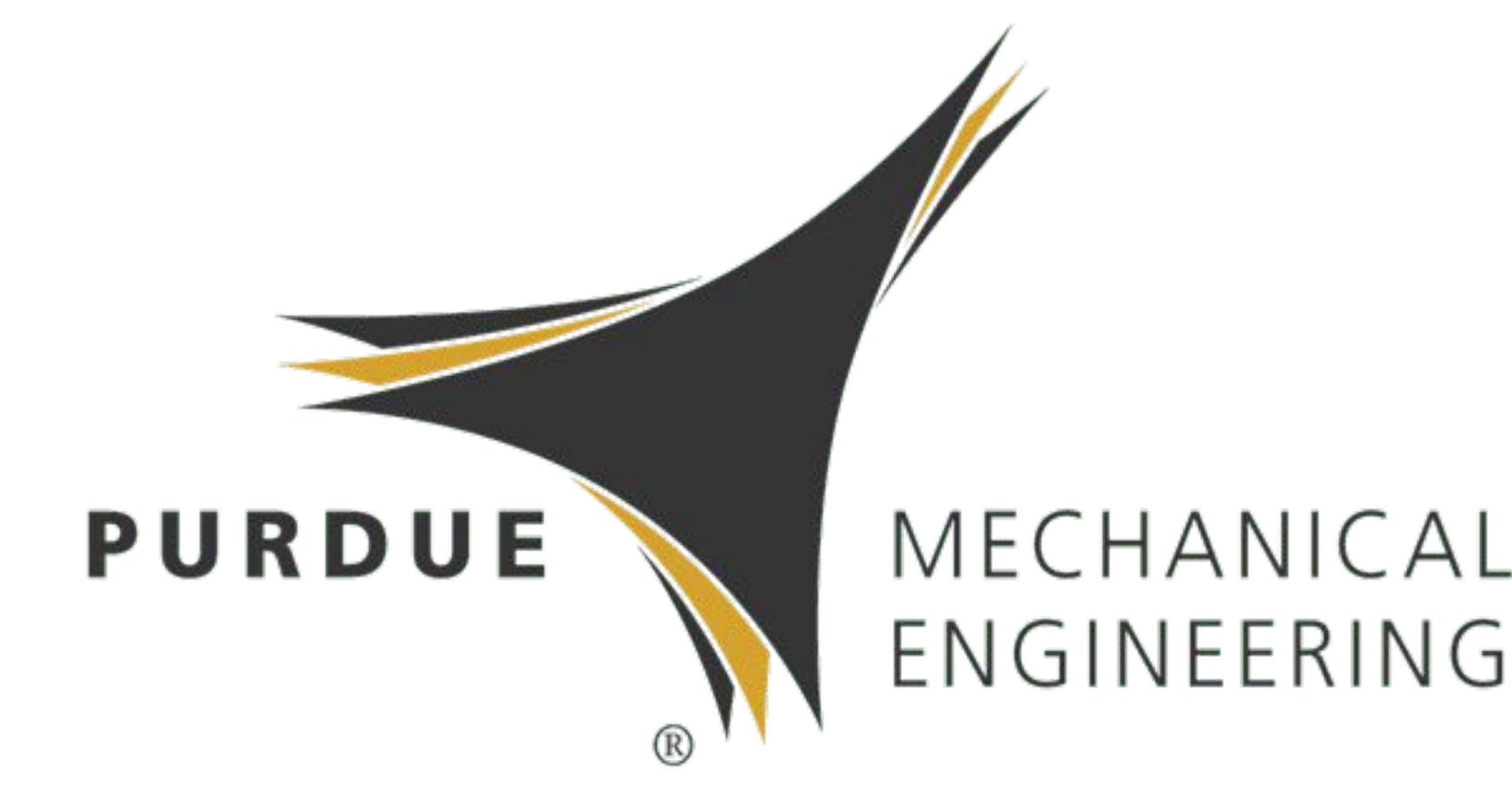


Hydraulic Door Opener

Team Nugget

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Problem Statement: Opening doors with your hands can be unsanitary and inconvenient, there should be a hands-free way to open doors

Problem and Motivation

Current hands-free door openers are:

- Too slow
- Awkward or unwieldy
- Expensive

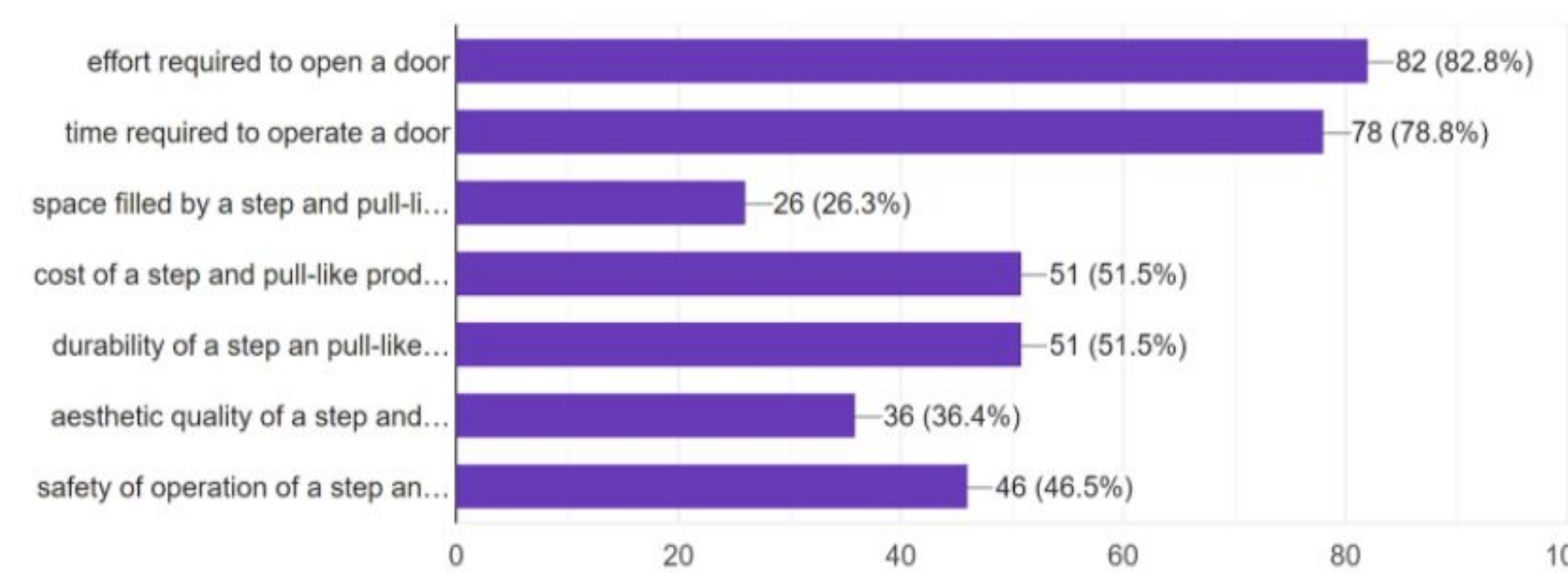
Our solution must solve these issues while being:

- Durable
- Safe
- Easy to install

Customer and Market

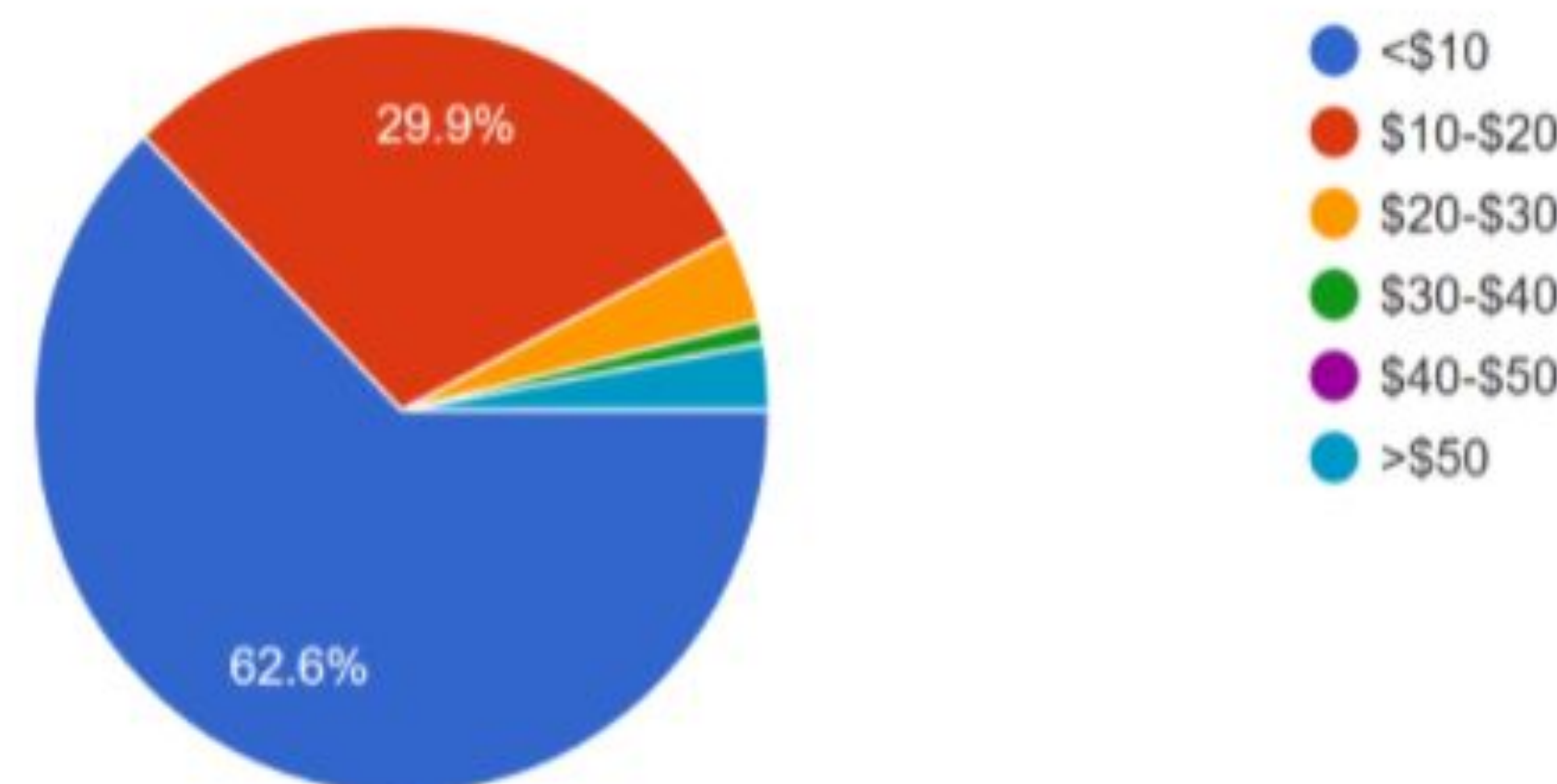
Stakeholders:

- People with Disabilities
- Warehouse Workers
- Universities
- Manufacturers



Customer Requirements:

- Easy to open door
- Durable
- Safe
- Fast



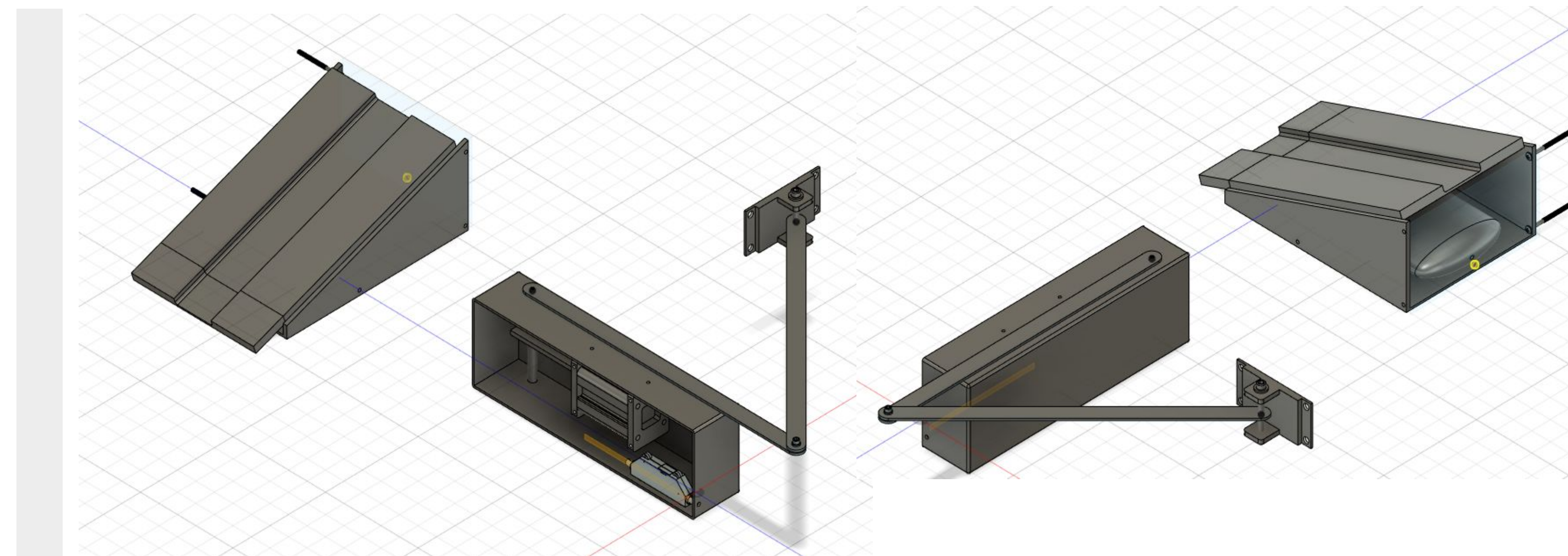
The "Doors Market" is valued at \$140.5 billion and growing

