrust output

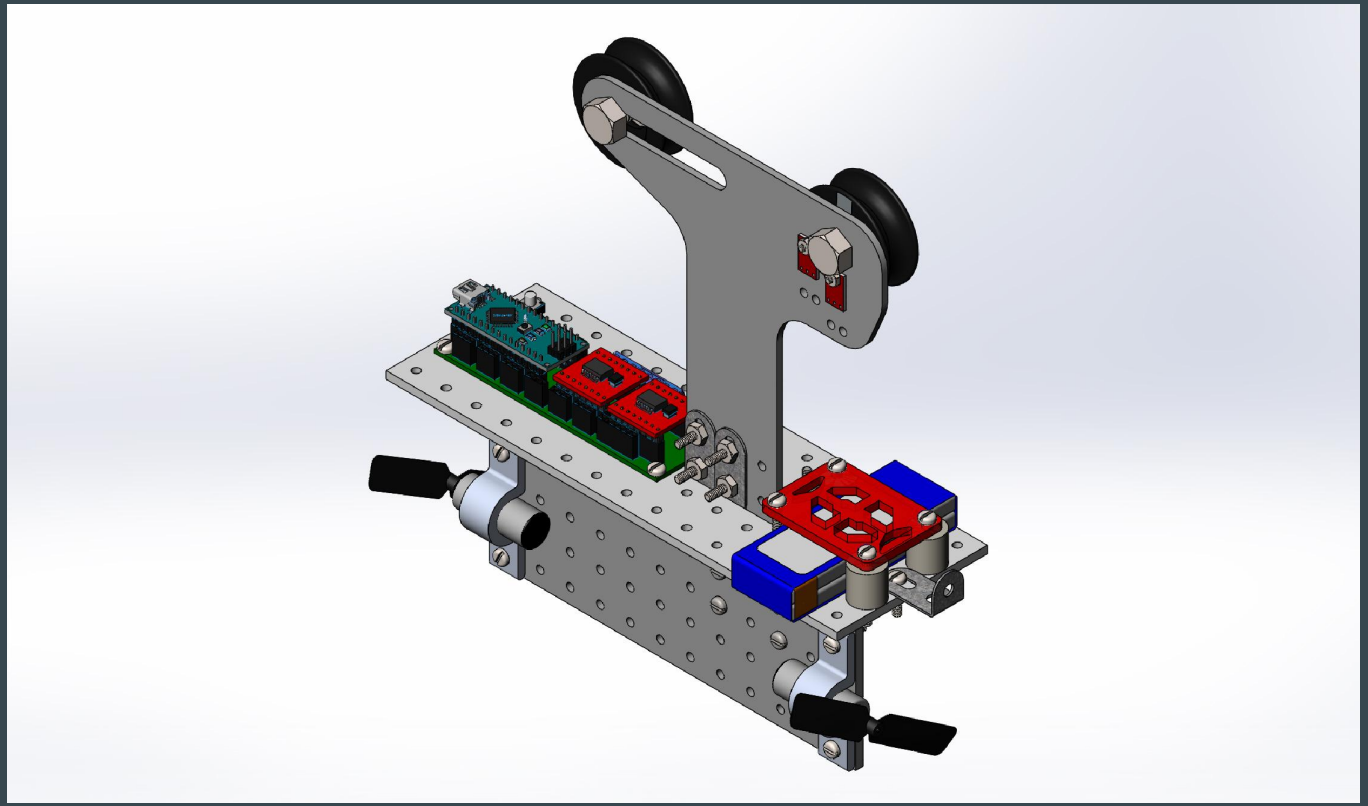


Thoughts on the Prototype

- 3030 pusher has better efficiency at greater advance ratios



Push/Pull Prototype

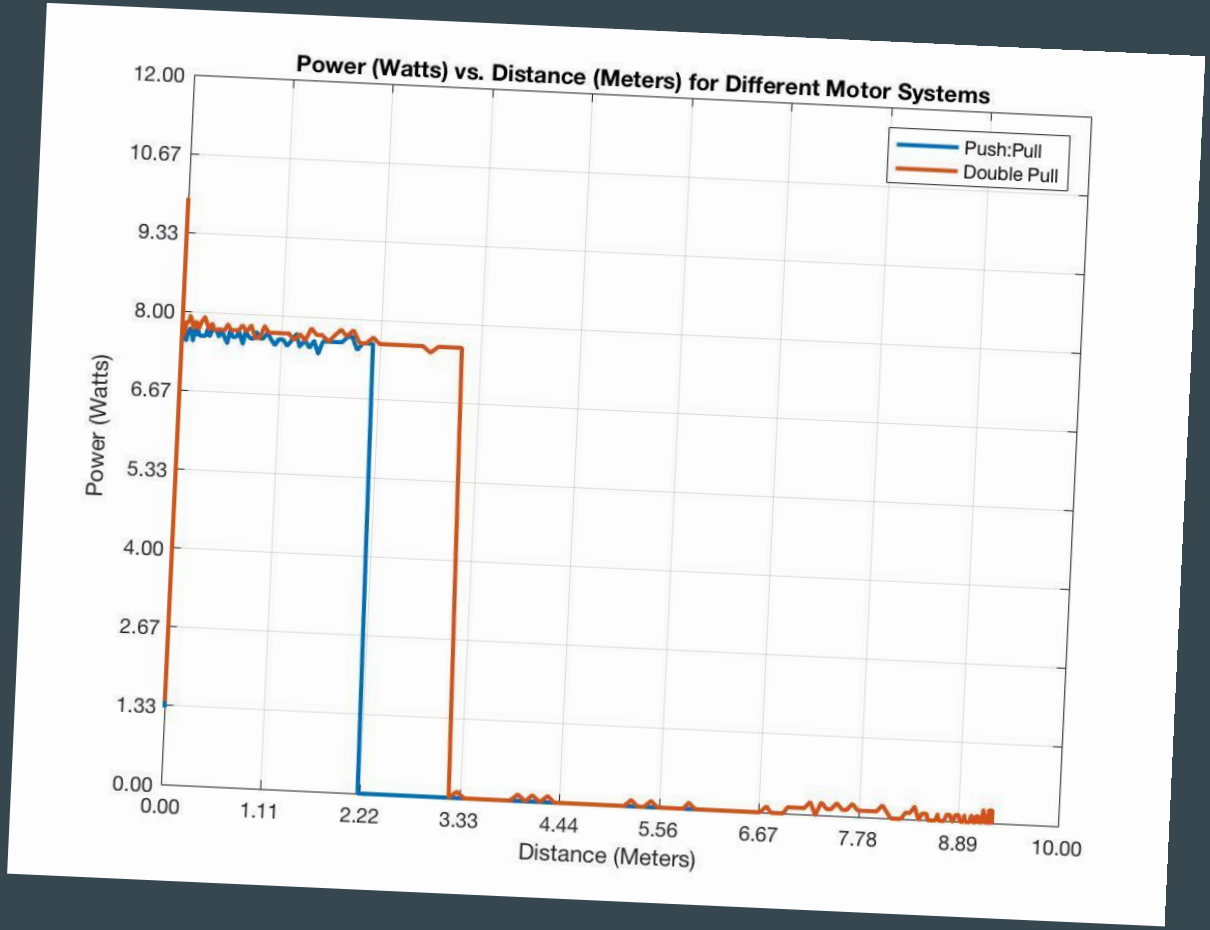


Initial Testing

