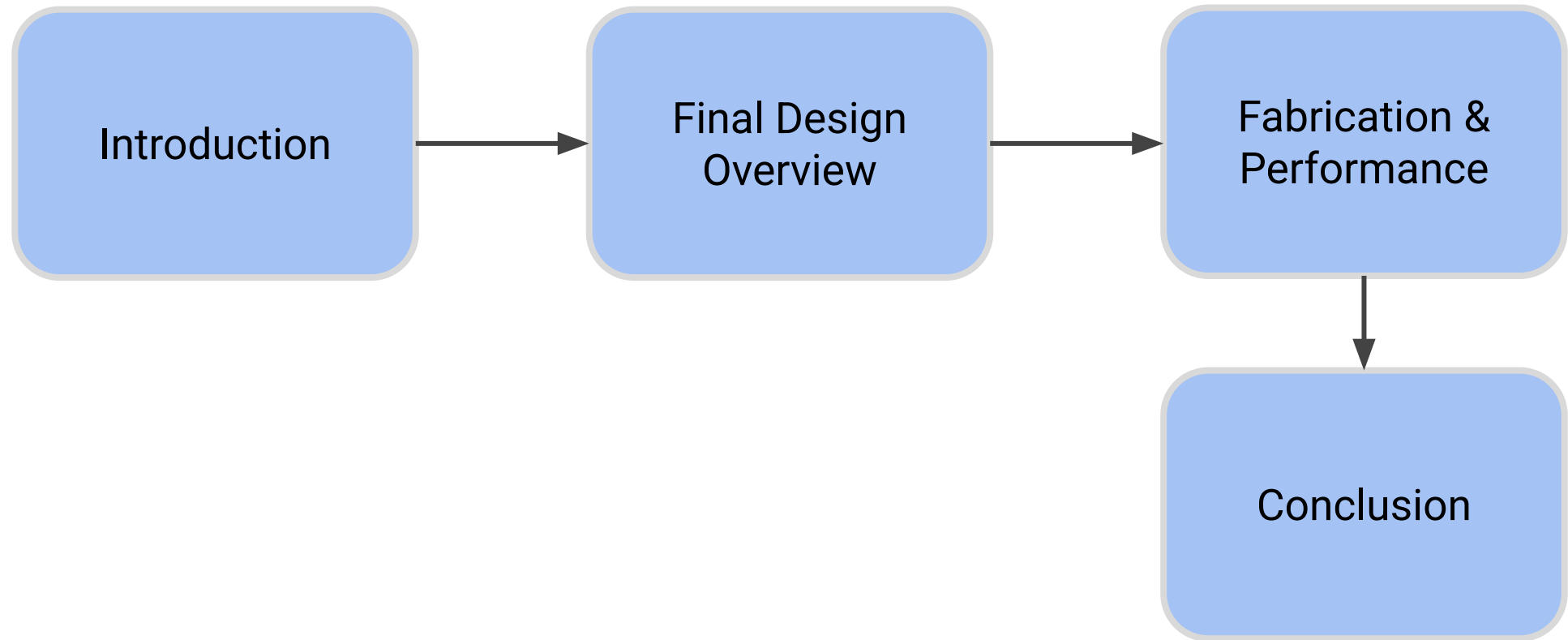


Final Report: JCFC

ME 2110

Team 3: Joshua Li, Jacky Chen, Roy Mazor, Ian Causseaux

Agenda



Introduction

Problem Understanding

Objective: The people of Berk require an autonomous robot to assist in completing tasks around the village to improve their quality of life and increase their safety.



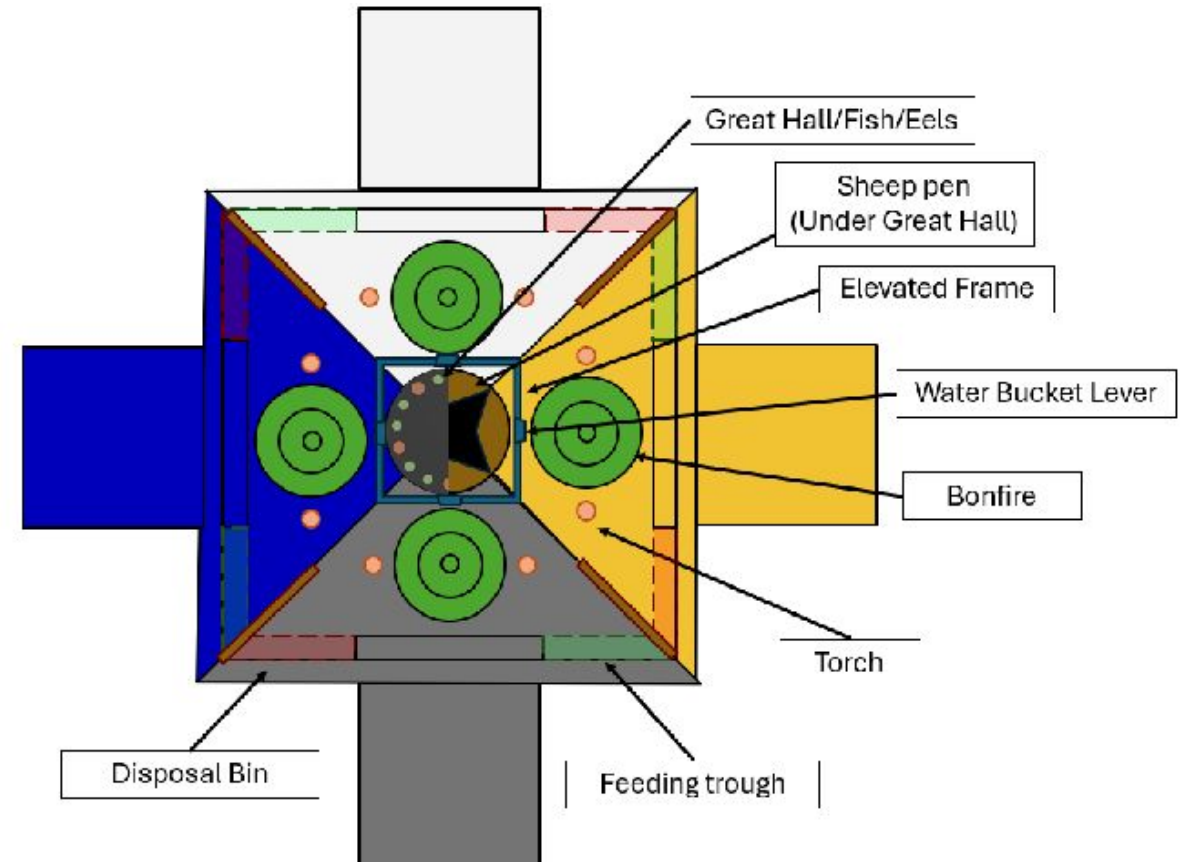
Customer Understanding

Customer:

- The Village

Customer Needs:

- Extinguishing fire
- Refilling dragon feeding stations
- Returning sheep
- Lighting the bonfire
- Activate System