Benchmarks



- All are either too slow, too unwieldy or don't have the desired functionality
- Electric door openers don't function during power outage
- StepNugget provides hands-free use, but is unwieldy and awkward

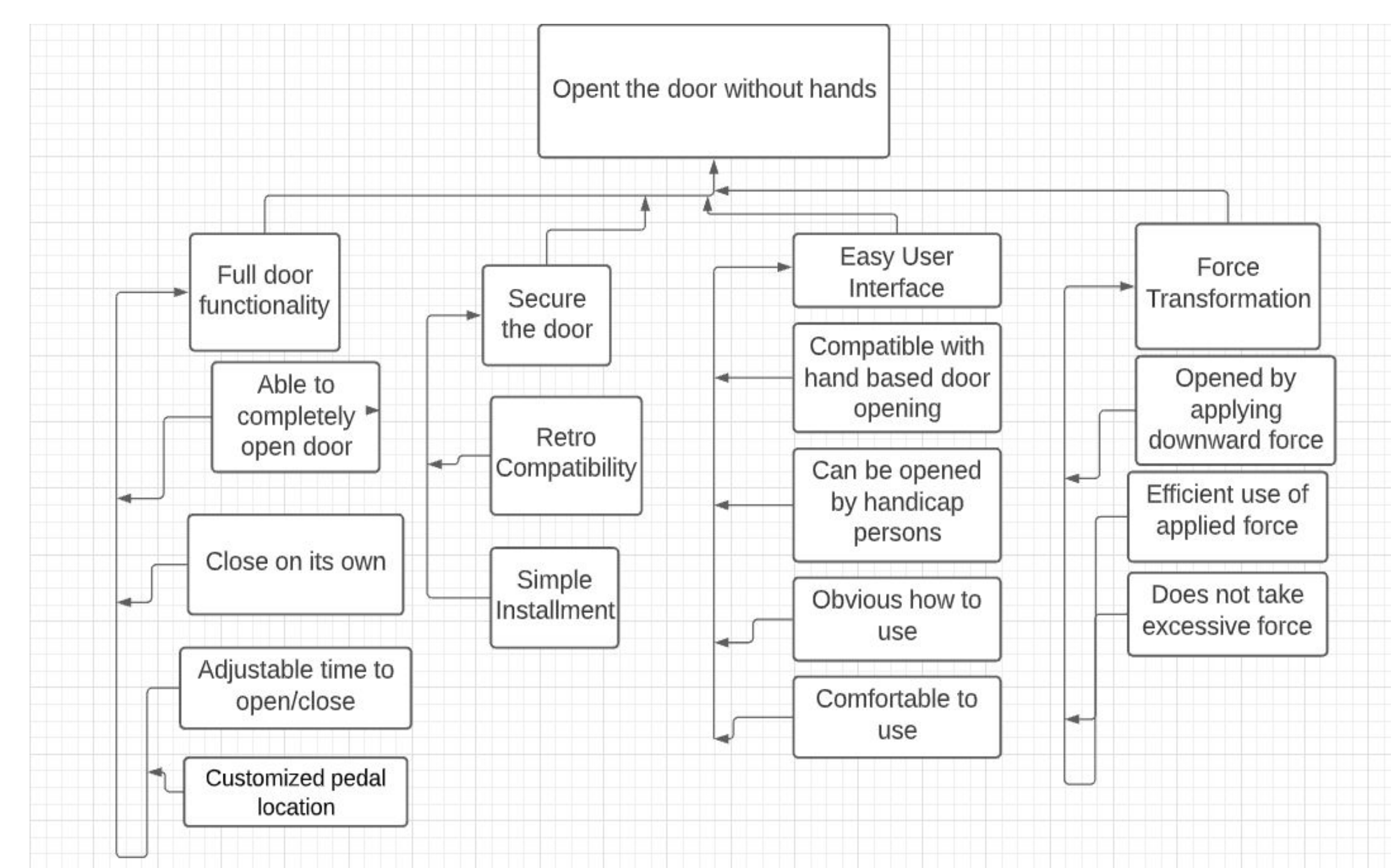
Proposed Design



Specifications

Engineering Specification	Target (Delighted)	Threshold (Disgusted)
Force of Operation (N)	22	132
Strength of Material (ksi)	45	25
Longevity (years)	15	3
Unit Cost (\$)	10	1600
Size of Unit (in ³)	100	500
Use of Standardized Parts (#)	6	0
Sound Produced (dB)	10	70
Time to Open Door (seconds)	1.5	10
Number of Pinching Parts (#)	0	6