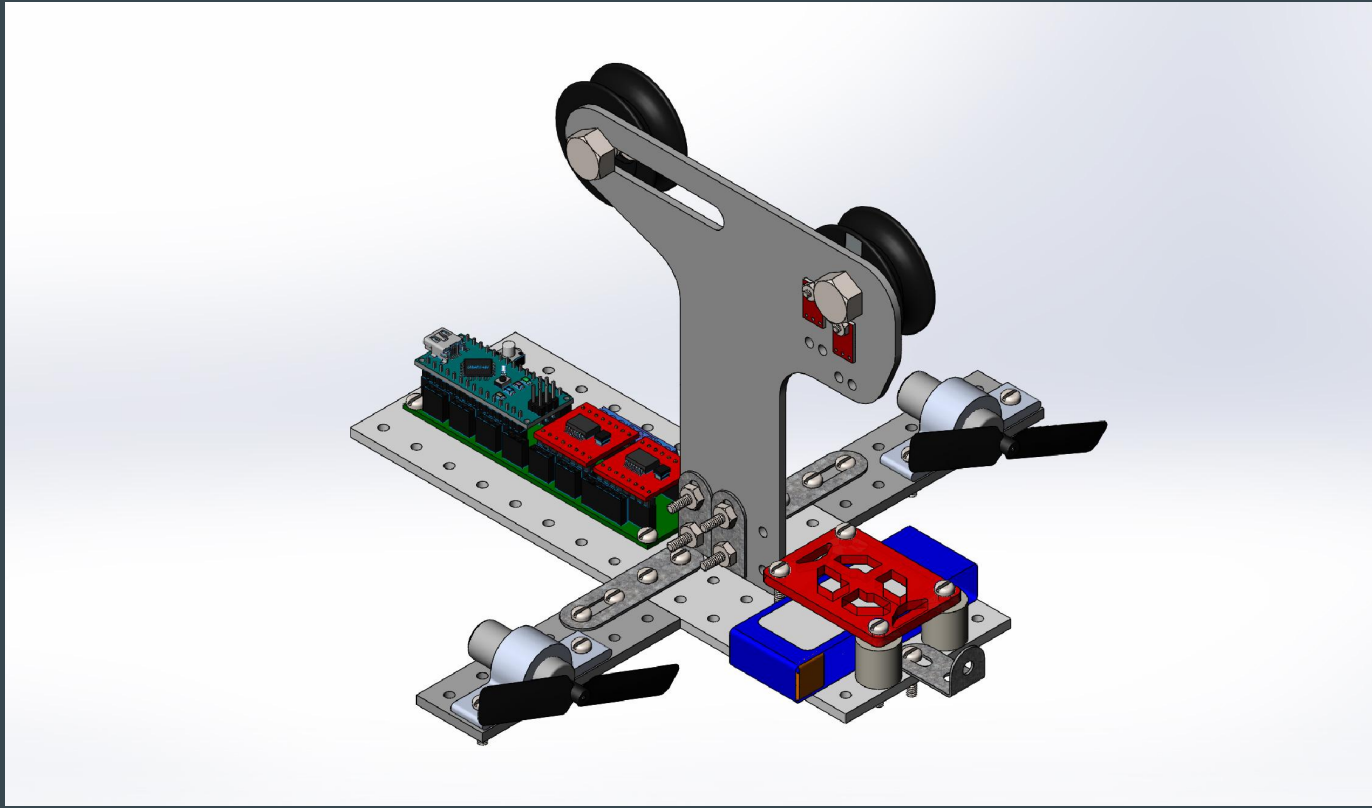
- Weren't happy with distances travel by Push/Pull compared to input power
- The attachment for the Push/Pull motors added a lot of weight
- Decided to look into other designs