Key Synergies & Tradeoffs

Breadth vs. Depth

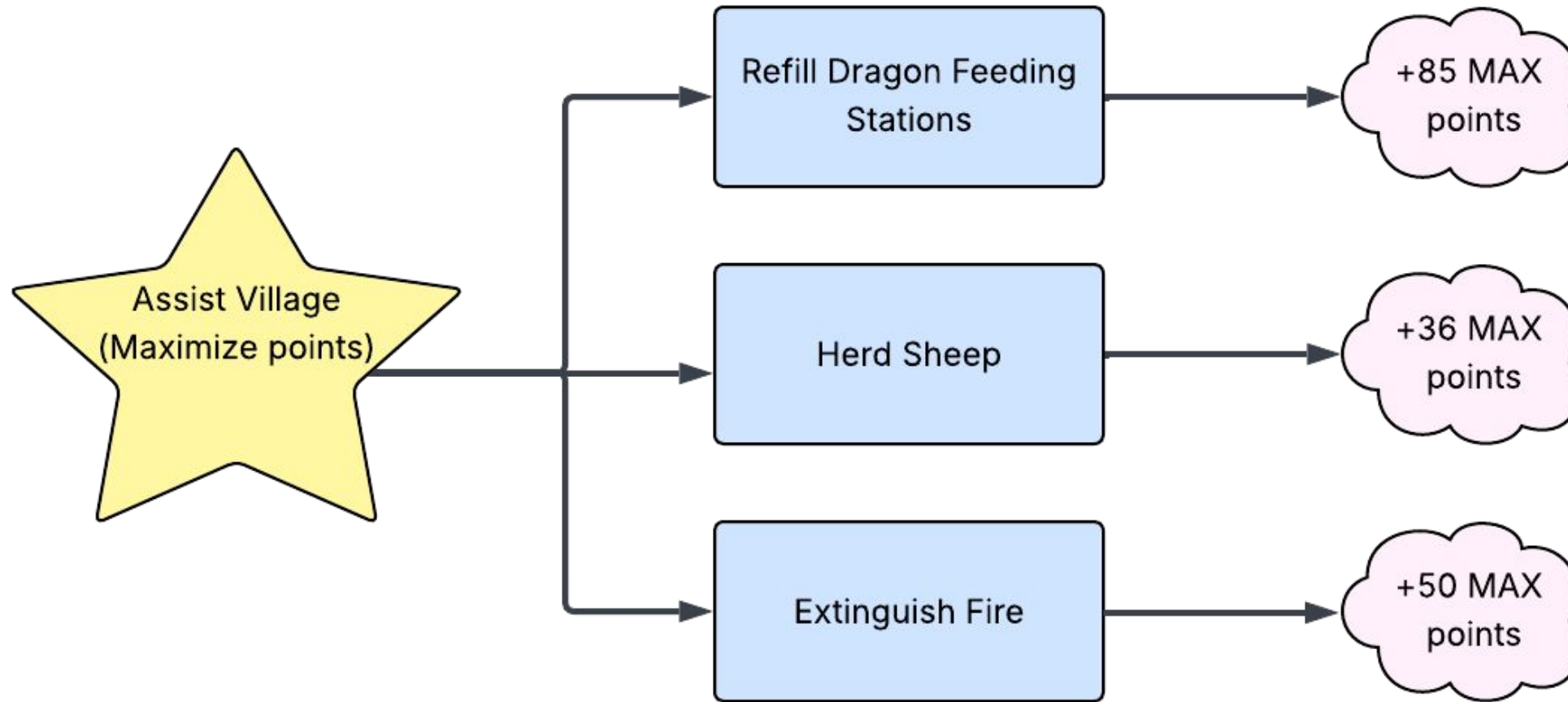
Task Completion

Complexity vs. Reliability

Subsystem Testing

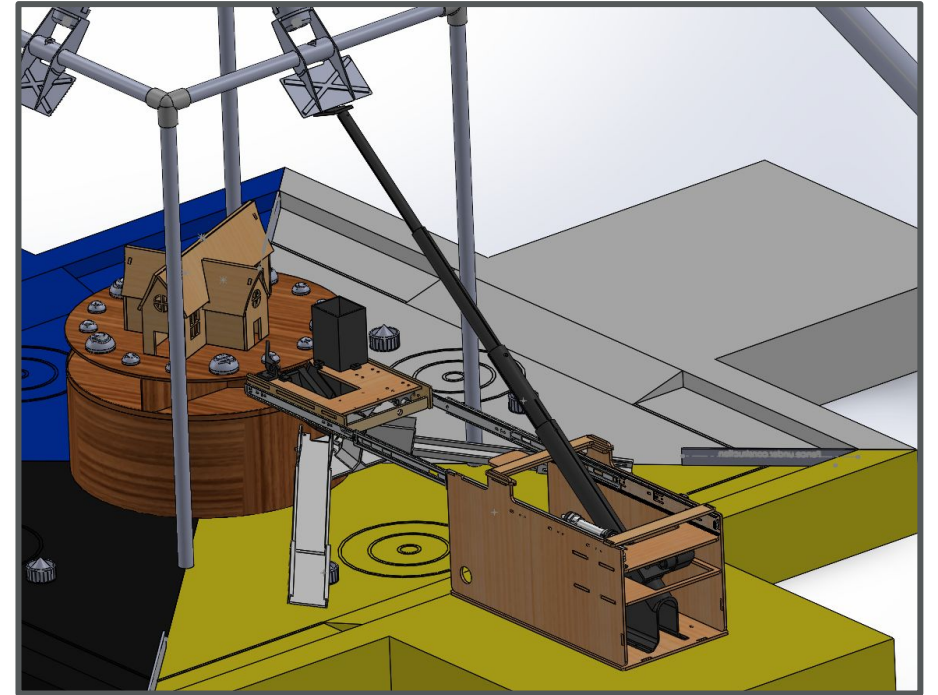
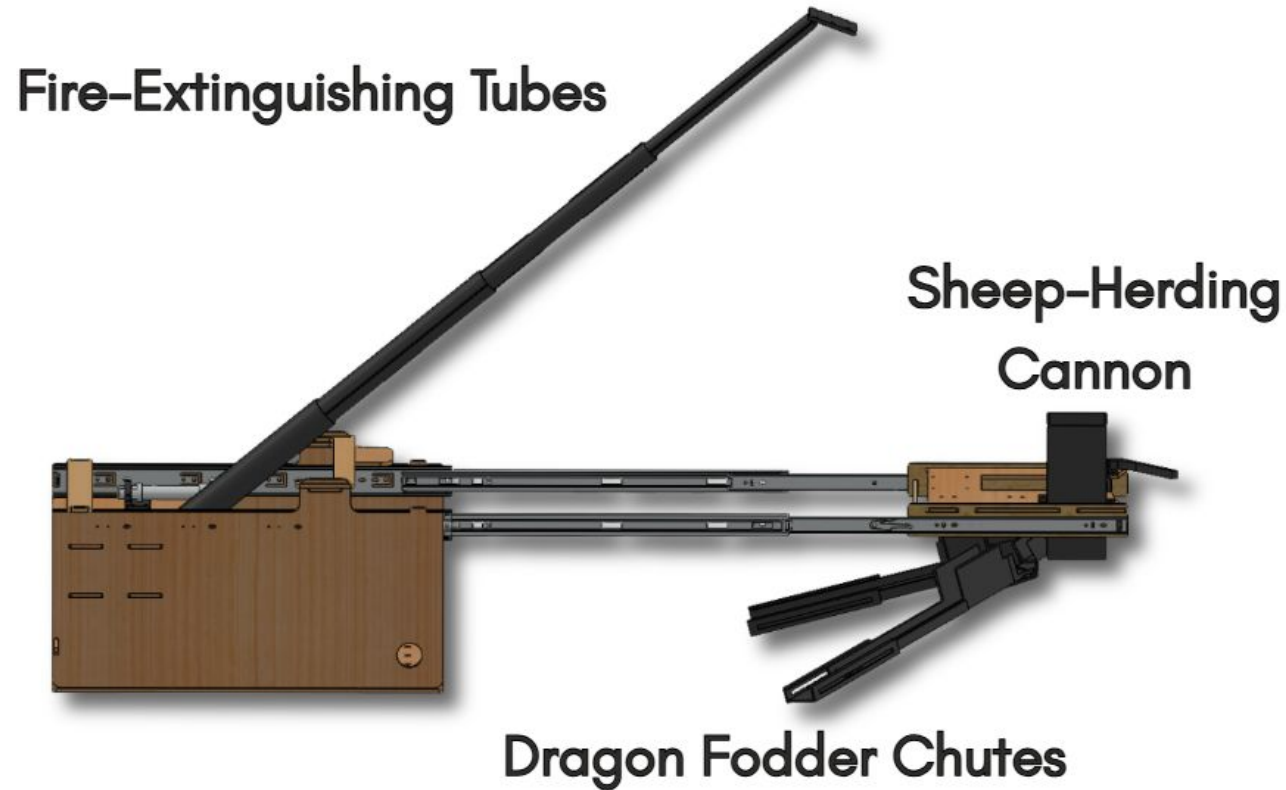
	Task	Competition Point Value	Max Points
1	Activate the System	+5 points for successful deployment +25 points for fully leaving dragon stables	30
2	Extinguish Fire	+13 for robot within 6 inches of lever (in height) +35 for partial activation of lever +50 for full activation of lever (NOT CUMULATIVE)	50
3	Refill Dragon Feeding Stations	+1 for fish in team's home zone OR +7 for fish in team's fish collection zone -4 for eels in team's home Zone OR +3 for eels in team's eel collection zone 0 Points earned (negative points still apply) for Task 3 if any eels in fish collection zone	85
4	Return Sheep	+9 for each sheep deposited in unique zone -9 for EACH of multiple sheep in a zone	36
5	Light Bonfire	+2 for each torch moved +5 for each torch on outer ring +10 for each torch on middle ring +15 for each torch on bullseye (Highest ring touching counted per torch, NOT CUMULATIVE)	30

