Smart Face Shield Logbook

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2-1-21 : The issue

[grocery store covid-19 safety protocol]

-

[average face shield]

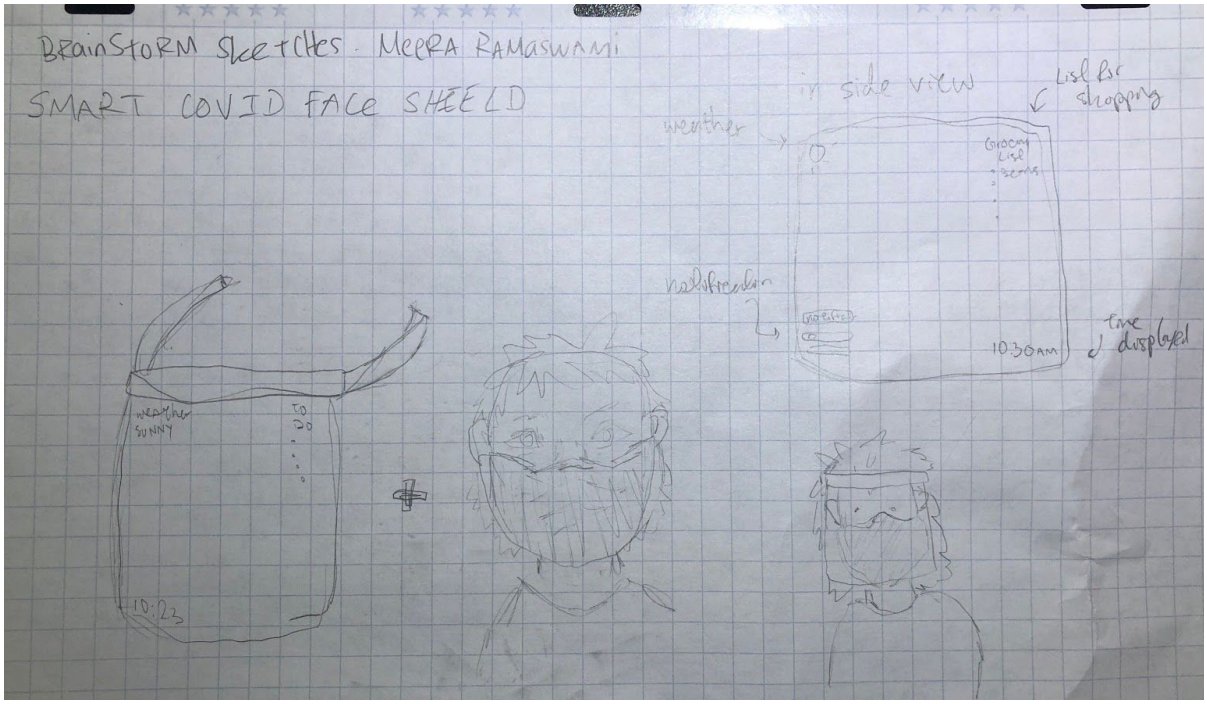
- Flimsy and thin
- Glare

[bacteria on phones]

- Written 2017, doesnt address Covid-19
- Danger amplified with Covid-19

2-3-21 First Project Proposal: face shield for covid with a screen inside so you can view things on your phone or lists and such right in front of you. can project off your phone. made with a clear material and words and images are displayed on top.

2-4-21 First Brainstorm Sketch :



2-5-21 -feedback and refining

After receiving peer feedback from my original proposal, here are my clarifications:

In response to “how would yousee where u are going if the words and information are displayed on the face shield???” - the text and other items displayed on the screen will be located out of central vision and will be in your peripherals.
In response to “if covid dies down and isn't really an issue anymore, this product would become obsolete.” - This product can still be very useful post Covid-19, even without the current pandemic, bacteria is still very present in grocery stores and public places and will be for a long time. The product is also very useful otherwise and is easier than having to pull out your phone to check something everytime you need it.
In response to “ i think this would be a hard thing to make and distribute to everyone, i also think it would be hard to make this product durable since the regular face sheilds are light and flimsy” - this product would likely be made out of a thicker material to suit the display built in and would be more durable, but also would need to be handled with more care.

