Rear View Camera

By: Group B01A (Alaa, Brandan, Mason, Anujan, and Aleksandar)

Problem Statement

The client, who has limited mobility and visibility in a wheelchair, wants to be able to see behind her to help with maneuvering around.

Customer Needs

- Compatibility with different phones
- Ability to fit different style wheelchairs
- Device is simple and user friendly
- Device is operational at all times

Benchmarking

- drawbacks to this solution are it costs $220 USD and the video feed is hard wired into a monitor whereas our client wants the video feed to be wireless and to connect onto her phone.

- $200 CAD, still double our budget. Once again, we need the camera to be wireless.

- Couldn’t find products that work exactly like our idea

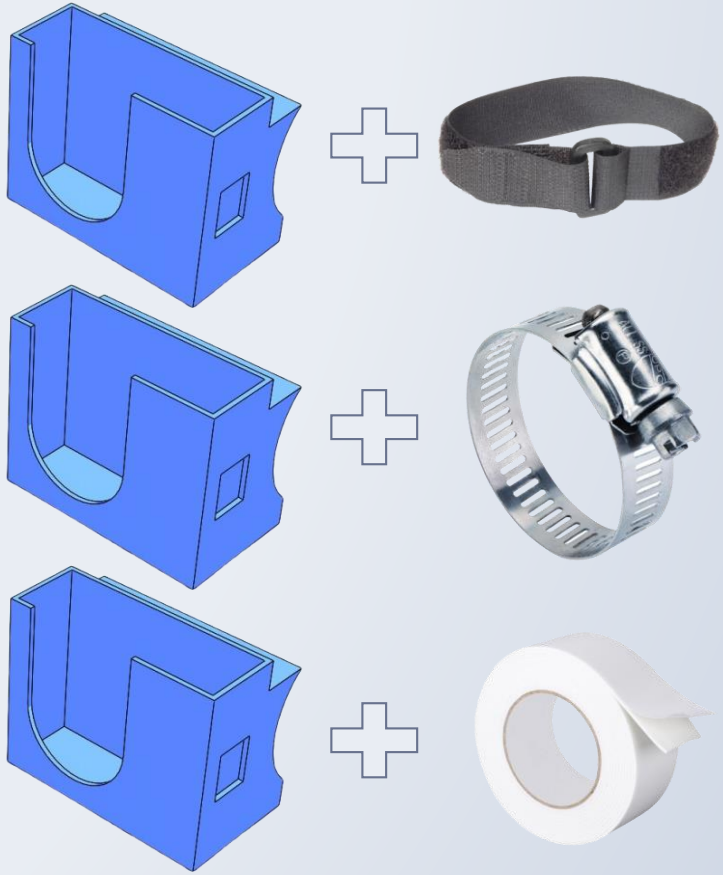
Decision Matrix

★ 1=bad and 5=good

Selection Criteria	Single wide-angle camera	Single pan-tilt-zoom camera	Two side blind-spot cameras
Price	3	1	2
Ease of mounting	3	2	2
Ease of use	4	3	3
Image quality	4	5	3
Total score	**14**	**11**	**10**

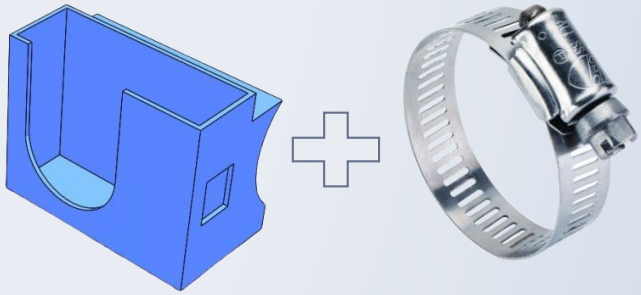
Solution Options (Camera Mount)

- 3D printed case attached with velcro
- 3D printed case attached with a hose clamp
- 3D printed case attached using double sided tape