Competition Strategy



Final Design Overview

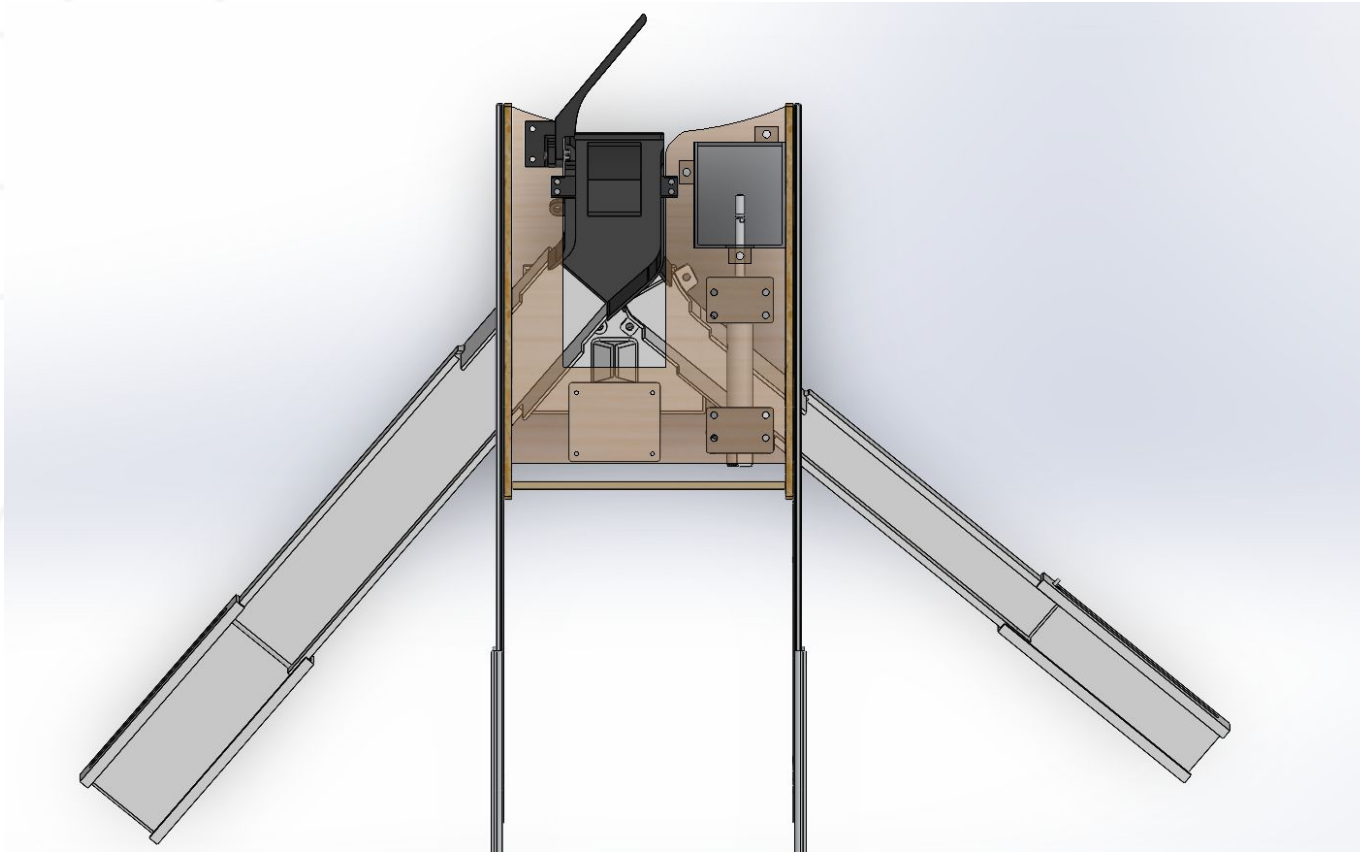
System Overview



Aims to accomplish 3 main tasks:

- Extinguish Fire
- Herd Sheep
- Deliver Fish & Eel

Slide Mounting Mechanism

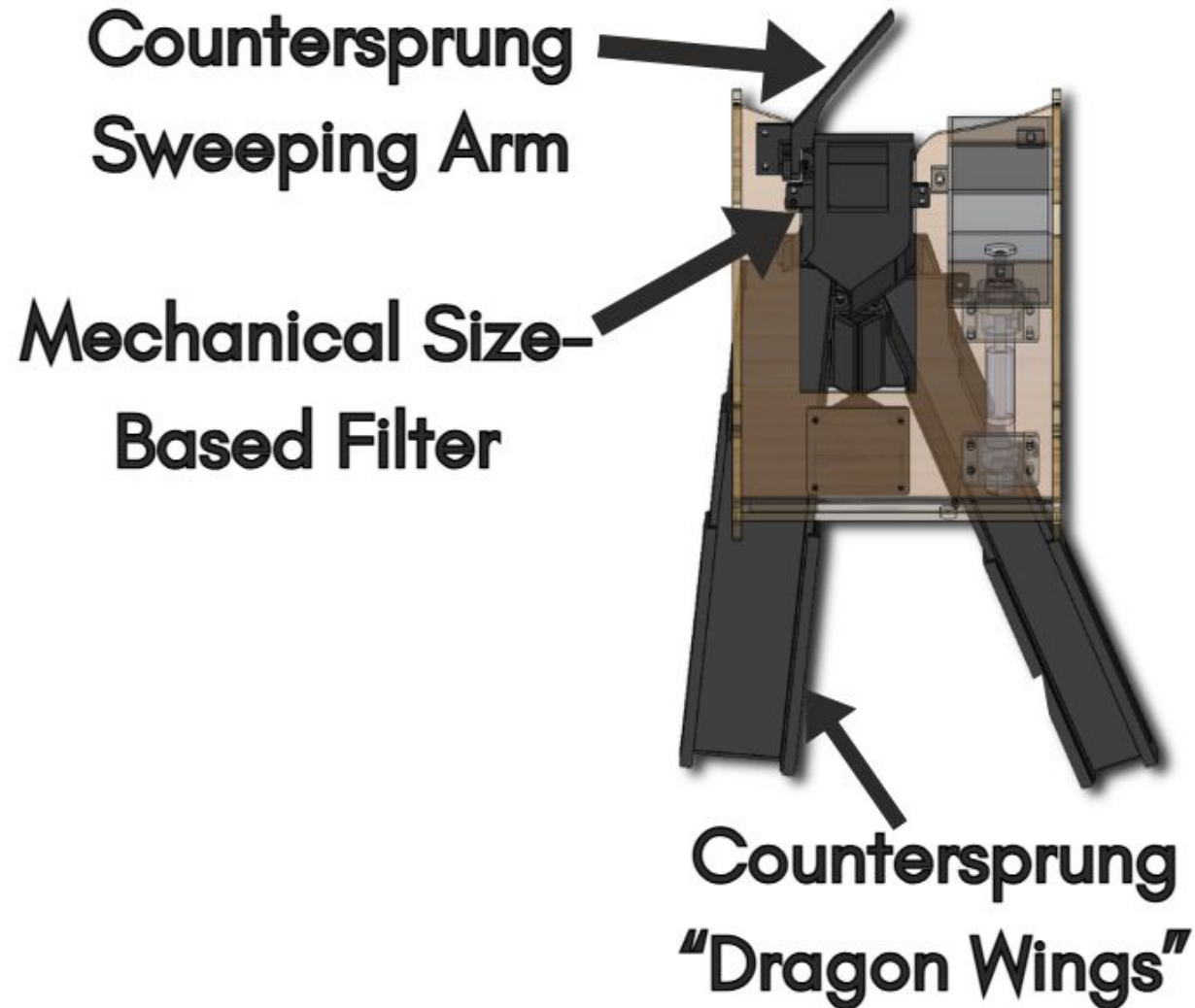


Pneumatic actuator eject slide mounting assembly with subsystems:

- Fish & Eel Collection
- Sheep Herding

Reaches centerpiece <1 sec

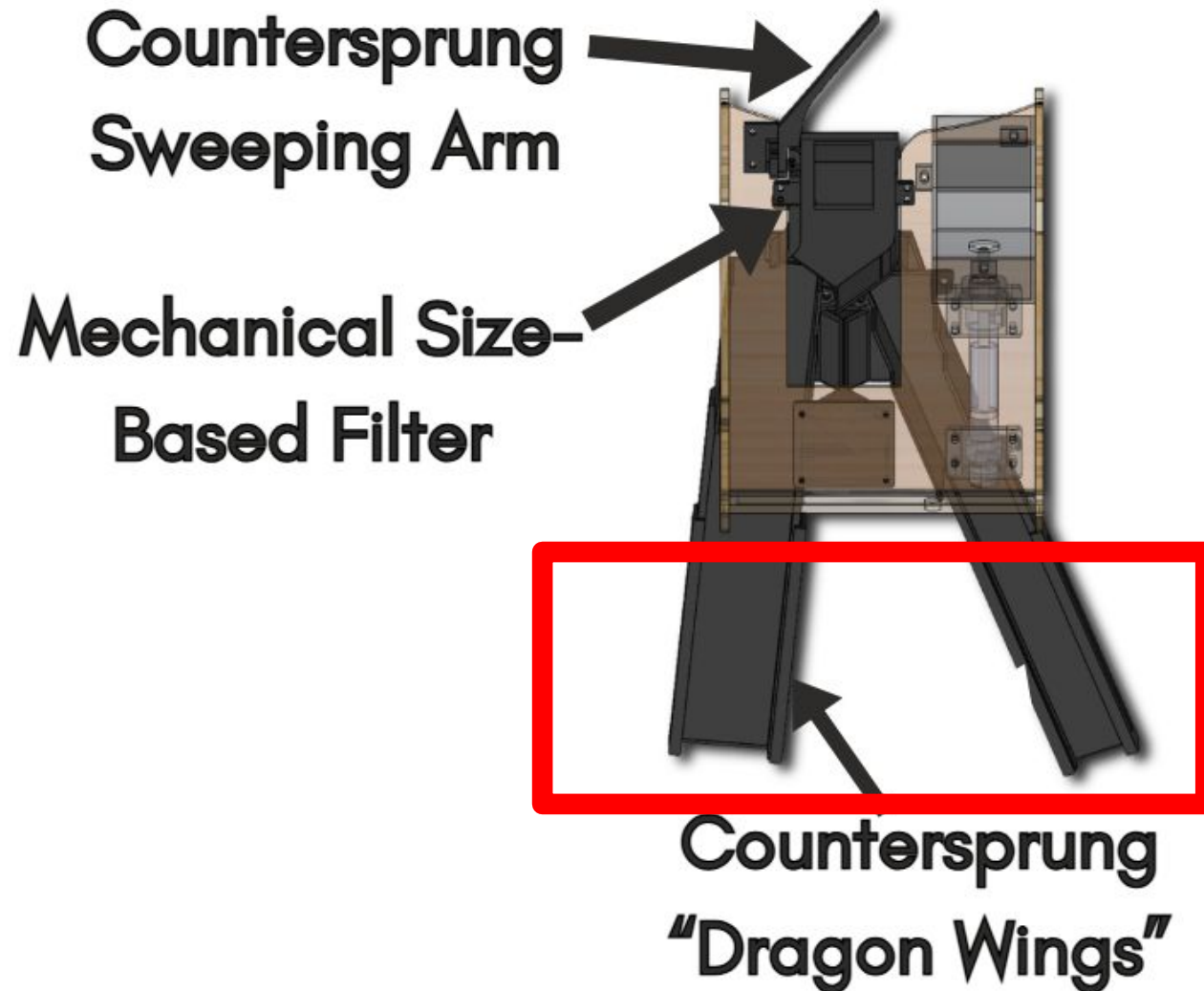
Fish and Eel Mechanism



- 1) Sweeping arm springs out
- 2) Fish and eel spin into filter
- 3) Fish and eel are mechanically sorted by size
- 4) Fish and eel slide down respective chutes and zones

