Jasper Tu's Research

Source #1:

The World's First FDA-Registered Transparent Smart Mask
Michael Vane

Type: Web Article	**Source**: manofmany.com/lifestyle/this-is-the-worlds-first-fda-registered-transparent-mask#:~:text=Meet%20Leaf%2C%20the%20world's%20first,AUD%20on%20crowdfunding%20platform%20Indigogo.

Summary:
General overview of the Leaf smart mask and its capabilities

Key points:
- Leaf is a transparent smart face mask which self-sterilizes from UV light
- Carbon fitters on the chin enable it to have 99% standard air filtering abilities
- Self-purifies based on UV-C light
- Material: Ultra-lightweight medical-grade silicone
- Silicone is also anti-fogging, has active ventilation, and air quality sensing
- Mask is managed and monitored through a companion app
- Bonus: Mask is transparent so smiles can be seen!
- Has 4 different sizes, capable of fitting kids to adults
- Filters can last up to 1 month thanks to active sterilization, before they need to be replaced

Insights & Remarks:
What does this mean? How is this useful for us?
- The concept of a smart mask with a companion app is a feasible solution
- Has several key strengths we can reference as essential starting points;
  - Adjustable filters and filtration levels
  - Lightweight yet durable medical-grade silicone
  - Transparency; good for better emotional expression and surveillance
  - Active ventilation
  - Air quality sensors
  - Anti-fogging; good for people who wear glasses and cooks
  - Different sizing (family-friendly)
  - Comes in different colours; can match with different outfits
- Potential pain points:
  - Filters needing replacement?

- ○ Needing UV-C light to self-sterilize seems dangerous for the skin because short wavelength UV-C light is the most damaging form of UV radiation
  - ○ Is it washable?
- **Note**: Upon further research, the Leaf mask is a purely hypothetical product for now. The Indiegogo campaign for it has ended and masks for the people who have ordered are still in production.
  https://www.techtimes.com/articles/250624/20200626/covid-19-update-first-fda-approved-transparent-n99-mask-with-uv-c-sterilizing-now-available.htm

Source #2:

Leaf—Website	
Redcliffe Medical	
Type: Product Website	**Source**: https://www.leaf.healthcare/
Summary: Analyzing the core pain points the Leaf smart mask aimed to solve for.	
Key points: - People of varying professions had much to say about the inconveniences brought by conventional cotton/cloth masks: "As a doctor on the frontline it's very difficult to wear the conventional mask all day long. It gets sweaty, itchy and changing it every now and then is both dangerous as well as tedious." *—A Pulmonologist working on frontline COVID defense* "Being a fashion model it was virtually impossible to wear a cloth mask on the face all the time." *—Active fashion model* "With larger numbers of people wearing masks covering most of the face, it's becoming a threat to public safety as surveillance becomes virtually crippled. A transparent mask is the need of the hour." *—Law enforcement professional*	
Insights & Remarks: What does this mean? How is this useful for us?	

- These comments highlighted various issues in conventional cotton/cloth masks, thus proving there is a market and value proposition for creating a reusable, smart mask.

Source #3:

'Smart' Face Mask Aims to Improve Communication in New Normal
Bryan Lynn

Type: Web Article	**Source**: https://learningenglish.voanews.com/a/smart-face-mask-aims-to-improve-communication-in-new-normal/5530547.html

Summary:
General overview of the smart C-mask and its capabilities

Key points:
- Face masks have become the new normal during COVID-19
- However, one pain point in normal cloth/cotton masks is they tend to make it harder to hear voices through the covering, negatively affecting the quality of communication
- C-mask is a wearable electronic aiming to improve speech interactions, created by Japanese startup Donut Robotics
- Can be worn over existing, common face masks
- Material: Soft plastic
- Has built-in microphone and holes for air flow
- When turned on, mask connects with mobile phone via Bluetooth
- Has a companion app letting users turn speech into text, complete phone calls, and amplify volume of voice
- Bonus: C-mask can translate someone's voice from Japanese into 8 other languages
- How does speech through the mask work? Maps facial muscles to interpret speech.

Insights & Remarks:
What does this mean? How is this useful for us?
- Working in fashion retail in the mall's busiest store, I can definitely attest to communication being hindered by ordinary cloth/cotton masks. This is often exacerbated by plexiglass shields at the cash counters.
- Strengths:

- - - Can <mark>amplify volume of voices</mark>
    - Utilizes Bluetooth to pair with mobile app to control mask features
    - <mark>Translation feature</mark> is useful for breaking down language barriers on the fly
- Potential pain points:
    - With the holes for airflow, does that still protect one from COVID-19 which can travel through respiratory droplets? If it's meant to be an add-on to existing medical masks, maybe this is an improvement point.
    - Soft plastic material is perhaps less environmentally friendly
    - Soft plastic might also be less durable?
    - Can this device be washed?
    - Does it have different sizes?

