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# PROJECTS

## **SUPERvisor**

Augmented Reality face shield for COVID-19 swab testers

## **Vitals**

Wearable corset to analyze sentiments from conversations

## **Prana** (Design@Large)

Multi-patient ventilator splitter for low-resource hospitals

## **Chris-Cross** (MDes Design Studio Thesis)

Low-cost mobile shelter for the unhoused population of the Bay Area



# SUPERvisor

\$10 Augmented Reality face shield that leverages the power of smartphones to protect COVID-19 swab testers working in nursing homes in the San Francisco Bay Area.

## Contributions

Hardware Design & Engineering  
3D CAD Modeling  
Photorealistic 3D Rendering  
Customer Discovery Interviews

## Awards & Accolades

Winner, Fast Company Linda Tischler Award 2020  
Finalist, Fast Company Innovation by Design Awards 2020  
Article by Co.Design (Fast Company)

FAST COMPANY  
CO.DESIGN

The Coronavirus was referred to as an “invisible enemy.” SUPERvisor sought to **make the invisible visible** for front line medical workers collecting test swabs, by providing them timely and essential information through an augmented face shield.

# SUPERvisor

## PROBLEMS

### **Physical Discomfort**

Wearing layers of PPE was hot & uncomfortable.

### **Time & Information Management**

Wasted time tracking down patient background conditions using a binder.

### **Patient History**

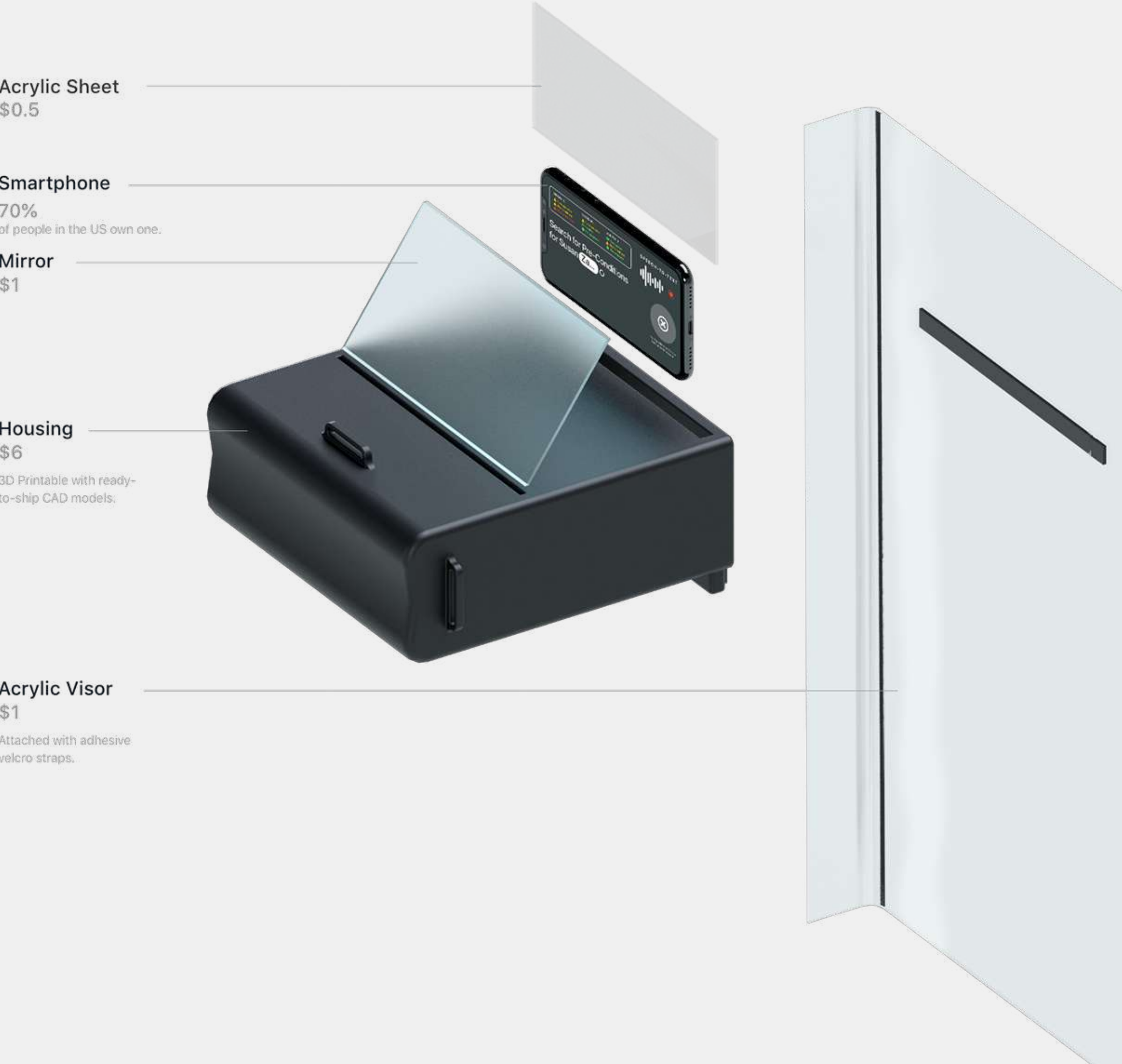
Desire to know the patient's mood they were about to encounter.