100%* Filtering accuracy for fish and eels

Fish and Eel Mechanism



1) **Sweeping arm springs out**

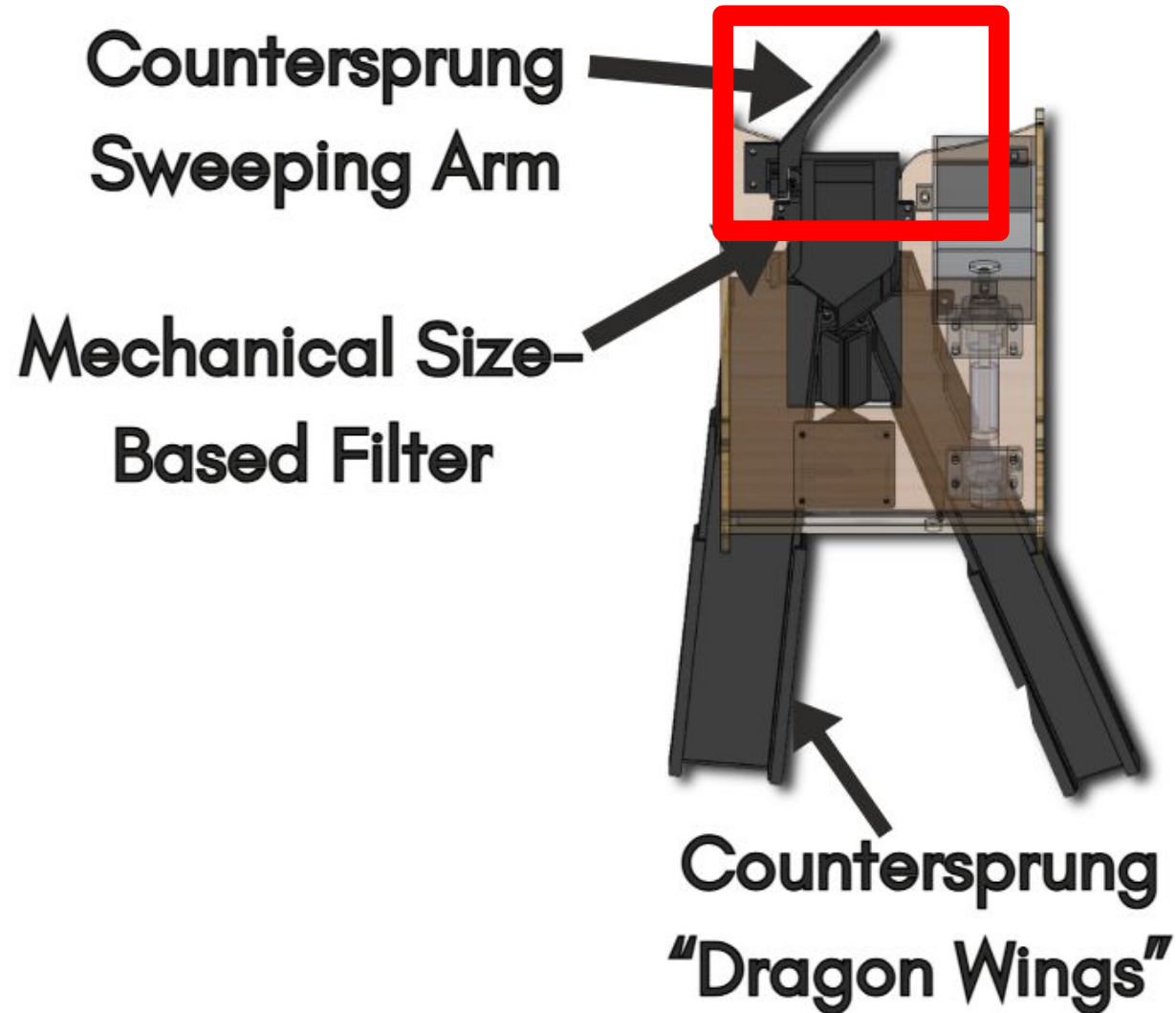
2) Fish and eel spin into filter

3) Fish and eel are mechanically sorted by size

4) Fish and eel slide down respective chutes and zones

100%* Filtering accuracy for fish and eels

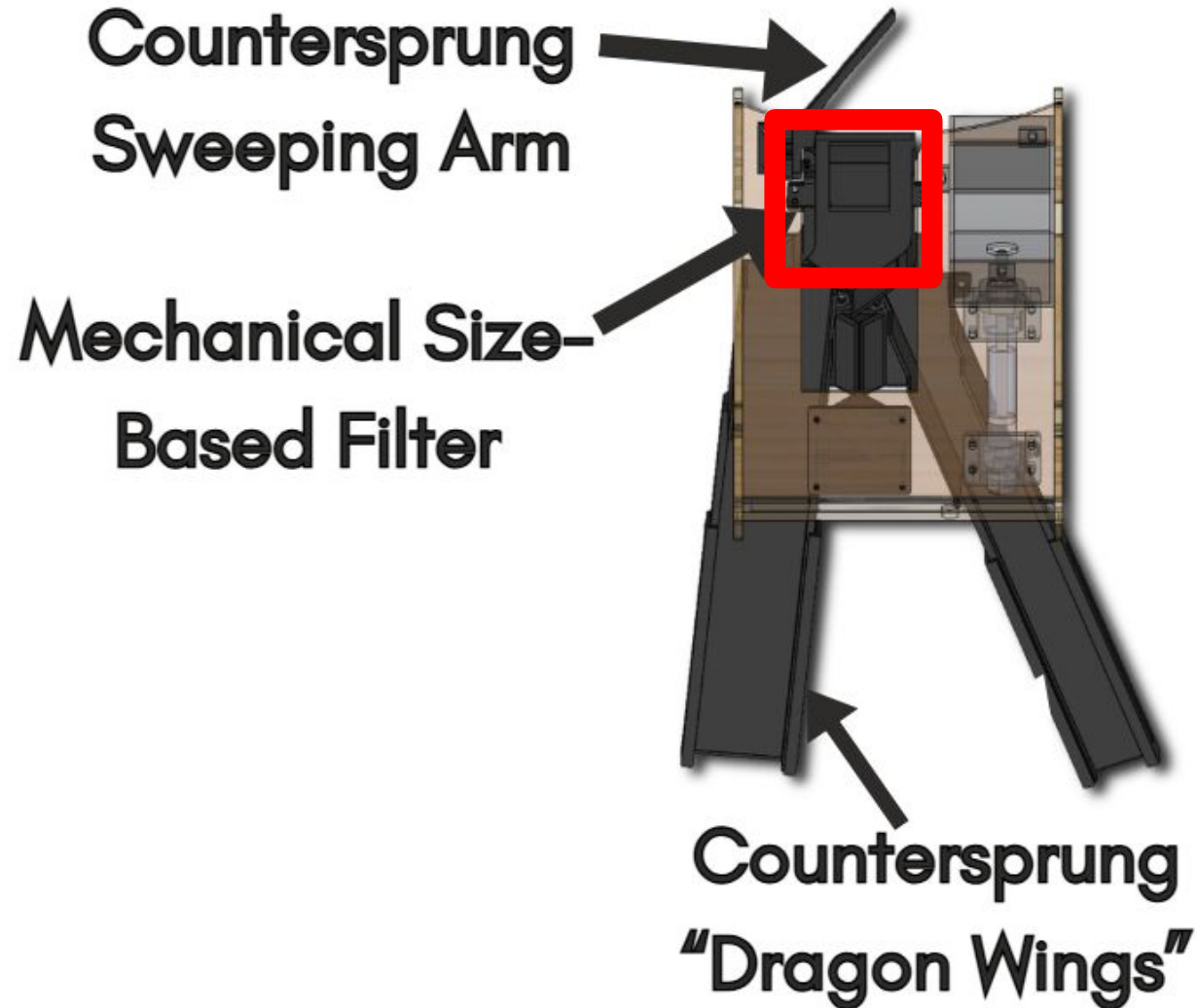
Fish and Eel Mechanism