Double Pull System

- Why we leaned away from Push/pull and towards double pull
- More distance for barely more power input

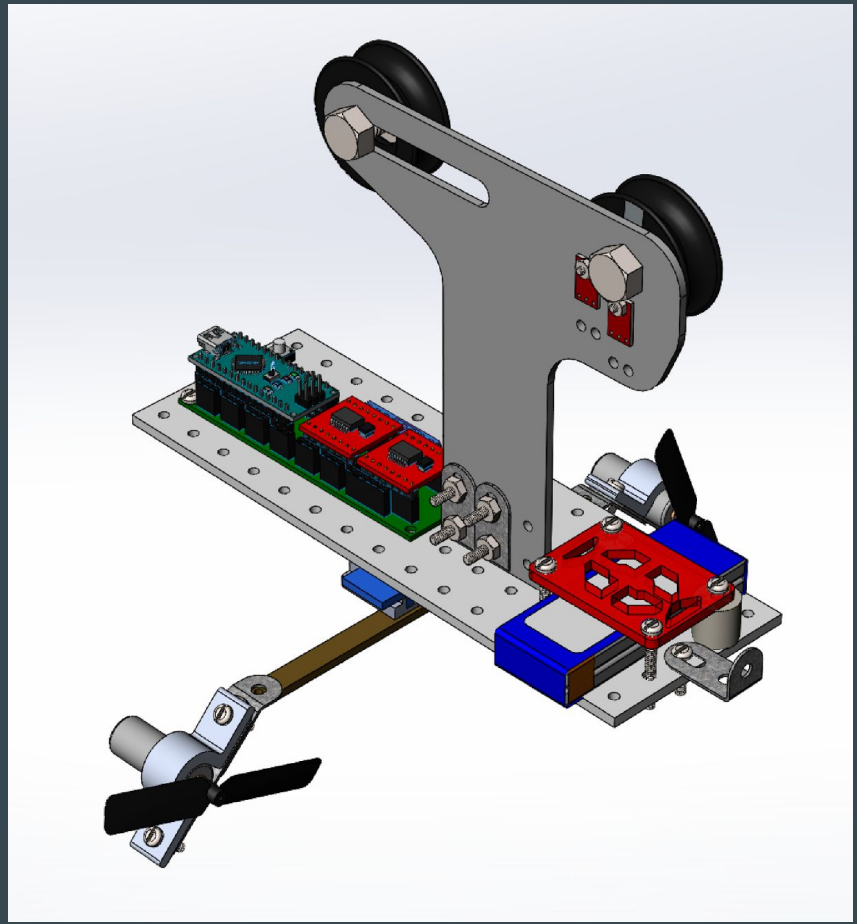


Double Pull Prototype



Improvements

- Team wanted pull system in both directions (servo)
- 3D-Printed Parts delayed
- Improvised
- Some parts taped together



Arduino Code

- Four sections
- Short burst of speed
- Longer period of lower speed
- Coast, rotate servo, low-power brake
- Perform backup check, rotate servo back and proceed to next stage