# Model 1

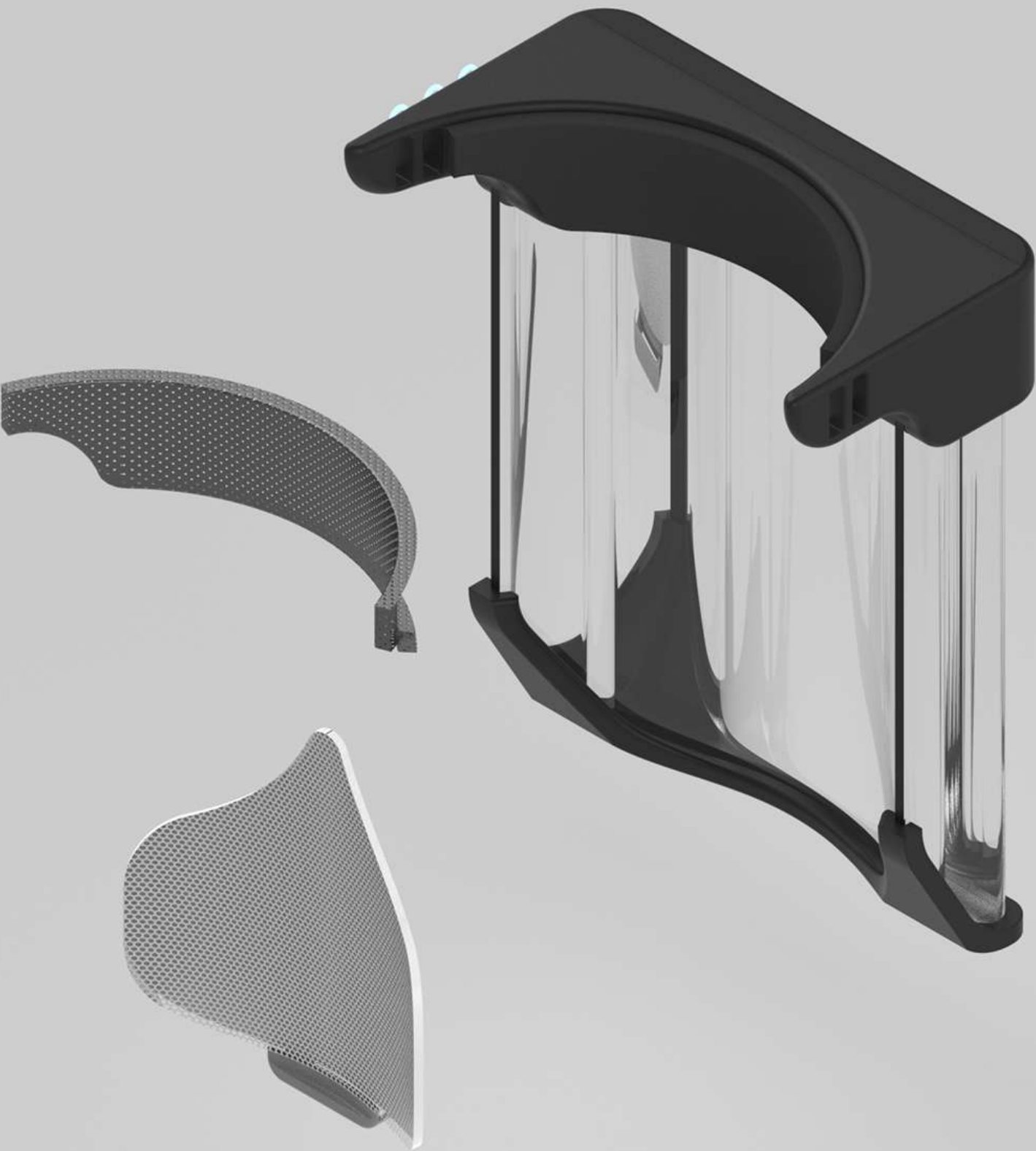
3D printable, low cost AR headset  
powered entirely by a smartphone