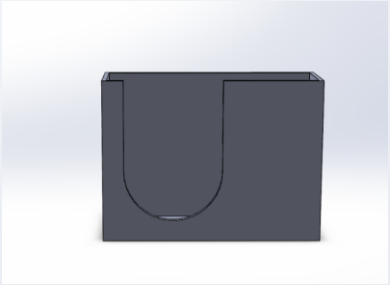


Chosen Concept (Camera Mount)

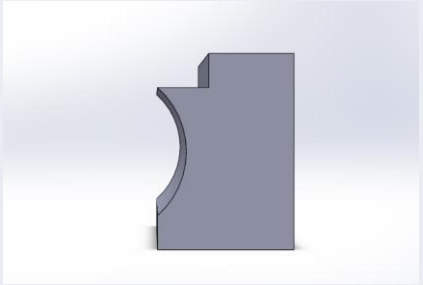
- 3D printed case attached to the back bar using a hose clamp



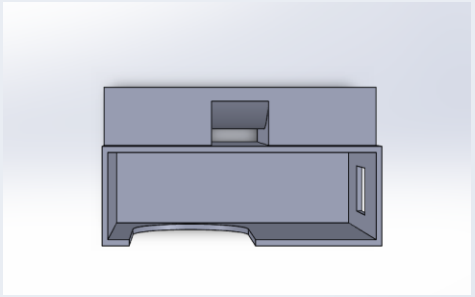
- ➔ No interference with client's belongings
- ➔ Low risk of breaking apart
- ➔ Supports the weight better



