Project Progression

Group Z22

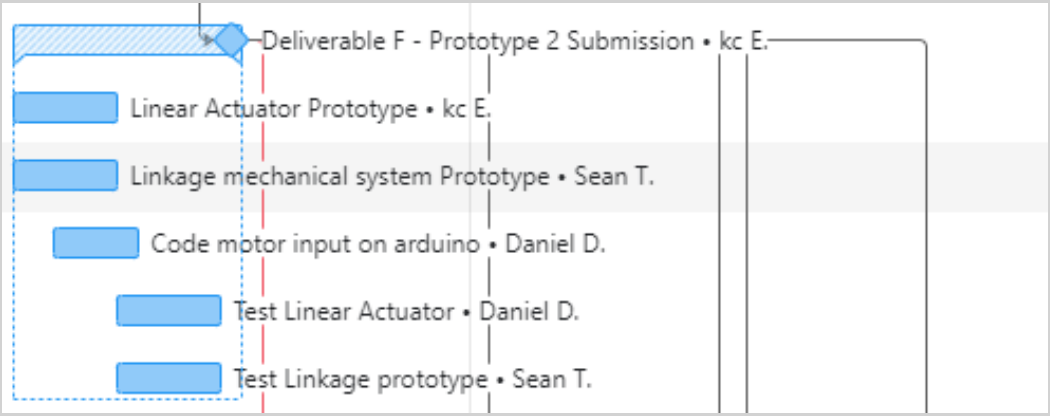
By Sean Tsang, Daniel Deiros, Kesi Ezrim

Agenda

- Project Plan
- Client Meeting
- Problem statement
- Design Criteria
- New Designs
- Next Steps

Project Plan

- The teams initial plan were to have 2 meetings a week
- The team scheduled milestones and goals on Wrike
- The team has been tracking the progress well on Wrike with minor setbacks as the team proceeded through the design



The Proposed Problem

- The standard pick up uses a manual trigger that depends on the human strength to close the claw tighter around an object.
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Your task is to design a powered system that will replace the hand grip requirement with essentially a powered mechanical hand and will hold the object for recovery from the stick.

Client Meeting

- Our Users have arthrogryposis
- Arthrogryposis is the inability to move our body's joints easily. In the case of our client's grandson, the joints in his hands (fingers).
- He is to be able to lift things as big as a water bottle as small as Lego also preferably as sensitive as a Christmas ornament.
- The product would be used infrequently, should be weatherproof and light as possible, because it would be used frequently.

Problem Statement

The client requires a modified grabber handle to accommodate people with physical disabilities who have limited strength, finger dexterity and overall range of motion. It needs to be safe, lightweight, grab objects automatically, and ergonomic.

Priorities/needs specification

NEED #		PRODUCT NEED	SCORE
1	The Power Grabber	Can Squeeze Grabber Trigger	5
2	The Power Grabber	Includes a force sensor	3
3	The Power Grabber	Adjustable applied force to trigger	5
4	The Power Grabber	Operates in the rain and harsh weather conditions	2
5	The Power Grabber	Is automatic (motorized)	5
6	The Power Grabber	Is a manageable weight	5
7	The Power Grabber	It is ergonomic for people with arthrogryposis	5
8	The Power Grabber	Can be used for variously designed power grabbers	3
9	The Power Grabber	Is safe for client use	5
10	The Power Grabber	It is aesthetically appealing	1
11	The Power Grabber	Is durable	3
12	The Power Grabber	Is battery efficient	3
13	The Power Grabber	Is portable	5

Target Specifications

METRIC #	METRIC	UNIT	MARGINAL	TARGET
1	Weight of the Handle	Pounds	0.8	0.4
2	Grip Force	Newtons	4	2
3	Force applied to object	Pounds	1	3
4	Object Weight	Pounds	1	3
5	Battery Life	Hours	5	8
6	Motor Speed	RPM	n/a	n/a
7	Cost	Canadian Dollars	150	100