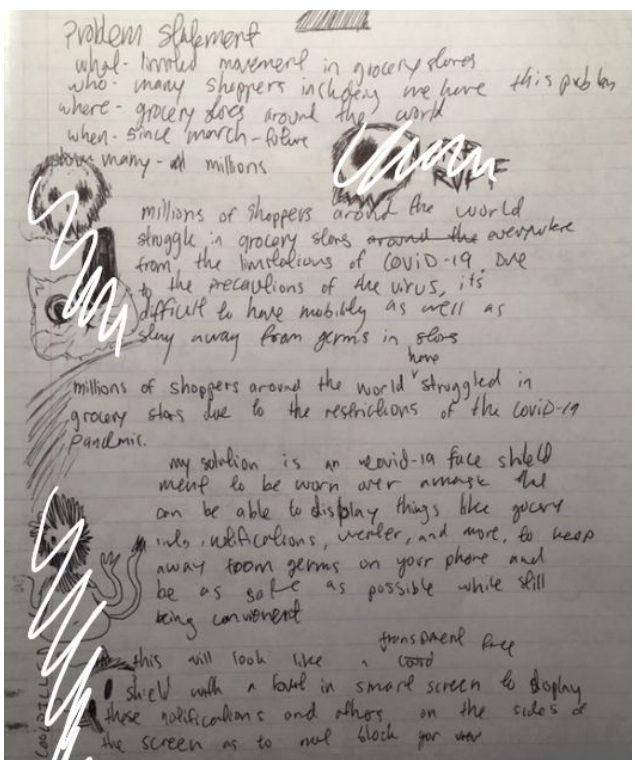
2-8-21 - problem statement
Looked at “Writing a Problem Statement” presentation for format.

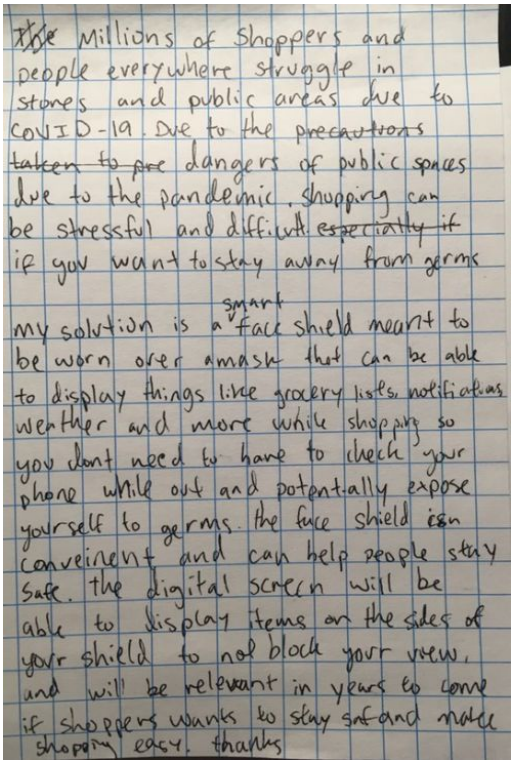
- What..Exactly is the problem?
- Who..Says there is problem?
- Where..Exactly is the problem happening‘
- When..Is it happening? How long?
- How Many People.. Does the problem impact? Statistics?

What- Limited movement and high expose in grocery stores and public places
Who- Many shoppers and people affected by Covid-19 everywhere
Where- grocery stores, public areas, public transit, and more.
When - Covid has been a large issue since March 2020, but bacteria and other germs have always been an issue
How many people- people worldwide, average person everywhere.

Problem Statement: Millions of shoppers and people everywhere struggle in stores and public areas due to Covid-19. Due to the dangers of public spaces because of the pandemic, shopping can be stressful and difficult if you want to stay home and away from germs.