Code - Stopping

```
boolean isStopped() {
  boolean stopped = false;
  int pos1 = getVehiclePostion();
  goFor(.2);
  int pos2 = getVehiclePostion();
  if (pos2 - pos1 <= 0) {
      stopped = true;
      }
  return stopped;
  }
```

```
void stopAEV() {
    int mSpeed = 20;
    while (!isStopped()) {
      motorSpeed(4, mSpeed);
      goFor(.1);
      mSpeed += 5;
    }
    brake(4);
  }
```

Code - Check Mechanism

```
while (!isStopped()) {
  if (getVehiclePostion() > 476) {
    stopAEV();
    }
  }
```

```
if(getVehiclePostion() < 473) {
    reverse(4);
    motorSpeed(4, 28);
    goToAbsolutePosition(473);
    brake(4);
    reverse(4);
    stopAEV();
  }
```

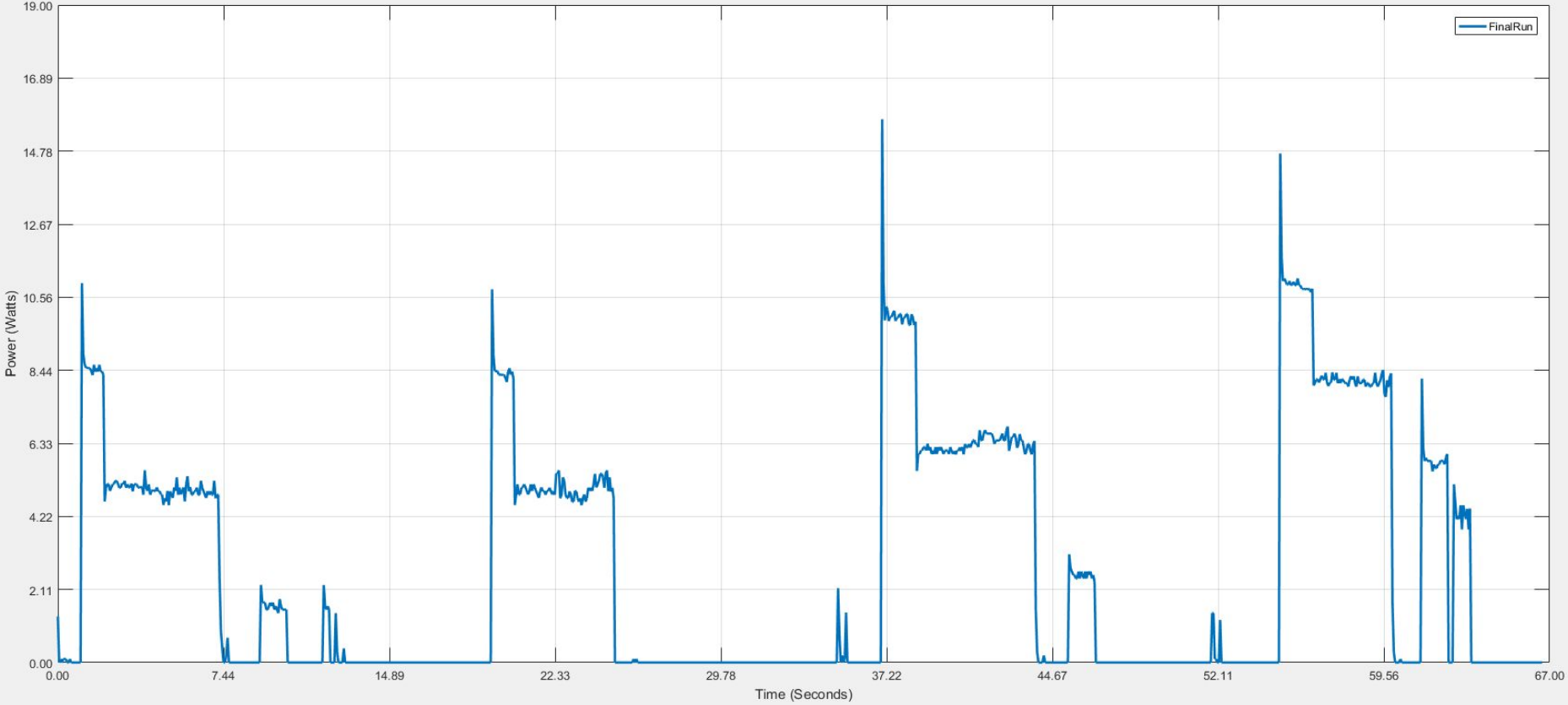
- After planned brake
- While moving, ensures it doesn't pass destination
- After stopping, checks if it is short

Final Test Results

- The team ended up having to stop the AEV manually
- The code didn’t work because isStopped() used absolute position
  - Wasn’t calibrated for reverse travel
- Used 178 Joules of energy
- Ended up with an energy ratio of 635 J/kg

Results - Power vs. Time

File :	FinalRun.mat	File :		File :		File :	
Energy (J)	178.053	Energy (J)		Energy (J)		Energy (J)	



Video