Front View

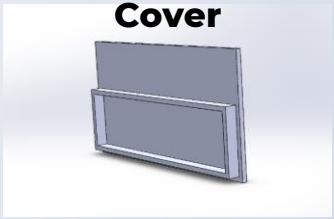


Left View



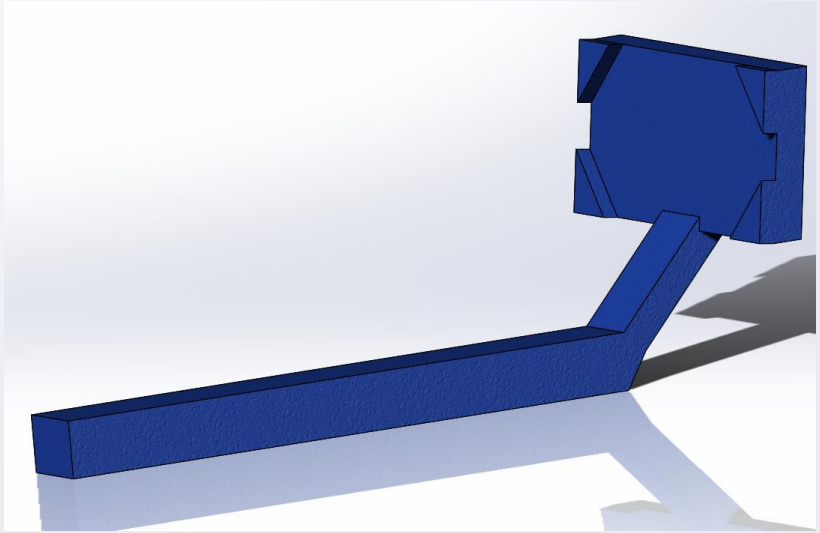
Top View

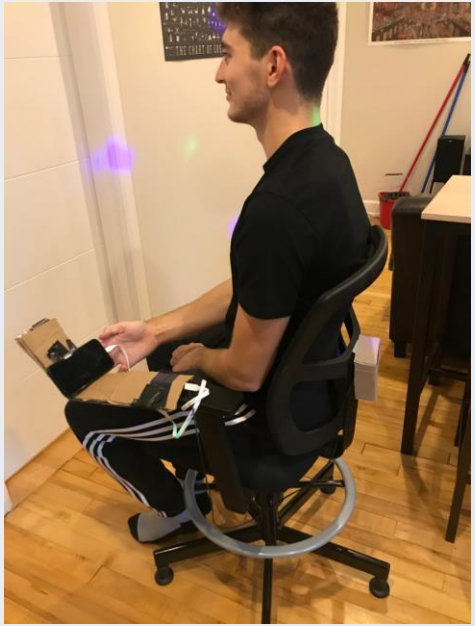
Camera Mount Cover

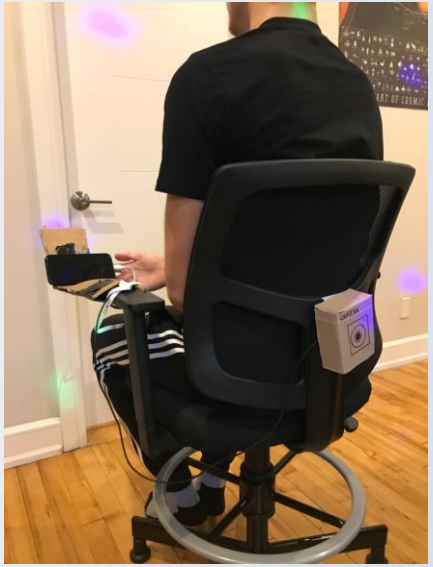


Prototype I

- Comprehensive Physical
- Low cost, low fidelity

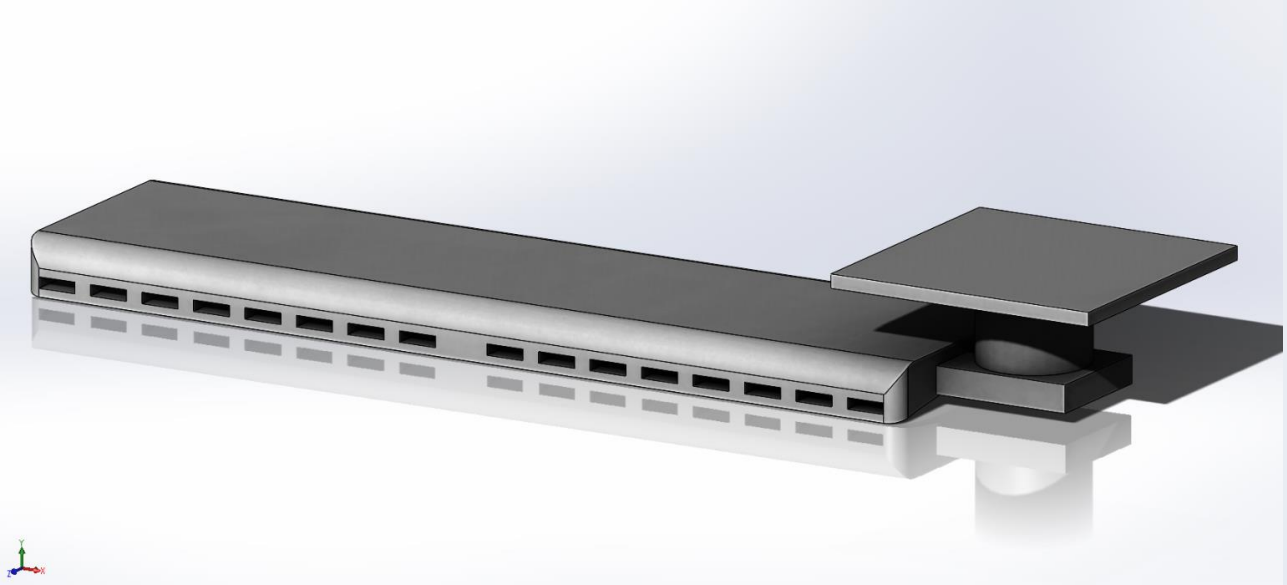


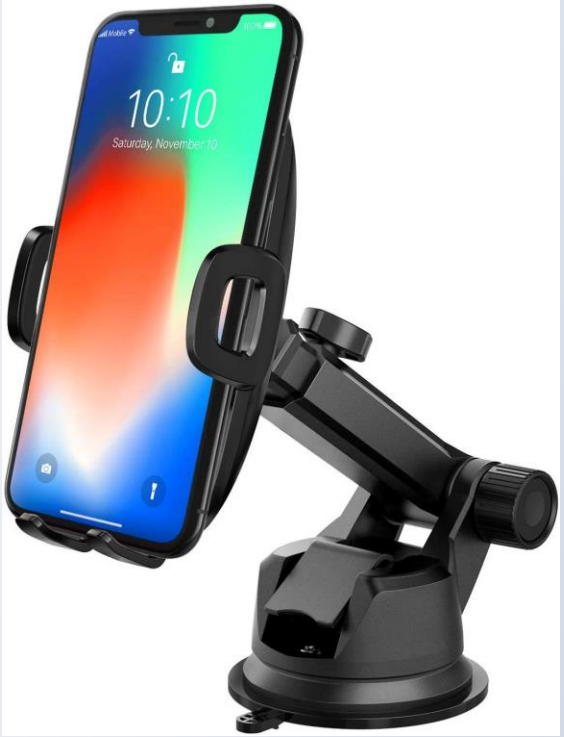




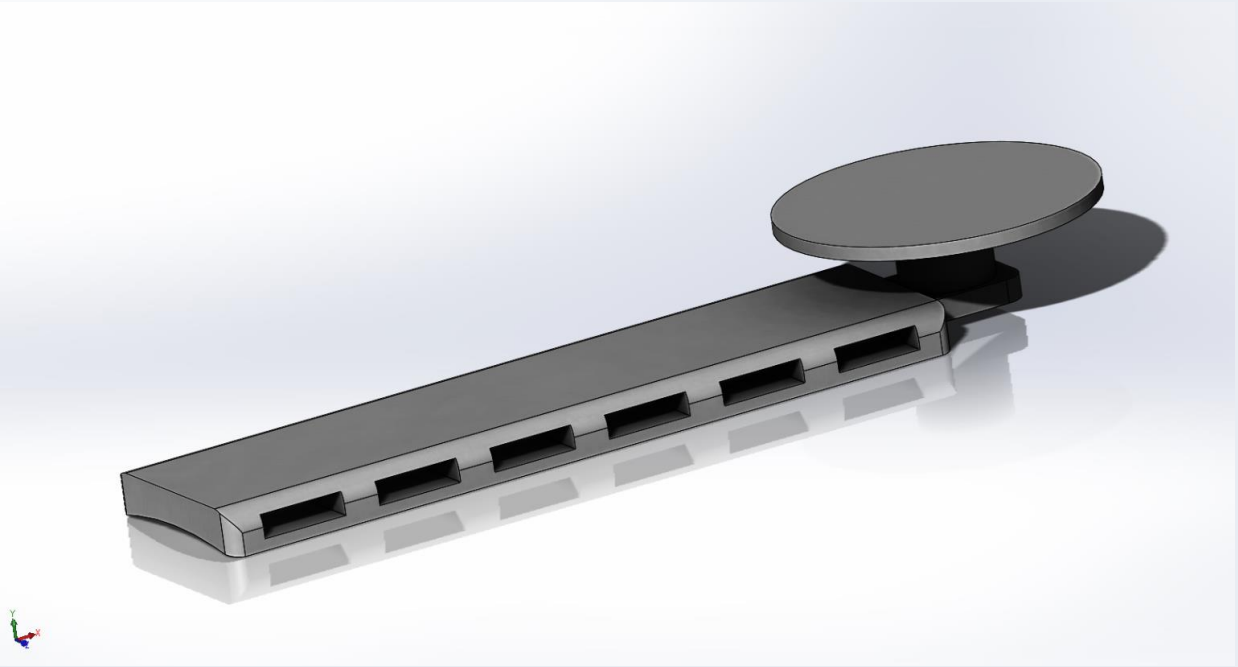
Prototype II

- Focused Physical
- High fidelity





Prototype III

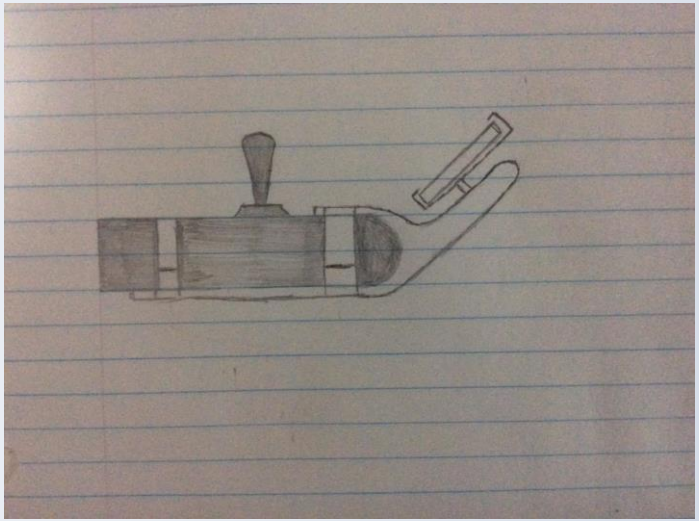


Client Feedback

- Our initial plan was to create a mount that would extend past the armrest, being secured with straps.

- Clients main concern was stability of the mount.

- Another concern was of how well the phone will be seen for its position on the mount.

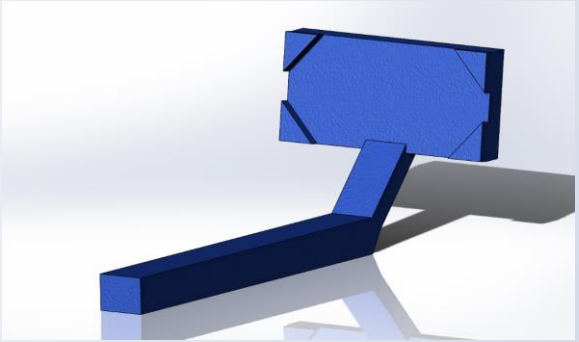


Client Feedback (Cont.)