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- 2) Fish and eel spin into filter**
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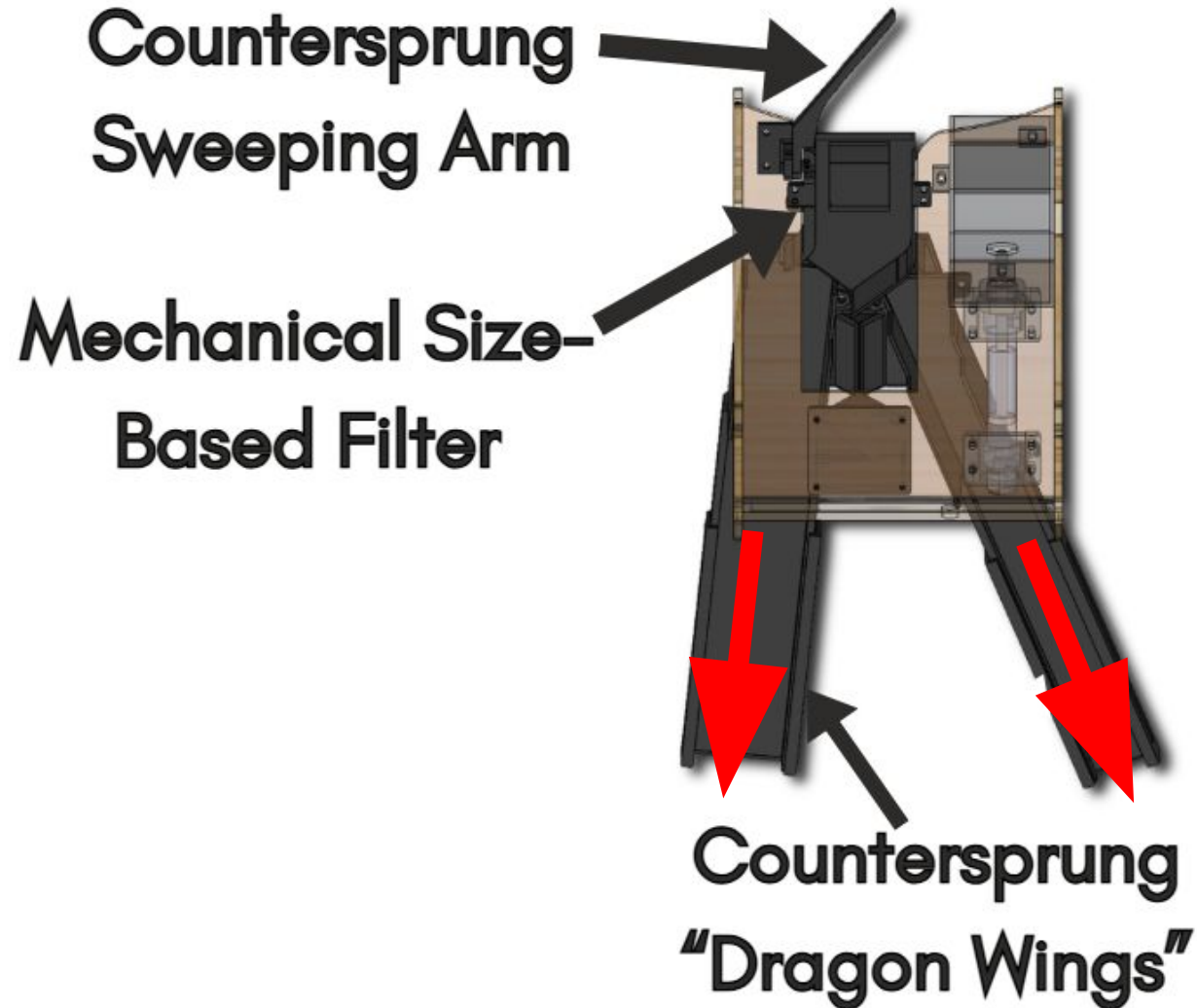
Fish and Eel Mechanism



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Fish and Eel Mechanism

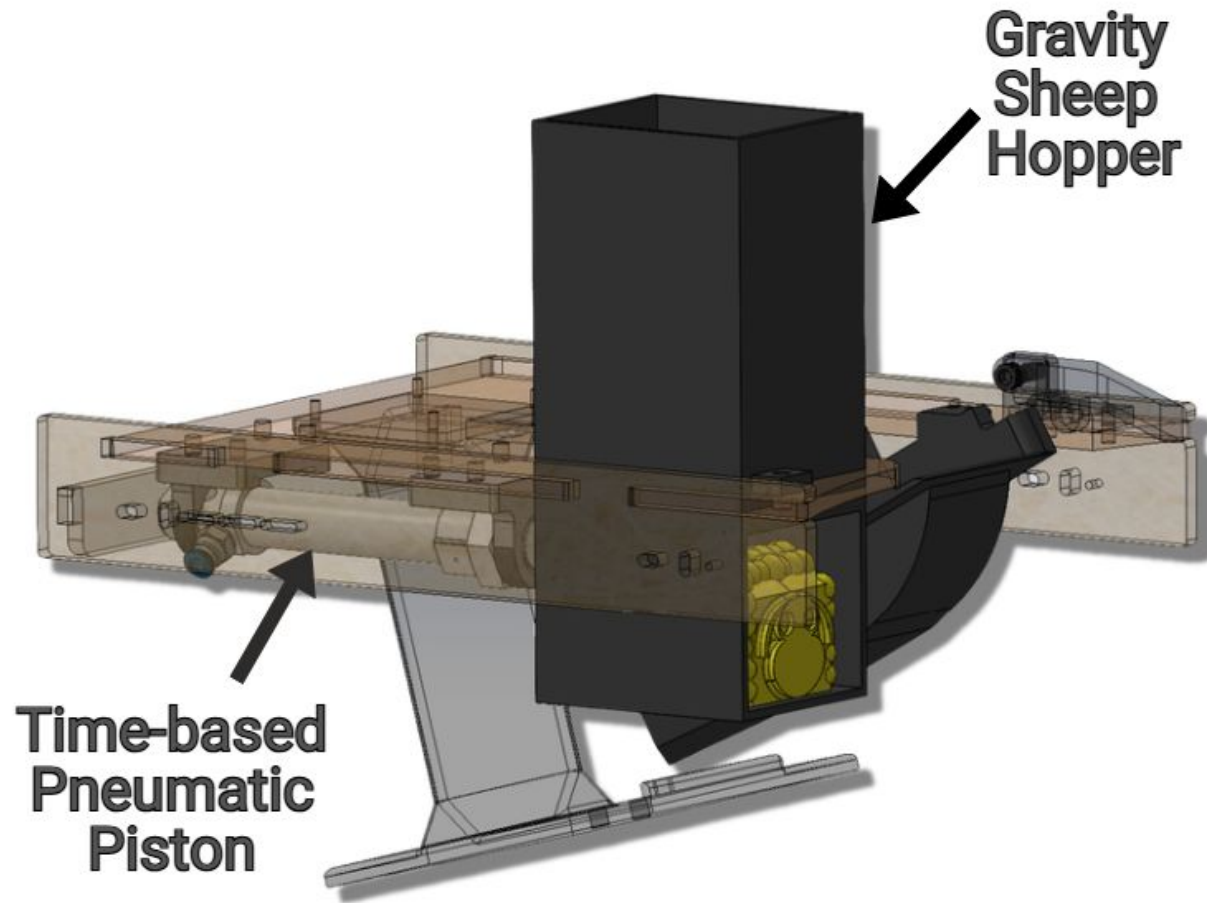


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100%* Filtering accuracy for fish and eels