# Model 2

Ready-to-ship kit for quick assembly of a  
high-fidelity, smartphone-based system.

Prevents fogging of the visor, measures  
temperature with infrared lasers, and is  
modular for additional, low-cost sensors.



# Augmented Reality for under \$10

SUPERvisor uses a mirror and transparent plastic film to achieve the augmented reality projection on a 3D printed housing.



Voice-based interactions using Siri and Google Assistant



Capture photos of binders & swabs with the phone's camera



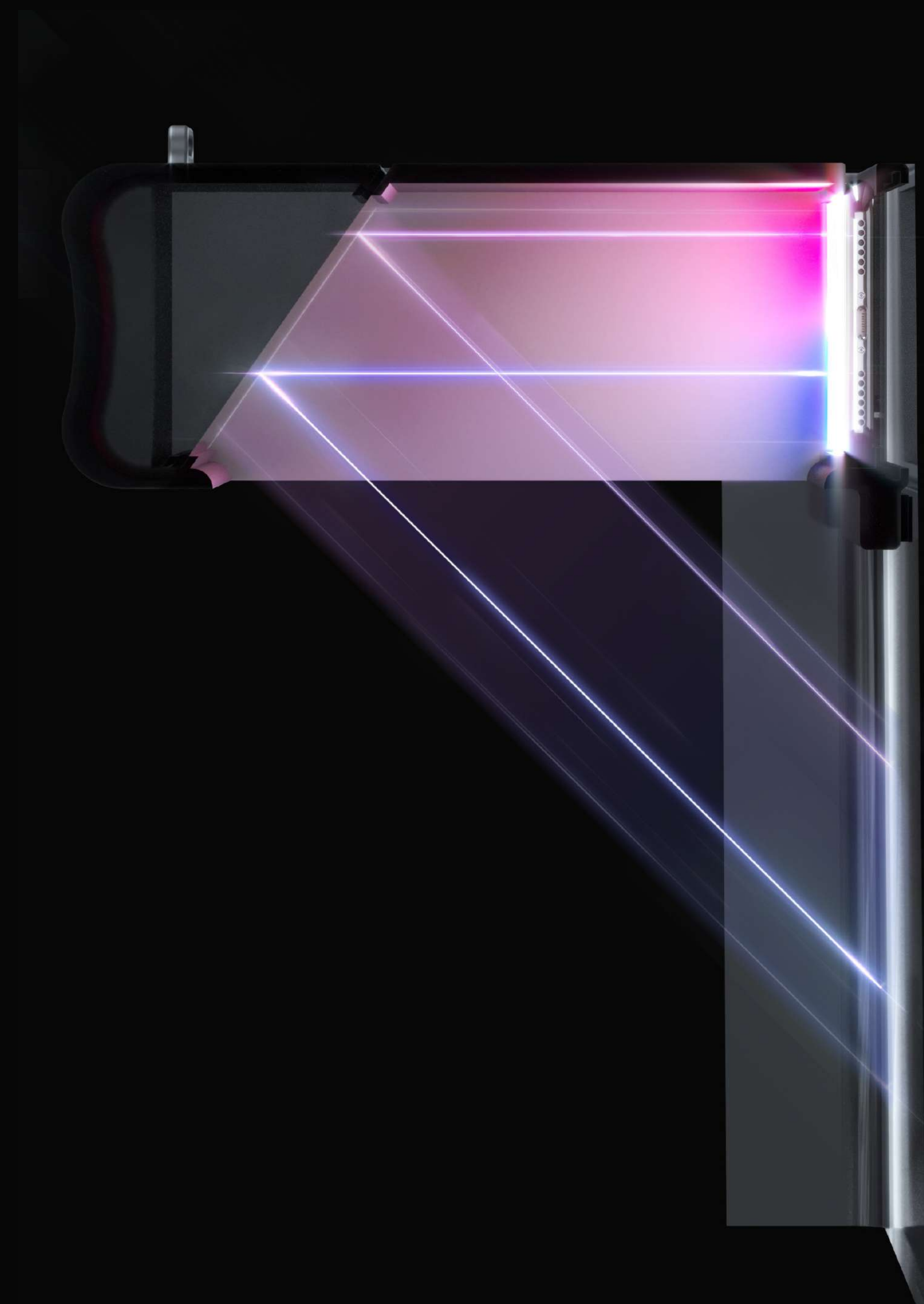
Hand gesture detection allows contamination-free operation