- With this feedback we decided to go with a more stable design.

- This Design is more stable by allowing more straps and rests on top of the armrest.

- However, this did not solve the screen visibility concern.



Client Feedback (Cont.)

- Added adjustable phone stand to improve visibility.
- Concerns on how the camera would be turned on and off.
- Currently solution: Unplug camera
- Future solution: Switch added next to mount

App Software

-Android studio development kit

-Bluestacks

-Java/C++ language

Feasibility Study

- **Technical:**
  - Experience in mechanics
  - Experience in circuits and software
  - Experienced TA and PM
- **Economic:**
  - Mechanical costs
  - Camera costs
  - Wiring costs
- **Legal:**
  - Risk insurance (Unless taken into market production)
  - Copyright (Unless taken into market production)
- **Operational:**
  - Manufacturing
  - Assembly
- **Scheduling:**
  - Weekly deliverables/assignments
  - Prototypes
  - Design Day (Nov28th)

Income Statement

Position #	Description	End of the year
10	**Revenue**	
10.1	Sales (37590 x $200)	$7518000
20	**Operating Expenses**	
20.1	Marketing	$20000
20.2	Salary	$30000
20.3	Production Materials	$4730000
20.4	Depreciation	$0
20.5	Rent	$500000
20.6	Total Operating Expenses	$5280000
	Operating Income (#10.1- #20.6)	**$2238000**
30	**Net Income**	**$2238000**

- Assuming 10% of the 1% population using wheelchairs in Canada purchase the product.
- Units cost $125.83 to manufacture and are sold at $200.

Plan Of Development

- Main Focuses:
  - Sorting out camera; Costs, shipping, software interface, balance of customer needs, Prototype deadlines
  - Starting the manufacturing process for the mechanical parts.

Lessons learned for the future

- Time management
- Develop an iOS app
- Waterproofing cables/connectors