2 minute video MIC district submission prep and rough script (featuring doodles):





2-18-21 MIC problem statement feedback

Smart Face Shield	-Strong set-up of the problem. We feel the pain of grocery shopping in a pandemic. -I see more applications of this - making schools safer, work spaces, etc. Sell these ideas!	-Need a presentation or slide deck for visual explanations -Show some pictures that describe the problem -Walk us through the grossness of the phone even more - there's lots of research to support this. Focus less on COVID issues (surface transmission is not a major factor in community spread) -How will you create this prototype given the restrictions of being at home? - Show us sketches of your design

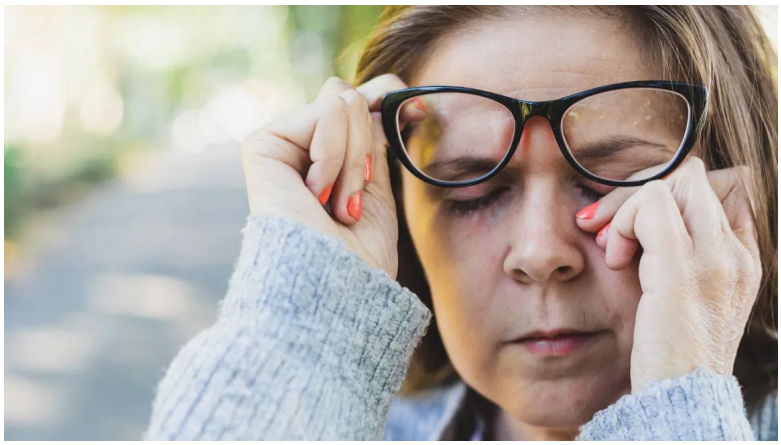
Need a presentation or slide deck for visual explanations:
Slide deck linked at bottom of logbook

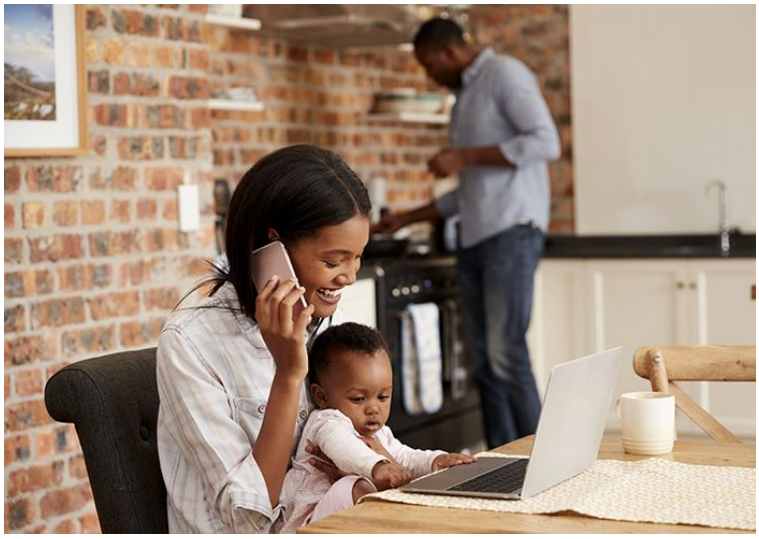
Show some pictures that describe the problem and Walk us through the grossness of the phone even more - there's lots of research to support this:


source constantly touching phone and all kinds of products,

source touching checkouts, notepads, and other items. Not often sanitize between each use or sanitized thoroughly. Then, touching phone again.

Though people wash their hands, they cannot wash their phones.


source people touch the germs from the store on their phones and touch their faces.


source dangerous for family at home and puts family members at greater risk.