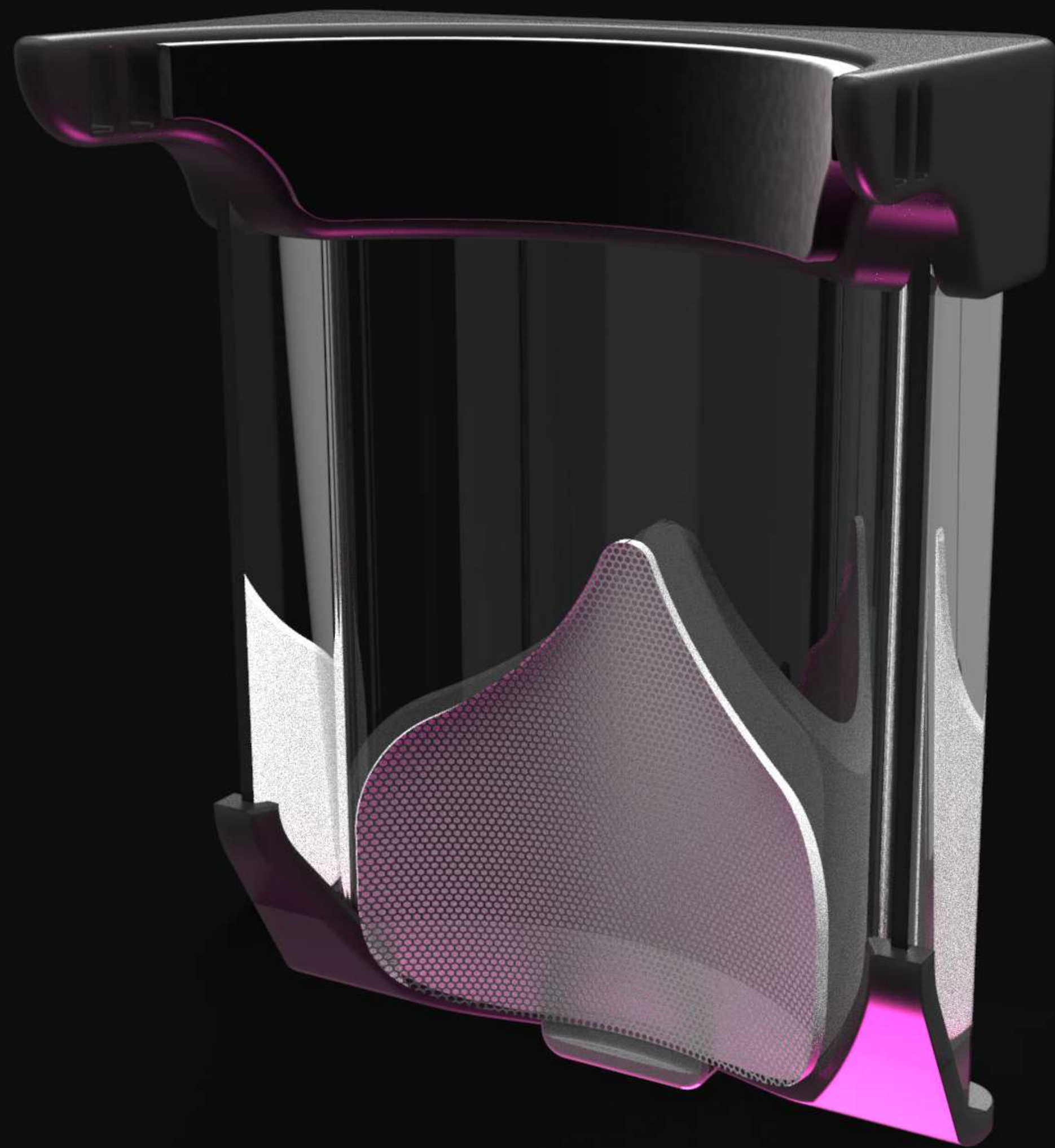
Store information on the cloud using Wi-Fi or mobile data