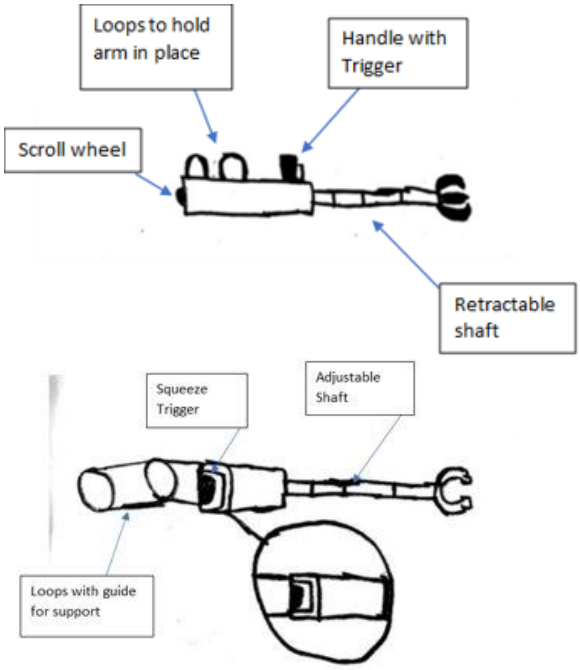
Benchmarking

- There is no product on the market similar to one the client wants us to make.
- User benchmarking:
- Majority commented on the port ability of the device, its comfort/ergonomics and ability to squeeze variou s grabbers.

	PRODUCT 1	PRODUCT 2	PRODUCT 3
Product and Features	The Helping Hand Handi-Grip Pro Reacher (Brand: The Helping Hand)	Grabber Reacher Tool,FitPlus Premium Grabber (Brand: FitPlus)	FTH All Stainless Steel Grabber Reacher (Brand: FTH)
cost	$32.99	$35.22	$59.99
length	26-32 inches	32 inches	40 inches
One-handed	Yes	Yes	Yes
Lightw eight	Yes	Yes	Yes
Simple trigger (pistol grip)	No	Yes	Yes
Motorized handle	No	No	No

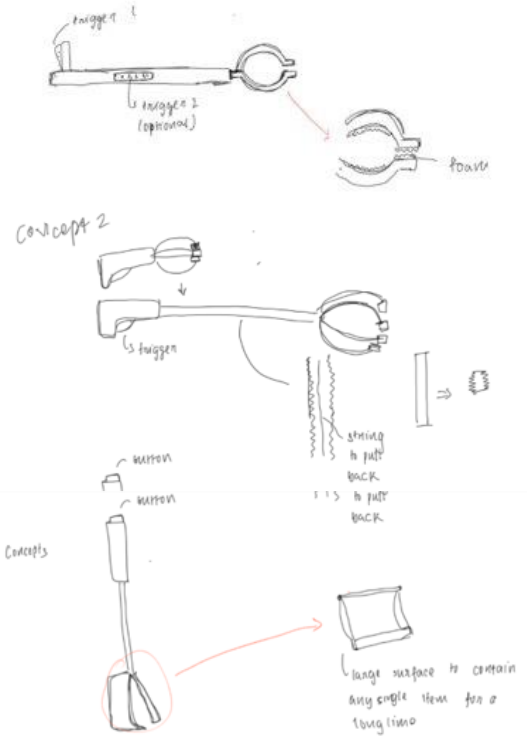
Sean's Designs

Selection Criteria	Weight	Design Concept #1	Design Concept #2	Design Concept #3
Cost	0.1	4	3	1
Handle Ergonomics	0.2	3	3	2
Weight	0.1	3	2	1
Grip of Grabber	0.2	3	3	4
Ease of Operation	0.25	2	3	3
Force Detection System	0.05	2	3	3
Magnets	0.025	0	5	0
Hook	0.0125	0	5	0
Portability	0.0125	3	2	1
Ease of Retrieval	0.05	3	3	5
Total	n/a	2.69	2.96	2.56