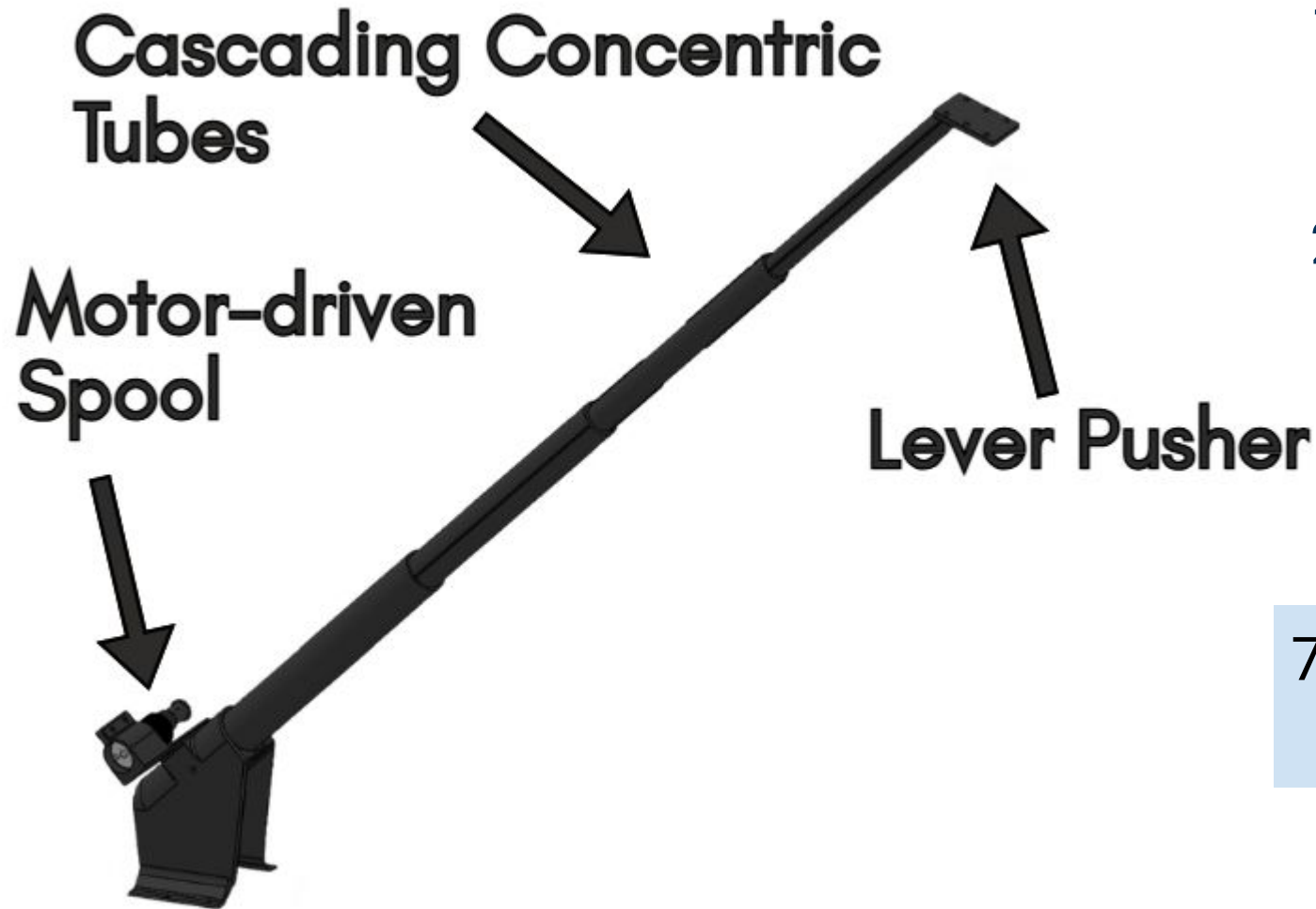
Sheep Delivery Mechanism



- 1) Pneumatic shoots sheep into pen
- 2) Time-based activation (fires every 3.75s)

75% Sheep Herding Success

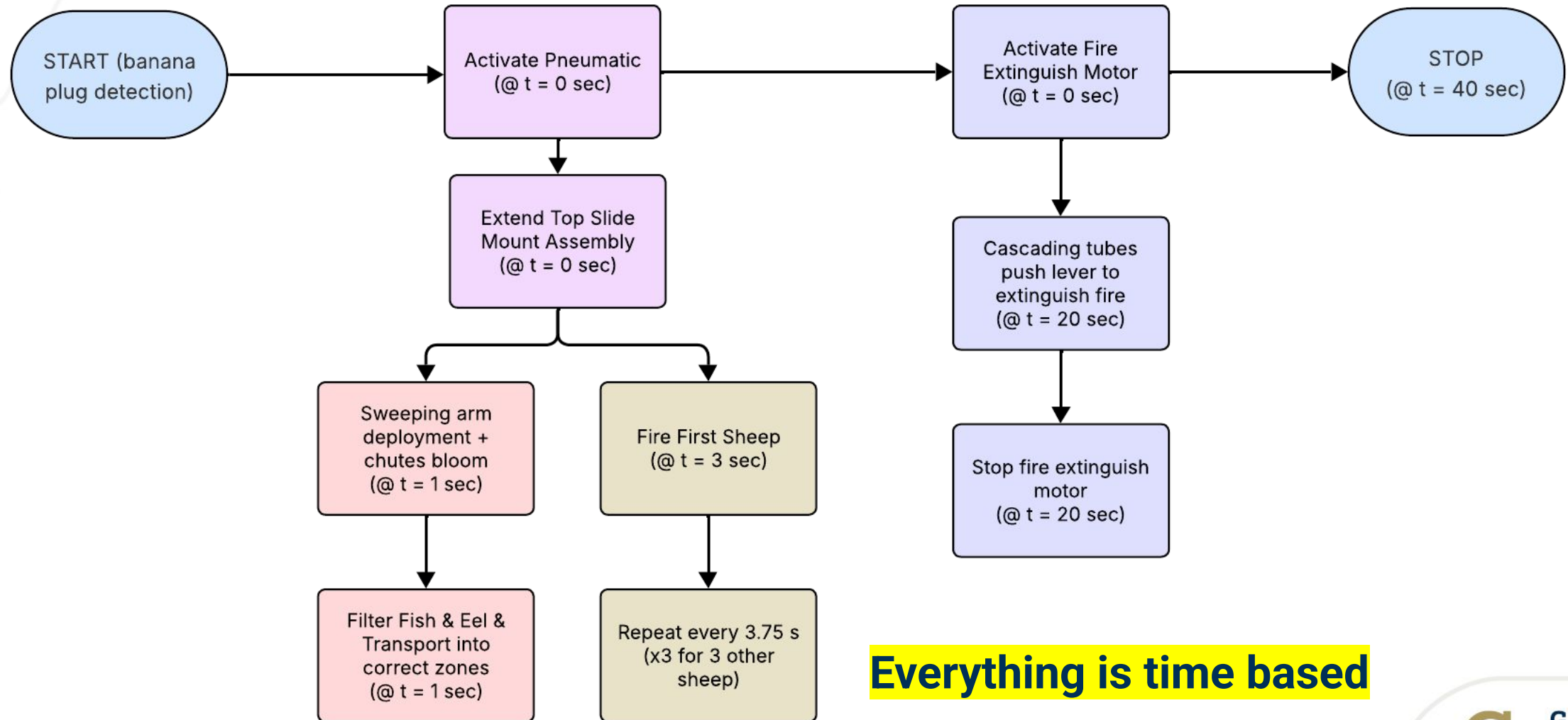
Extinguish Fire Mechanism



- 1) Spool reels string to extend cascading tubes
- 2) Pusher hits lever to extinguish fire