Research:
- a recent study found more than 17,000 bacterial gene copies on the phones of high school students. Scientists at the University of Arizona have found that cell phones carry 10 times more bacteria than most toilet seats. https://time.com/4908654/cell-phone-bacteria/

-Americans check their phones about 47 times per day, according to a survey by Deloitte, which affords plenty of opportunities for microorganisms to move from your fingers to your phone.
-“We’re not walking through a sterile environment, so if you touch a surface there could be something on that, here are lots of environmental contaminants." -Susan Whittier
https://ihpi.umich.edu/news/your-cell-phone-10-times-dirtier-toilet-seat-heres-what-do-about-it

How will you create this prototype given the restrictions of being at home?:
Won’t be able to create a fully working prototype due to lack of materials and technology, but can create sketches, CAD, and make a prototype that looks similar to what a final product would be.

- Show us sketches of your design
Sketches are shown below

2-8-21 - 2-24-21 Ideas and refining
Revisions to original sketch
-shield will wraparound the face more rather than just staying in front.

-shield will have an adjustable fit for head and will be able to swing up and down for adjustment

like this 

Things needed to account for:
-weight of shield on face, if too heavy like glass it would weight down the wearers head, but still needs to be durable to support technology
-integrations of technology
-how will connect to phone/need to come up with app?

Board of thoughts and ideas:

Mask image source

Decided to use watch -type adjustable strap for ease of use and comfort.

Possible materials for shield part source:
-Polycarbonate (stable, blocks uv radiation, tough)

-PMMA/acrylic (shatter resistant, glass alternative)
-Polyethylene Terephthalate (thin, light, cheap)

I am leaning toward the polycarbonate. From what I have seen, it may be the best option.
Polycarbonate pros and cons:

- ❏ Pros source
  - ❏ Stronger than glass
  - ❏ Are used to make glasses so would work well for shield
  - ❏ Light enough for shield
- ❏ Cons source
  - ❏ Sensitive to scratches
  - ❏ Can expand

My solution to the cons: this product would not be meant to be thrown around, so as long as the user remained careful, there would be minimal scratches. Another solution to the scratch issue would be to apply a clear coat of a scratch resistant polish of some sort. The expanding in heat issue would not be a problem because it would not be left in heat for a long time.

Technology that can accommodate the display part source
-LCD DISPLAY. I watched a youtube video of a couple trying to make a transparent screen: screens and monitors usually have and led layer behind another display that would colorize it. The LCD display is what shows the actual image and the led just provides light. Since the product will likely be used in well lit areas, this could be an option, but the lack of light could be an issue. An issue is that the lcd is thin and delicate, so if the display could be sandwiched inbetween two layers of the polycarbonate it could possibly work. However, don't need as intricate of a display as a tv or monitor.
-HUD. Head's Up Display source. Type of projection that is projected onto a display surface. Already technology to hook up to phone to receive notifications.
-OLED . similar to LCD. thinner and lighter plastic -can be squeezed in between translucent layers easier. Richer colors- not very helpful to me. Can be damaged when subjected to daylight-not good. expensive.
-TASEL allows dislay lamination in glass (but im not using glass). Uses a luminescent phosphorus layer and a circuit board. Can withstand extreme conditions. Only displays two colors.
-MINI PROJECTOR.source The Google Glass smart glasses contain a mini projector that project onto the glasses lens. This is similar to the HUD.

Looked at smart glasses for ideas :
Vuzix- used multiple small led projectors. Many other brands use a concept like this.

Design Matrix for display technology:

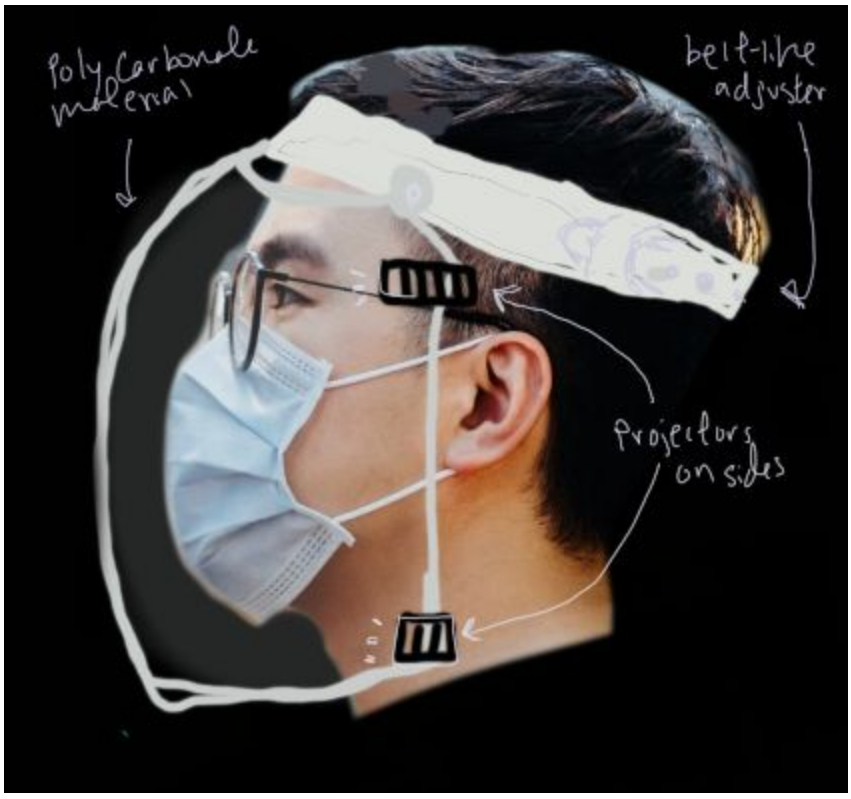
1-5 scale (1worst-5best)	Criteria

options	Ease of sight	Durability	Technology available	Practicality
LCD	5	4	5	4
HUD	5	5	4	5
OLED	4	2	3	3
TASEL	5	5	3	1
PROJECTOR	5	4	5	5

From this design matrix I can deduce that that HUD and the Mini Projector are my best options for the Smart Face Shield. The HUD and mini projector are very similar so there is not much of a difference in what i will choose to do.

The shield would also need to be slightly tinted on the sides to allow for better view of display.

2-22-21 Final idea:

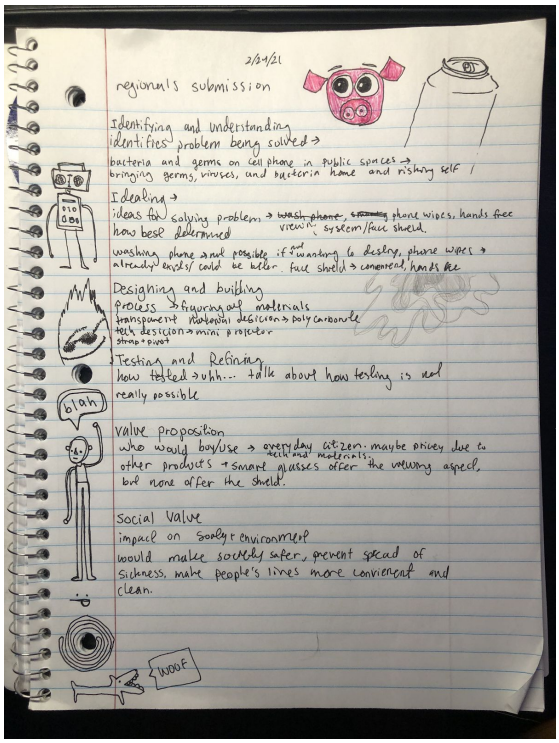


Refined:

[second image source]

FINAL PROTOTYPE
Not able to create a real-life prototype due to restrictions and lack of time

Pitch video prep



Slideshow Presentation Link:

https://docs.google.com/presentation/d/1jUOB5gr2ok9Ytog_VJGLwPK3mrrDfmplZ_uThB8NrNM/edit?usp=sharing