PD E

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Key Components

5 Metrics

Table 3 Metrics Table

Client Need Number	Description	Unit
4	Weight	g
5	Cost	CAD ($)
9, 12	Force required to pull the seatbelt	N
9, 12	Force required to unbuckle	N
9	The distance the client's arms must travel	m
3	Installation time	min
1, 11	Versatility	% (Percent of configurations the device works on)
6,7	Max impact the device can substant.	N
2,8	Amount of time for an unfamiliar user to buckle their seat belt	s

2 Client Statements/Observations

Table 1 Clients' Needs

The client needs a device to assist them in buckling up their seat belt
The device shouldn't hinder the sliding of the male part, as the previous groups did
The safety of the user should be most important. Any modifications should not endanger her
The product should last for at least five years. It should adapt with her growth and still function when she outgrows her booster seat
The client's favourite colours are pink and purple
The device should be small, so it is out of the way in case of accidents
The client uses two hands to pull the male part of the buckle but would need a third hand to hold the female part steady

The device should fit mostly on the client's 2016 Honda Odyssey, but should be adaptable to most cars
The device shall not obstruct the safety or functionality of the airbags. The Honda Odyssey consists of curtain airbags on the rear sliding doors, B and C pillars.
The device is preferred to be ambidextrous, but the user sits in the rear left passenger seat.

Problem Statement

The client needs a way to reach the male part of the seatbelt and guide it into the female part of the seatbelt while allowing for the user’s limited mobility and not hindering the safety of the seatbelt.

Project Plan

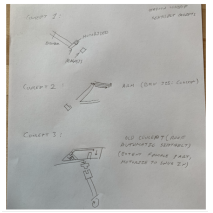
Plan

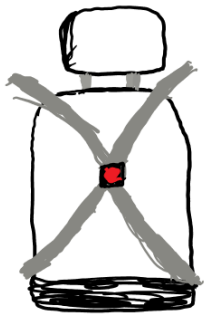
- Weekly team meeting
- Deliverable check up on Saturdays - milestone

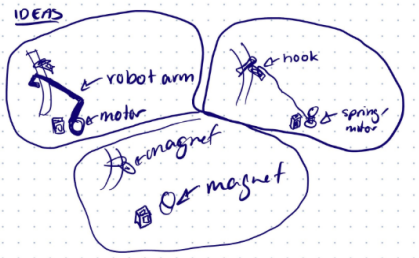
Tracking

- Keeping up?
  - Missed meetings
  - Late finishes for deliverables
  - Extensions
- Good marks
  - On time prototype