Kesi's Designs

SELECTION CRITERIA	WEIGHT	DESIGN CONCEPT #1		DESIGN CONCEPT #2		DESIGN CONCEPT #3	
Cost	0.1	3	0.3	3	0.3	4	0.4
Handle Ergonomics	0.2	4	0.8	2	0.4	1	0.2
Weight	0.1	2	0.2	4	0.4	4	0.4
Grip of Grabber	0.2	4	0.8	2	0.4	0	0
Ease of Operation	0.25	2	0.5	3	0.75	3	0.75
Force Detection System	0.05	2	0.1	4	0.2	0	0
Magnets	0.025	3	0.075	0	0	0	0
Hook	0.01	4	0.04	3	0.03	0	0
Portability	0.0125	4	0.05	4	0.05	4	0.05
Ease of retrieval	0.05	3	0.15	4	0.2	0	0
Total	1	3.015		2.73		1.8	



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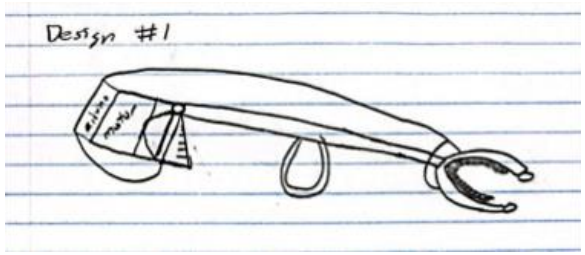
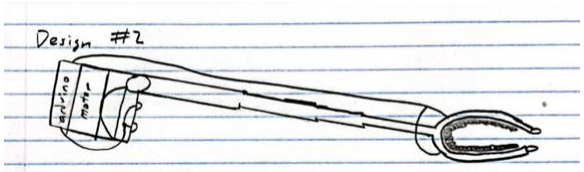
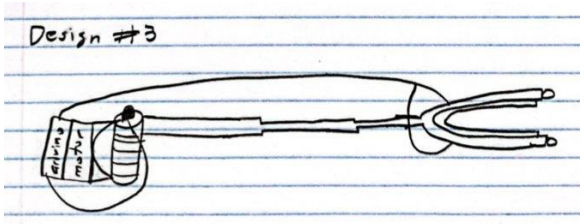
Daniel's Designs

Selection Criteria	Weight	Design Concept #1	Design Concept #2	Design Concept #3
Cost	0.1	4	2	1
Handle Ergonomics	0.2	2	4	5
Weight	0.1	3	3	3
Grip of Grabber	0.2	3	3	4
Ease of Operation	0.25	2	3	4
Force Detection System	0.05	4	4	4
Magnets	0.025	5	5	5
Hook	0.0125	0	0	0
Portability	0.0125	2	2	2
Ease of Retrieval	0.05	1	4	5
Total	n/a	2.24	3.2	3.7







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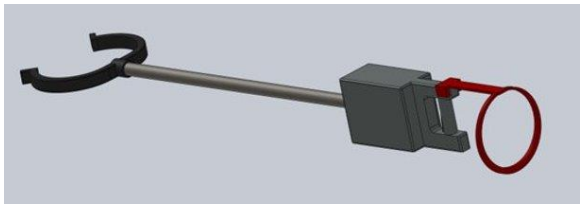
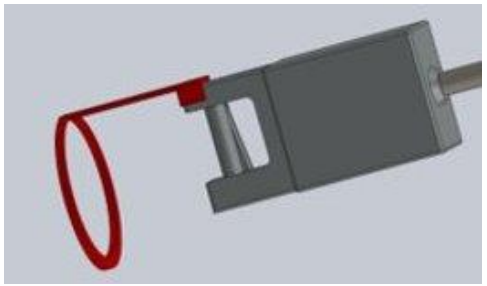
Final Design

Metric #	Need #	Metric	Unit	Marginal	Target	Final Concept
1	6	Weight of the Grabber	Pounds	1.7	1	Yes
2	8	Length of the Grabber	Inches	16	20	Yes
3	2	Force applied to object	Pounds	1	3	Yes (but may be difficult to keep within boundaries)
4	10	Object Weight	Pounds	1	3	Yes
5	14	Battery Life	Hours	5	8	Yes
6	5	Motor Speed	RPM	N/a	N/a	N/a (we can buy a suitable motor)





A Setback

What Went Wrong?