75% Partial Activation	25%
Full Activation	

System Flow Chart

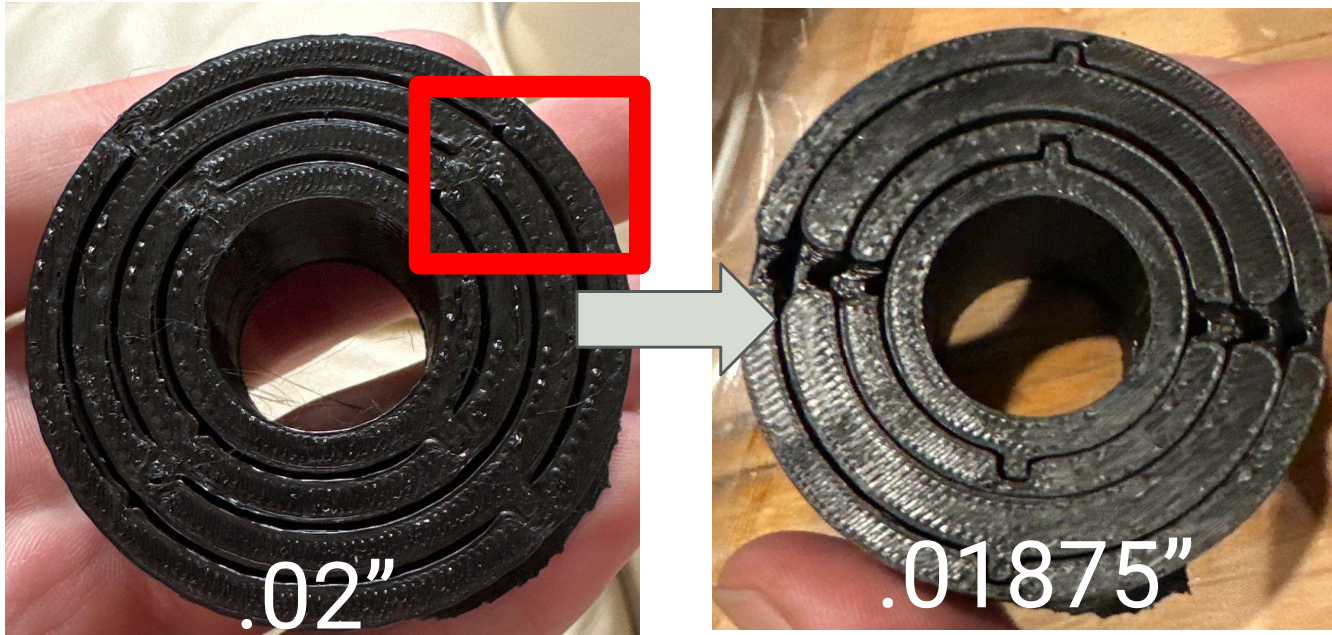


Everything is time based

Fabrication and Testing Approach

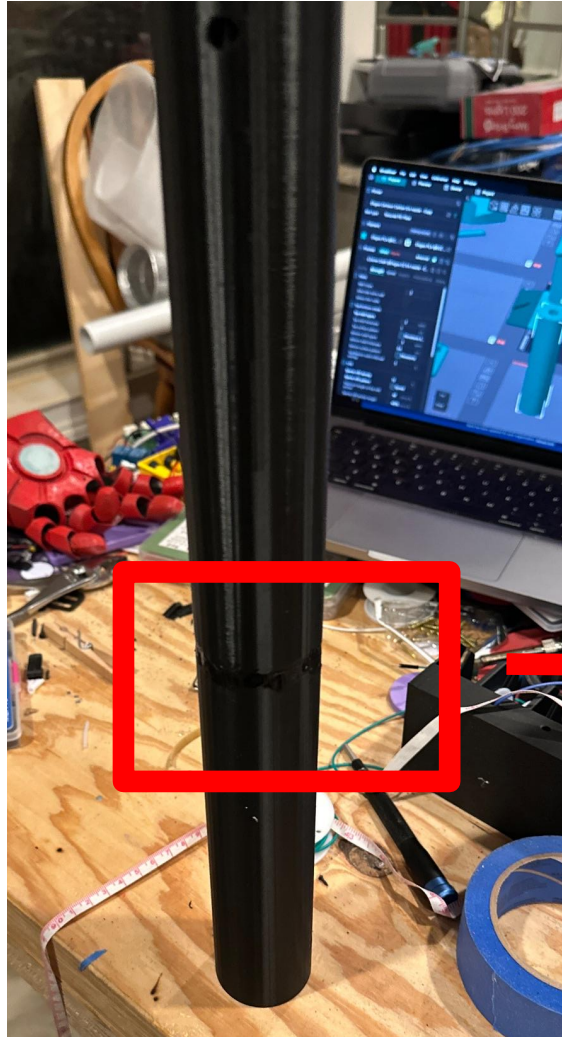
Fabrication and Testing

Tolerance Iteration for Extinguish Fire



Tolerances too small -> pieces fused together

Fabrication and Testing



Plastic welding

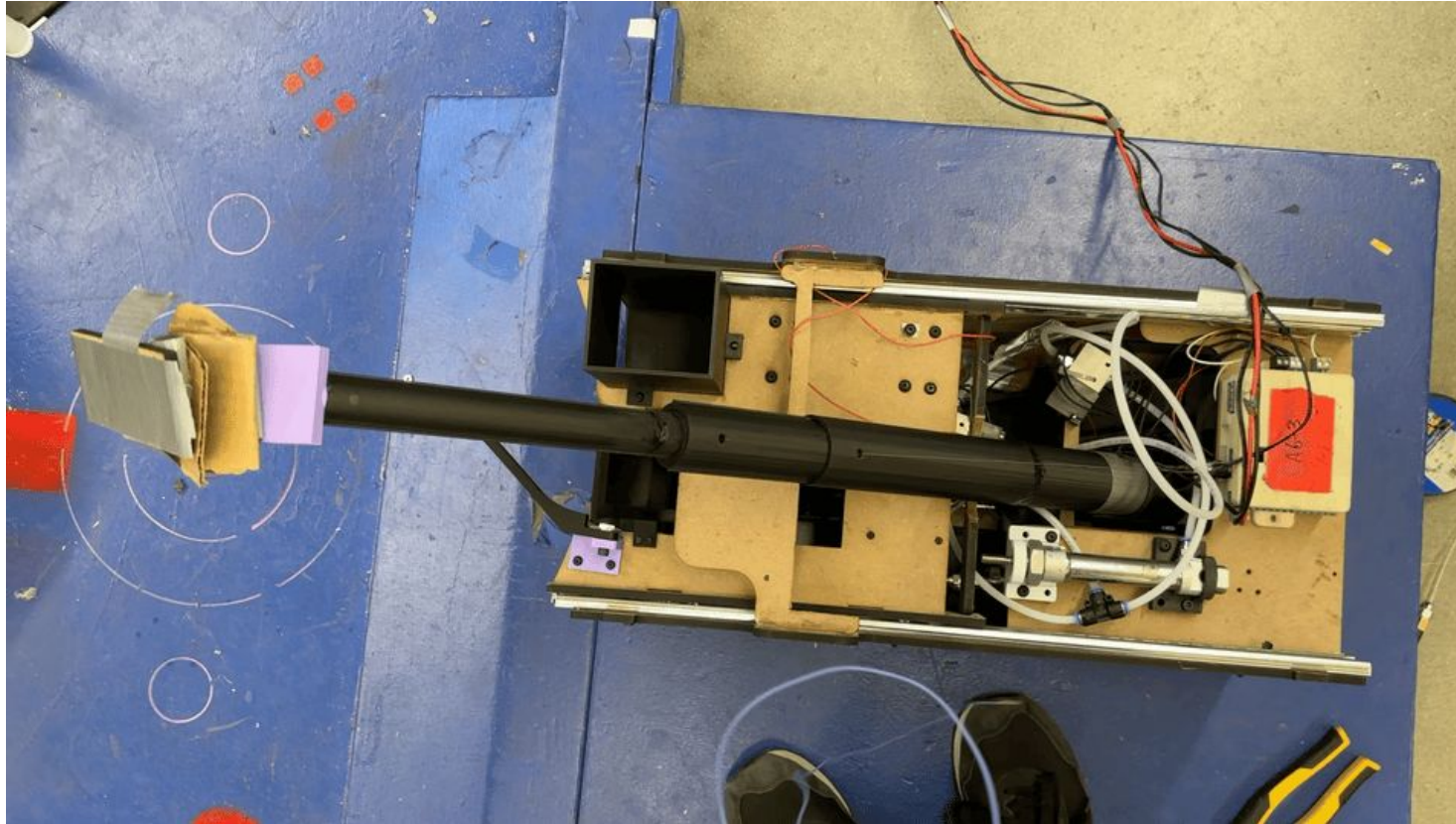
Fabrication and Testing

V1 Telescoping Base Mount



- Reduce: base width, wall thickness
- Motor mount tolerance
- **Too bulky**

Testing



- Deploying torch: **Compromises drawer slides**

Testing



- Horizontal sheep magazine with passive arm - **failed** -> **switch to vertical magazine**