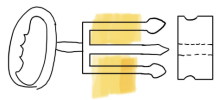
Team Member concepts

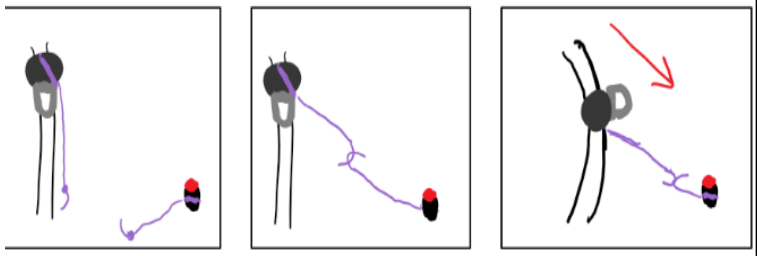


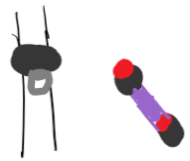


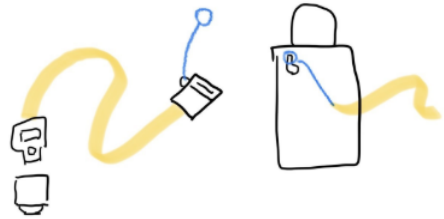


Team Member concepts





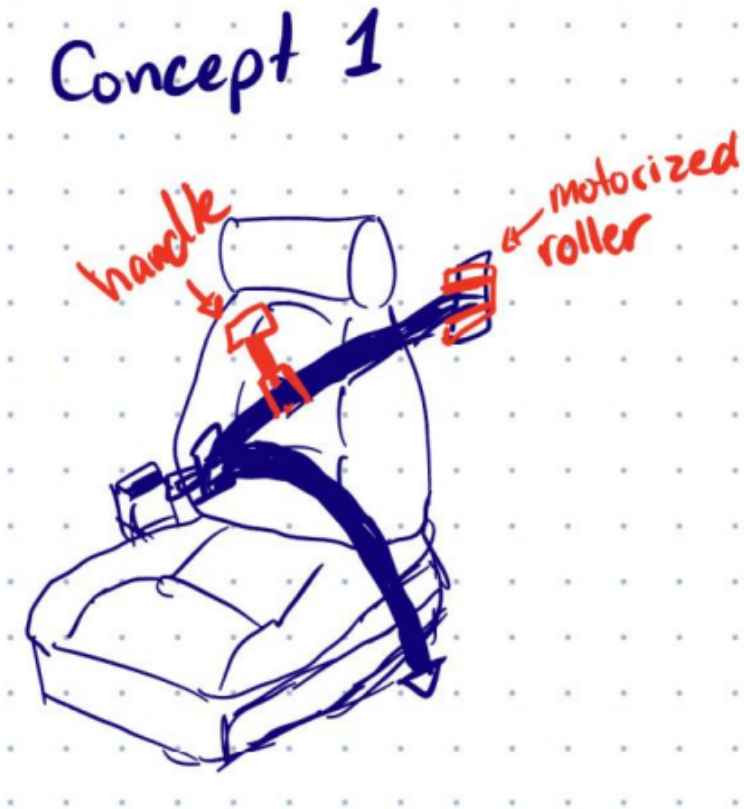




Decision metrics

	Cost	Ease of use	Versatility	Size	Durability	Weight	Force to buckle	Aids mobility	Reduces arm travel	Ease to install	Total
DB1	4	3	4	5	3	5	5	1	1	4	35
DB2	1	5	2	1	3	1	5	5	5	1	29
DB3	3	3	3	3	4	3	4	4	4	2	33
JW1	2	4	3	4	3	4	3	4	4	2	33
JW2	4	3	4	3	4	4	1	3	4	5	35
JW3	3	4	3	4	3	3	3	3	2	4	32
HY1	4	3	2	4	3	2	4	2	3	3	30
HY2	4	5	4	2	3	3	5	4	5	3	38
HY3	1	2	2	1	2	1	5	3	4	1	22
CZ1	1	1	2	3	4	3	1	3	2	3	23
CZ2	4	3	3	4	2	5	3	3	3	4	34
CZ3	1	5	2	3	4	3	4	3	4	5	34
AV1	1	5	4	1	2	1	5	5	5	1	30
AV2	4	4	4	4	3	4	5	5	5	4	42
AV3	5	2	4	5	3	5	4	5	5	4	42

Final Concepts



Client Feedback

- Concept 2
  - Novelty
  - Really hits the points
  - Sliding on webbing
  - Cigarette lighter to charge
  - Where the winch will sit

Prototype 1

- Concept feasibility
  - Safety details – pulling cable out of winch? Attachment safety

Moving forward - prototype

- An intermediate prototype
  - Arduino basics
  - 3D print winch drum, webbing attachment, casing
  - No motor
  - Manual functionality tests
  - Look back on what P1 taught
- Comprehensive or final prototype
  - Stepper
  - Casing and where everything sits
  - Tests on durability

System Components

Winch

- Stepper Motor
- Winch box
- Cable and Hook

Attachment

Microprocessor/Winch Control

- Switch/remote

Prospective Bill of Materials for the Final Prototype

System/Purpose	Item	Cost (to us)
Winch on female part	Stepper Motor	$8
Winch on female part	Winch drum/gear box	$0
Attachment	Hooks	$0
Attachment	Rope/Cord	$0
Attachment	Clips for attaching to the seat belt	$0
Microprocessor/Winch Control	Arduino	$17
Microprocessor/Winch Control	Arduino wires	$1
Microprocessor/Winch Control	Housing unit/casing	$0

Client Meet 3

- Questions:
  - Rather 12V power attachment or battery powered.
  - How is it the fit in your opinion.
  - Any improvement ideas, anything you would change
- Testing metrics for Prototype 2:
  - Force required to buckle up
  - Installation time
  - Time required to buckle up
  - Arm distance travel
  - Durability

Lessons Learned

- Brainstorming was a big plus
  - Quantity over quality
  - Lack of judgement allowed individual creativity to shine through
- Meeting regularly is important
  - Keeps everyone on the same page
  - Makes sure work gets done on time
- Communication is key
  - Lack of information about availabilities surrounding deadlines leads to rushing and underperformance
  - Keeps the team on track

Next Steps

- Prototype
- Client meeting
- Look ahead:
  - Business model and economics report
  - Design day