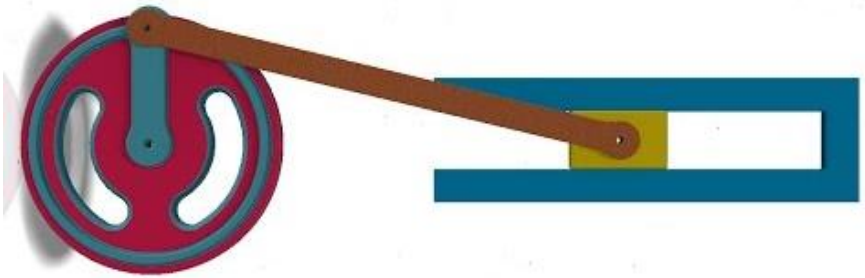
The group and the client had miscommunicated. There was a misunderstanding on what product was to be created.

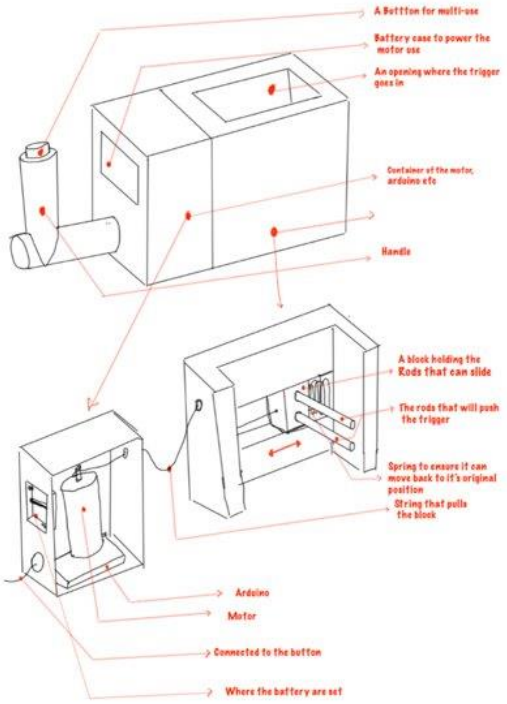
The team was tasked with creating an 'attachment' to the handle of a preexistent grabber such that those with difficulties gripping can use handle grabbers.

The group learned the importance of communication with the client.