Disposable film can be removed with a short pull







# Combat Heat & Fog

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Model 2 was designed specifically to address the pain points mentioned by nurses, such as heat, fogging up and blurry vision.

A porous breathing filter absorbs water particles to prevent fogging up.



# Prana

A medical device that allows up to four patients to share a single hospital ventilator safely in the event of equipment shortages due to disasters or medical emergencies.

## Contributions

Co-Founder & CEO  
Hardware Design & Engineering  
3D CAD Modeling  
Photorealistic 3D Rendering  
Customer Discovery Interviews

## Awards & Accolades

Gold Winner, Medical Devices & Technology - Emergency Equipment, New York Product Design Awards 2021  
Winner, Social Impact, San Francisco Design Week Awards 2021  
Winner, Promising Company, Indian Achievers' Award 2022  
Silver Winner, Product Design - Medical Devices, MUSE Design Awards 2022  
Finalist, Fast Company World Changing Ideas 2021  
Honoree, Health & Wellness, Core77 Design Awards 2021  
BBC Radio Leicester feature  
One of 7 finalists out of 40 in the Global Health track of the Johns Hopkins Healthcare Design Competition in 2022  
One of 26 finalists out of 354 teams in the University of California Big Ideas Contest 2021  
One of 5 projects to be awarded the \$2,000 Innovation Catalysts Grant from the Jacobs Institute at UC Berkeley  
Presented at the Kansas Respiratory Care Society's annual conference



“ ... **fewer than 2,000** working ventilators have to serve hundreds of millions of people in public hospitals across 41 African countries ...

compared with **more than 170,000** in the United States.

Ten countries in Africa have **none at all.** ”