Testing - Fish & Eel



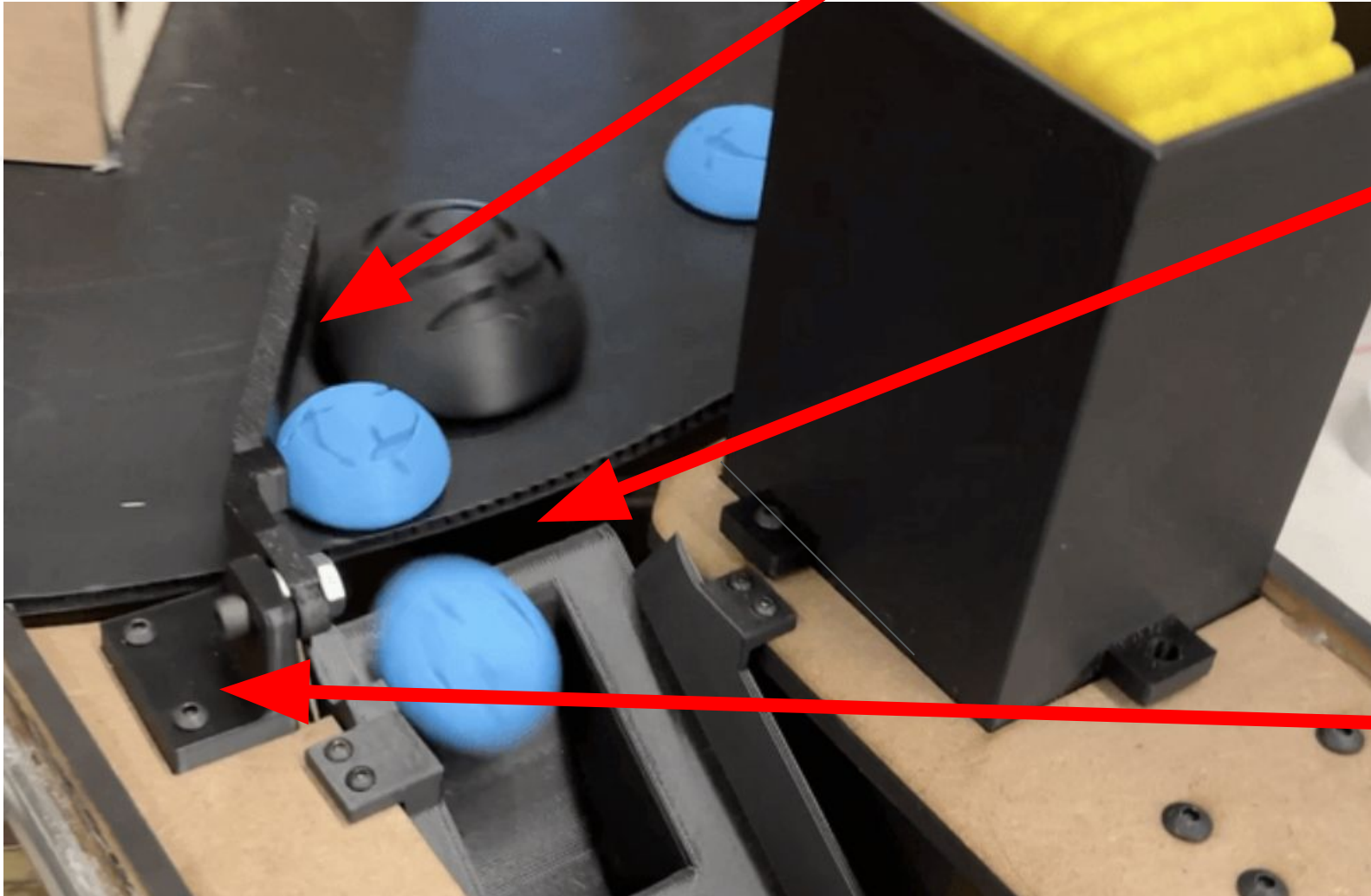
very nice
👍 👍

Testing - Fish & Eel

More aggressive **angle** for arm to redirect pieces better

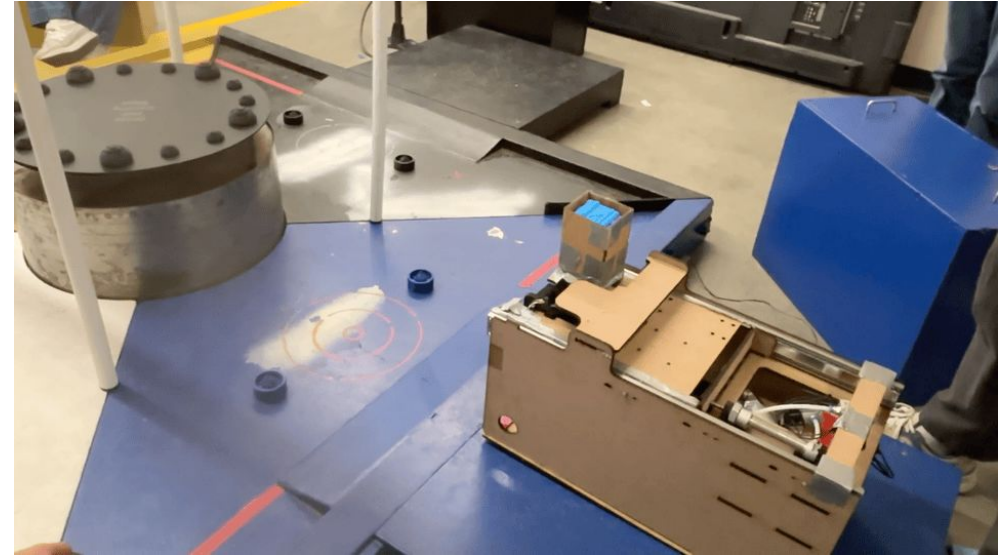
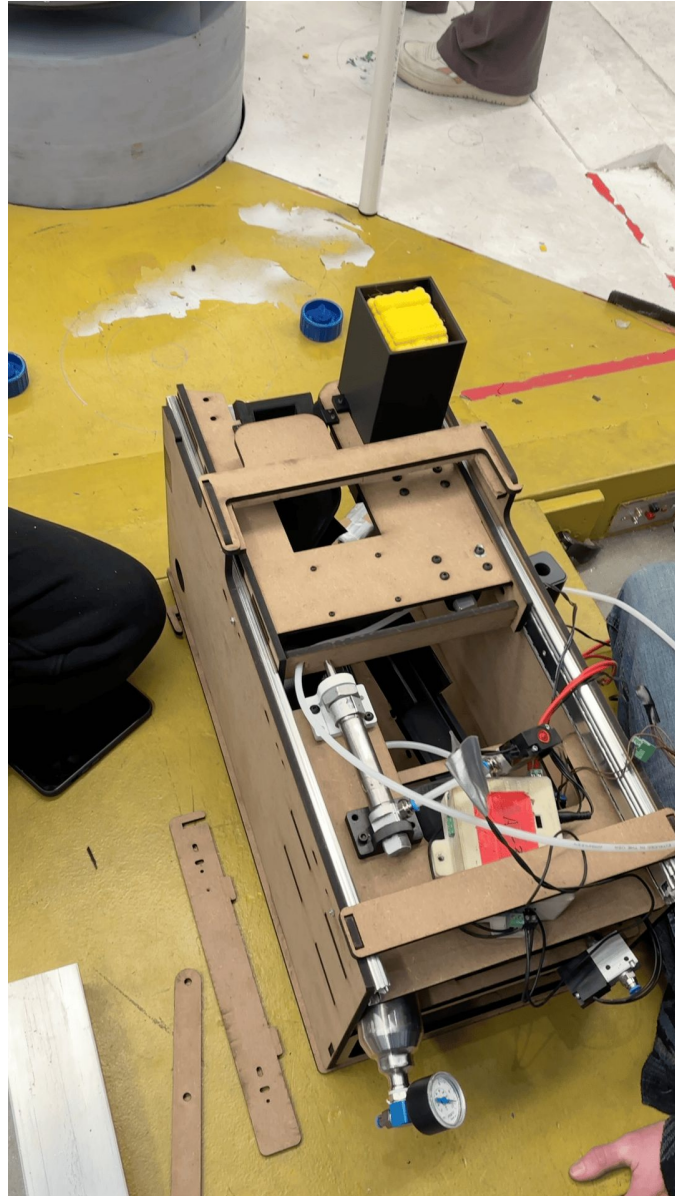
Lowering filter height so pieces can drop in easier

Swapping different sized mounts to **test arm height**



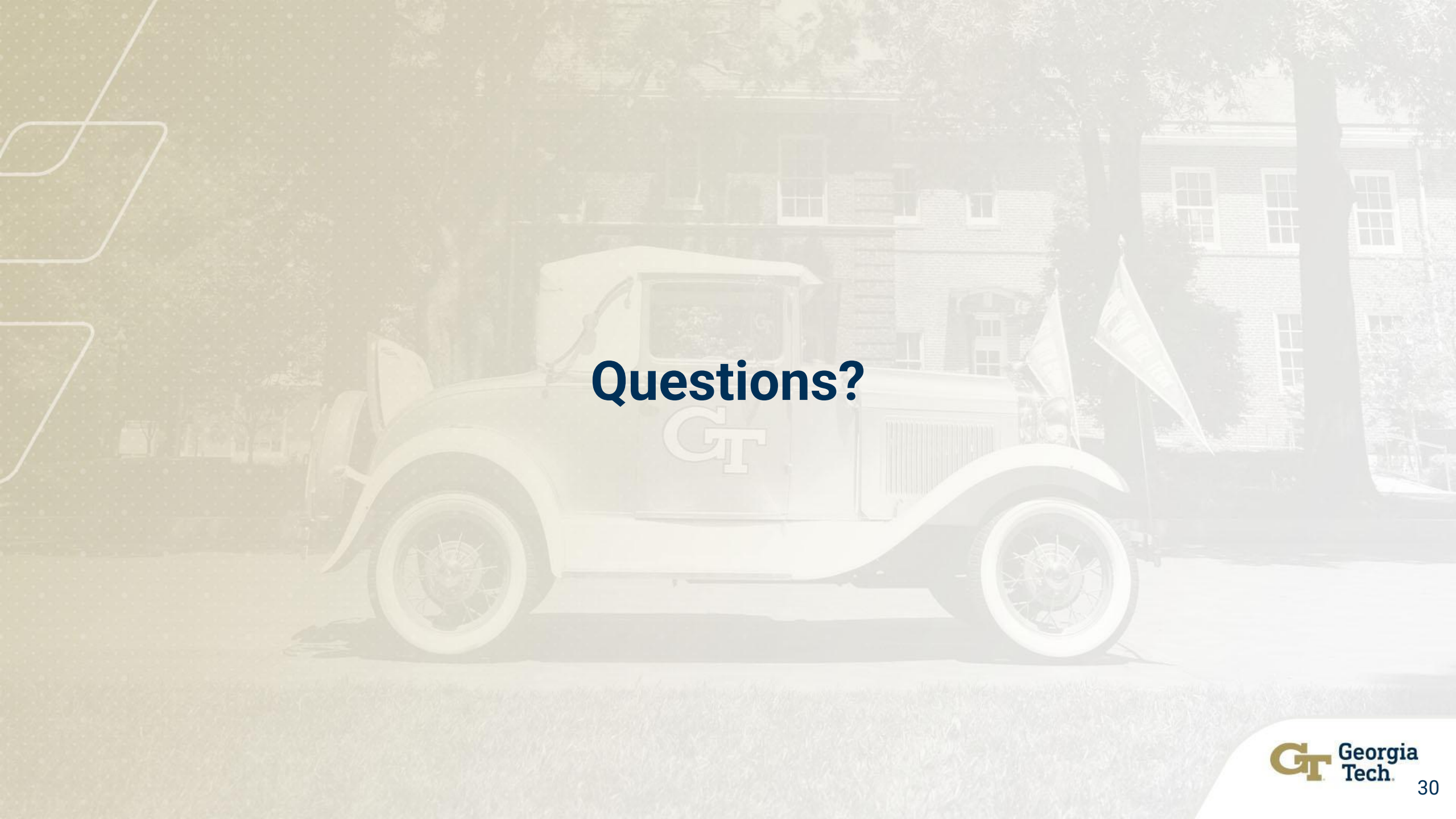
Conclusion

Most reliable subsystem 100% deployment rate 🍑 🍑



Conclusion

- Complexity increases time required for testing
 - Opportunity for improvement: Testing
- Selected design was predicted to outperform alternatives in reliability
 - Opportunity for improvement: Conforming to a single design
- Final competition score impacted by penalties and connectivity
 - Opportunity for improvement: Checklist

A vintage open-top car, likely a 1920s model, is parked on a grassy area. The car is light-colored with a dark 'GT' logo on the side. Two flags are attached to the front of the car. In the background, there is a large, multi-story brick building with many windows, partially obscured by trees. The entire image has a light green overlay with a subtle pattern of dots and lines on the left side.

Questions?