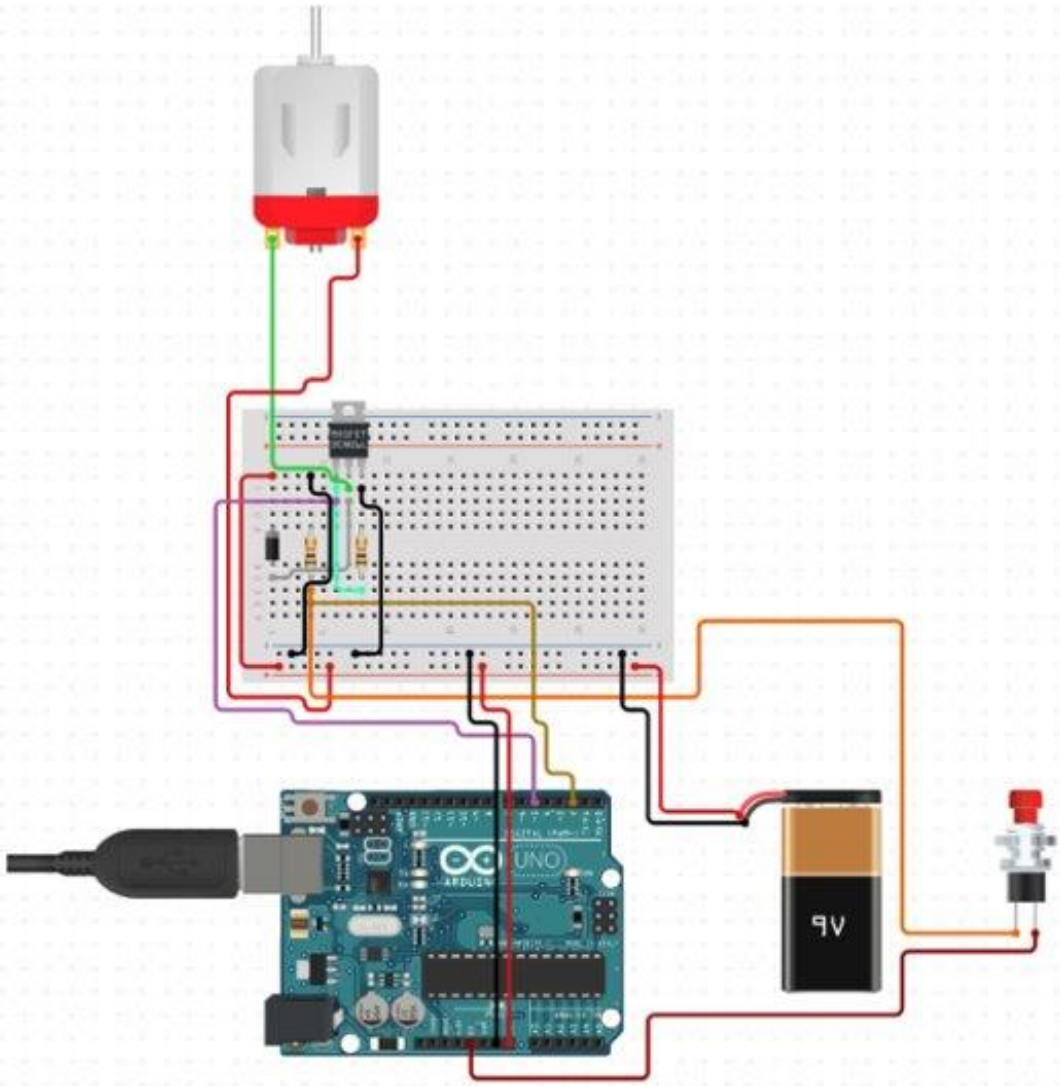
The New Design

- The teams initial design concept is a motor and string system to pull a shaft back to pull the trigger
- Another is to use a linkages to pull and push the shaft back and forth
- The final design uses a linear actuator





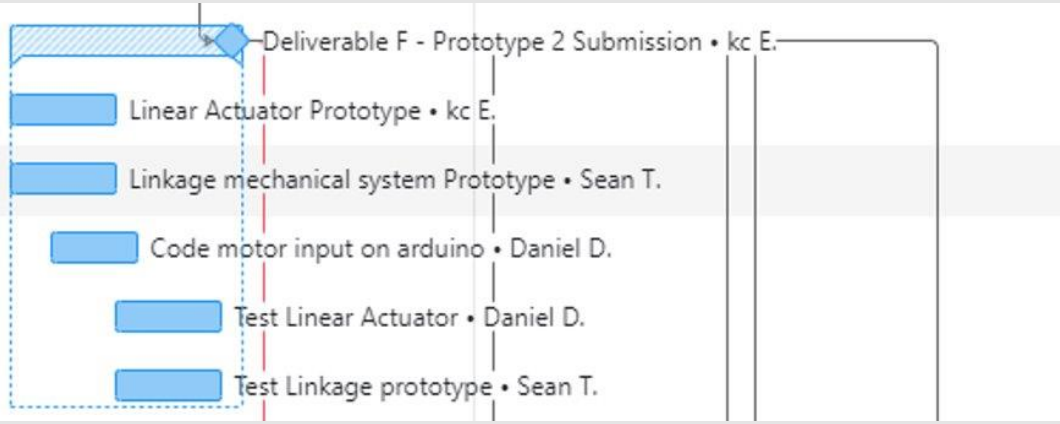
Detailed Design



First Prototype

- As the material needed has not come in on time to build higher fidelity prototypes
- Low fidelity protype was created to test for ergonomics and comfort

Next Steps



- Prototype for the linear actuator system
- Prototype for linkage system
- Add Gantt chart for progression in the next 2 weeks.

Preparation for Client meet 3

- Discuss new ideas with client about the new designs
- Show prototypes that have been made
- Get feedback from protypes and what are the main areas for improvement
- Explain what will be tested next with regards to prototypes and specific functions of device.

Thank You for Listening

Any Questions?