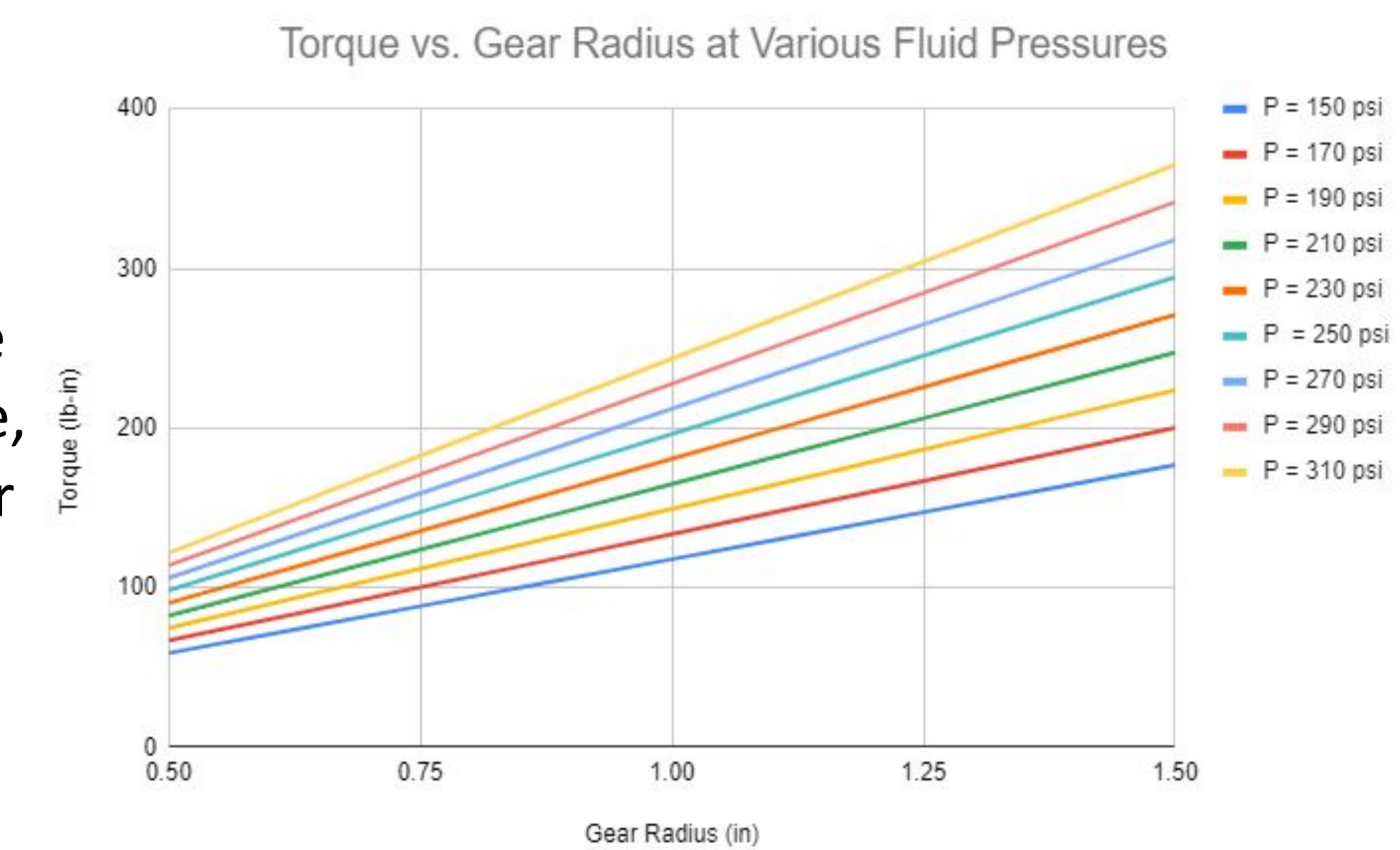
Functional Decomposition



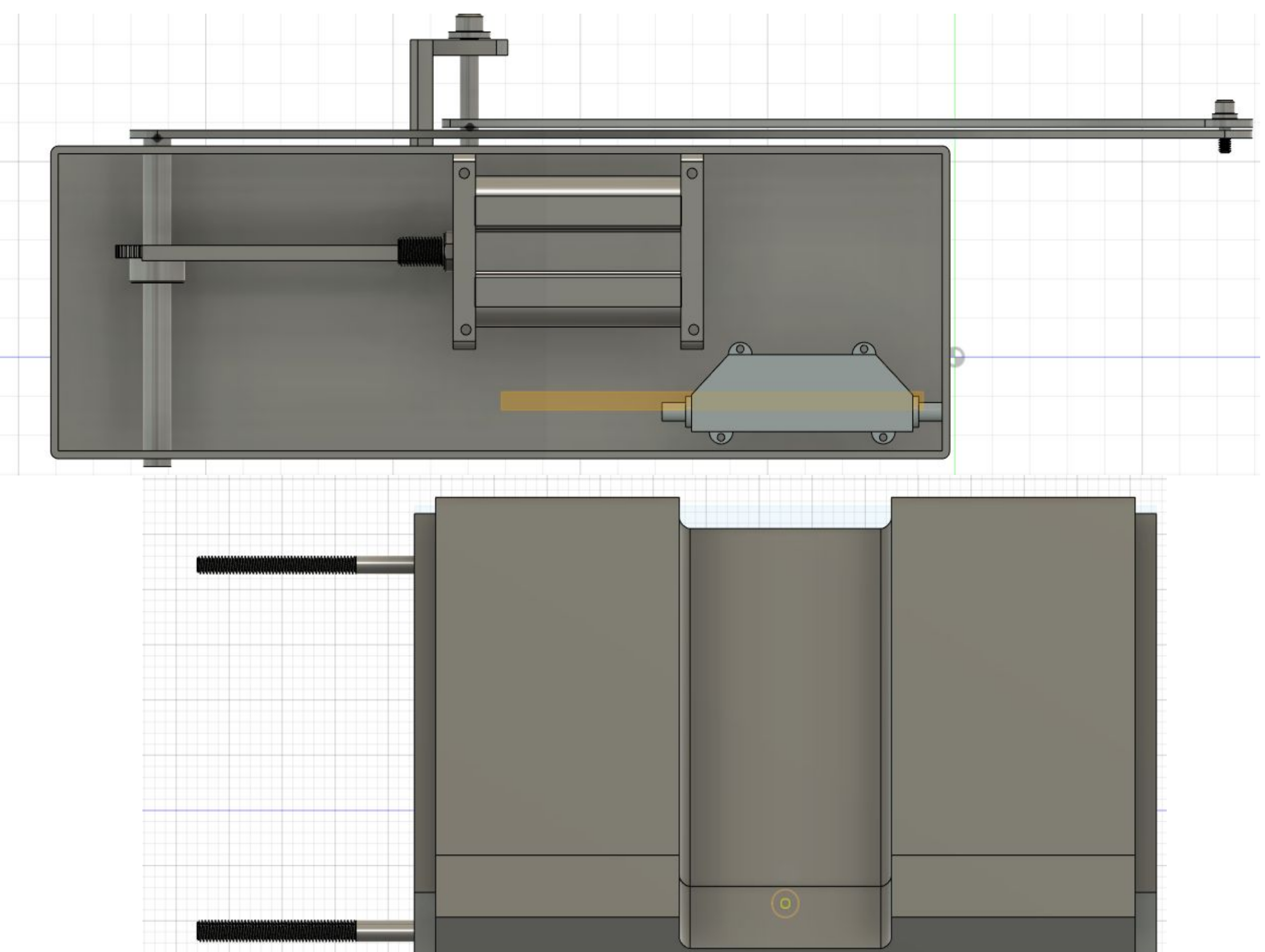
Theoretical Testing

Test Results:

- In order to produce the most torque, a larger gear should be used



Modeling and Functionality



Limitations

- High cost to consumers
- Bulky
- Installation requires many screws to attach
- Tubing needs to be organized and protected by customer