Source #4:

CX9 Smart Mask Review: A Revolutionary Face Mask?	
Mr. Gadget	
Type: Web Article	**Source**: https://mrgadget.com.au/cx9-smart-mask-review/

Summary:
A review of the CX9 smart mask and its capabilities, as well pain points of current masks

Key points:
- Most have few options when it comes to face masks: disposable, cloth, or N95 (which are hard to acquire in many places due to limited supply)
- Pain point in cloth masks: While affordable and trendy, their filtration effectiveness is much lower than medical masks
- Pain point in single-use masks: While effective and affordable, they can harm the environment.
- Pain point for both cloth and single-use masks: Many find them hard to breathe in

- CX9 is a customizable; has a filter, vents, and options to include a fan or LED light
- Intended use: exercise, daily use, protection against pollution, common germs
- Weakness: Can't be used to protect against COVID-19 because it has built-in

valves to facilitate airflow, which can let in respiratory droplets
- Has a 4-ply filter, but needs to be replaced almost daily. Filter purifies the air by filtering things like pollen, bacteria, and ultra-fine particles
- Strength: CX9 can be disassembled and washed
- Add-ons:
  - Fan offers cooling in hot weather, exercise
  - LED has 3 modes: Daily and Block modes protect the skin from dangerous bacteria. Beauty mode increases collagen creation, improves skin texture, softens skin, and reduces wrinkles.

Insights & Remarks:

What does this mean? How is this useful for us?
- Highlights more pain points of traditional masks
- Strong points:
  - ==Filter== betters breathing experience
  - ==Can be disassembled and washed==
  - ==Customizable with fan or LED== lights for more functionality
- ==Pain points:==
  - Doesn't protect against COVID-19
  - Can only choose between fan and LED as attachment
  - Need to change filter

Source #5:

Face Masks in the New COVID-19 Normal: Materials, Testing, and Perspectives

Ming Hui Chua et al.

Type:	**Source**:
Journal Article	https://spj.sciencemag.org/journals/research/2020/7286735/

Summary:

Examines traditional face masks from the lens of COVID-19, and promising start mask solutions. Proposes ways forward for how smart masks can be improved.

Key points:
- There are many creative approaches for developing the next-generation of protective masks.
- BioVYZR by VYZR Technologies: Made a purified air-bubble surrounding the

head to be worn like a vest-strap.
- Offers anti-fogging, 360 degree protection, filtered air as an N95 mask, positive air pressure for easy breathing. 1 charge lasts 8-12 hours.
- Joe Doucet takes a more fashionable approach by merging mask and shield together
- Other good ideas with potential
  - Communication tools
  - Breath sensors
  - Usage and air quality sensor
  - Self-powered mask
  - Microbe detectors

Insights & Remarks:

What does this mean? How is this useful for us?

- Highlights creative approaches to smart masks.

Feedback Mechanisms

Ideation:
- Have 2 straps extend and clip together at the back of the head to prevent ear chafing and having to tie anything.

- Have the mask curve with and around face shape. Curve with the nose. Stay elevated against cheeks.

- Filter removable via pushing a button which pops open the lid.

- Egg shaped mask case

- App: show mask's battery (progress indicator) + maybe even show on the mask (though that might not be as useful cuz person wearing it can't actually see)

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Audio/Visual/Haptic (touch) feedback on mask:
- LEDs flash in certain colour when _____
    - Green = Default state, everything running smoothly and charge game on point
    - Yellow = Mask has lost over 50% charge OR Filter in need of replacement
    - Red = Mask in urgent need of charge (under 20%) OR Filter not working
- Pair LED indication with Haptic buzz + sound when _____ (can also pair with app to receive push notif on phone)
- Facial recognition with phones to automatically adjust to different face shapes? (wild thought)
    - Plated mechanism for masks (like Batmobile); plates shift to grow and shrink mask size
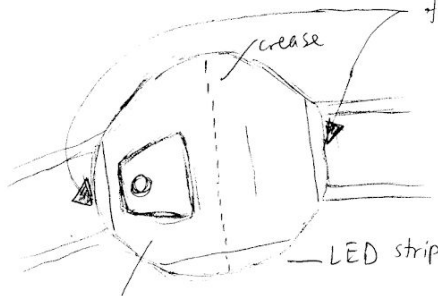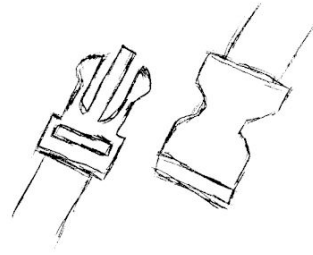
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User flows:
- Mask needs charging
- Filter needs replacement
- Size adjustment

- curves w/ nose,
- mask doesn't rest on face
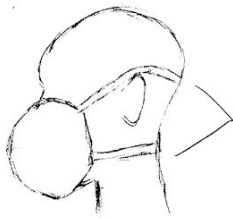
2 straps, prevent ear chafing

- use buckle clip for straps
- straps are extendable, elastic

crease

to make mask bigger → pull these 2 flaps to inflate

or pinch?
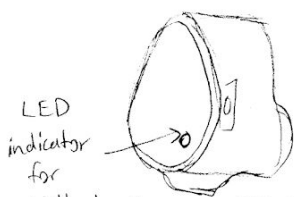
to make mask smaller → push on 2 flaps to deflate

straps don't extend till pulled out.

- fold in ½ for portability

LED strip

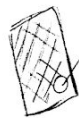filtration compartment on the side push button to pop lid → remove filter

green = good charge
yellow = losing charge
red = need charging

charging case

label for filter type

LED indicator for still charging or not

yellow = charging
green = full

filters will look like slips (thin)

Jasper's rough sketches ^