**The New York Times**

*April 17, 2020*

**Ventilator shortage** spurs team of doctors to take extreme measures

©CBS NEWS

Ventilator shortage threatens to cripple India's coronavirus response

FT FINANCIAL TIMES

**There Aren't Enough Ventilators** to Cope With the Coronavirus

The New York Times

**Who gets a ventilator?** The 'gut-wrenching' choices facing US health workers

The Guardian

The Engineers Taking on the **Ventilator Shortage**

THE NEW YORKER





# 60

Expert interviews

Ghana, Uganda, Tanzania, Cambodia,  
Mexico, India, Sri Lanka, Oman, USA, UK

**13** Physicians

**13** Anesthesiologists

**10** Respiratory Therapists

**6** Biomedical Engineers

**5** Pediatricians

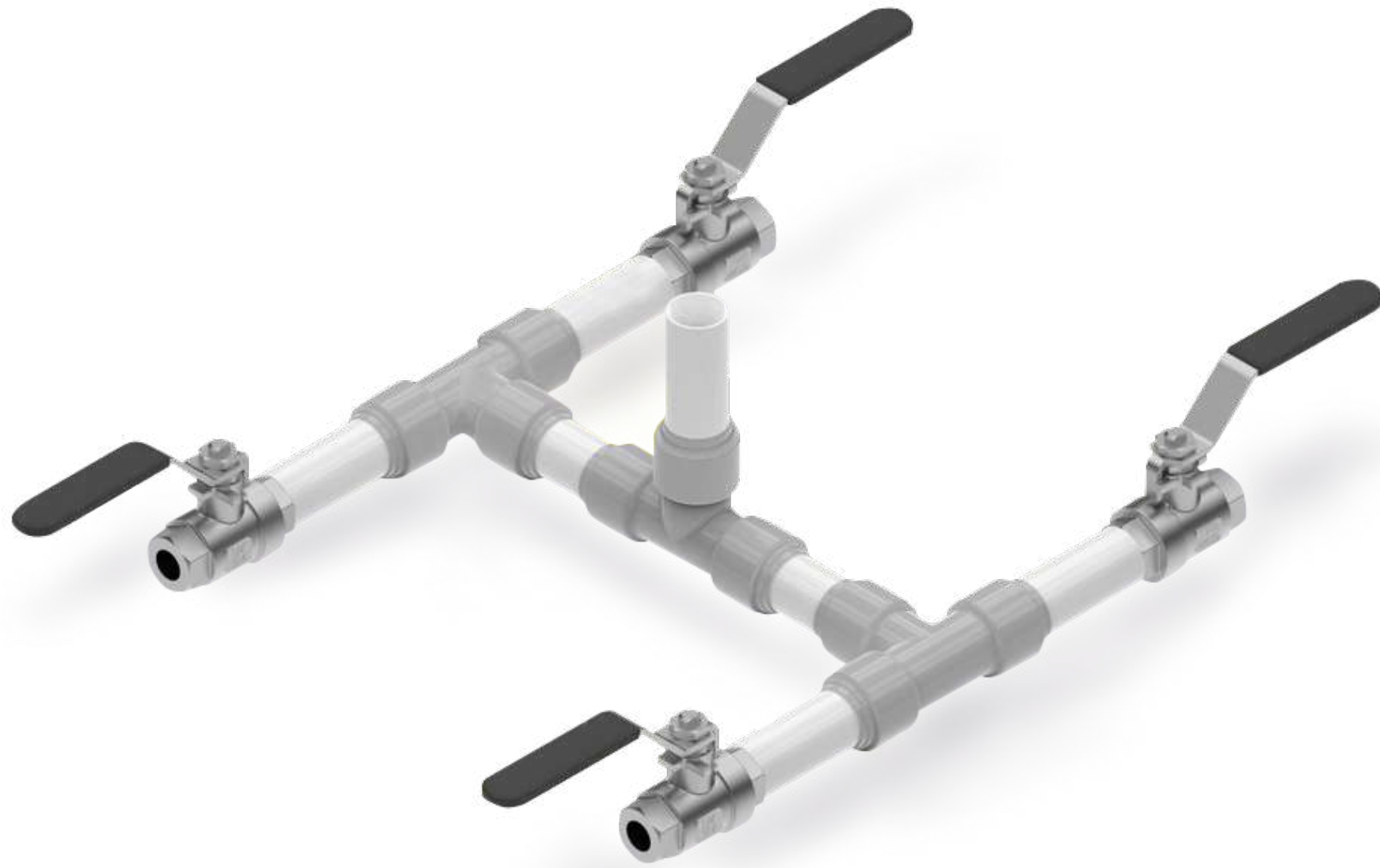
**4** Respiratory Care Professors

**4** Pulmonologists

**3** Intensivists

**2** Ops & Supply Chain





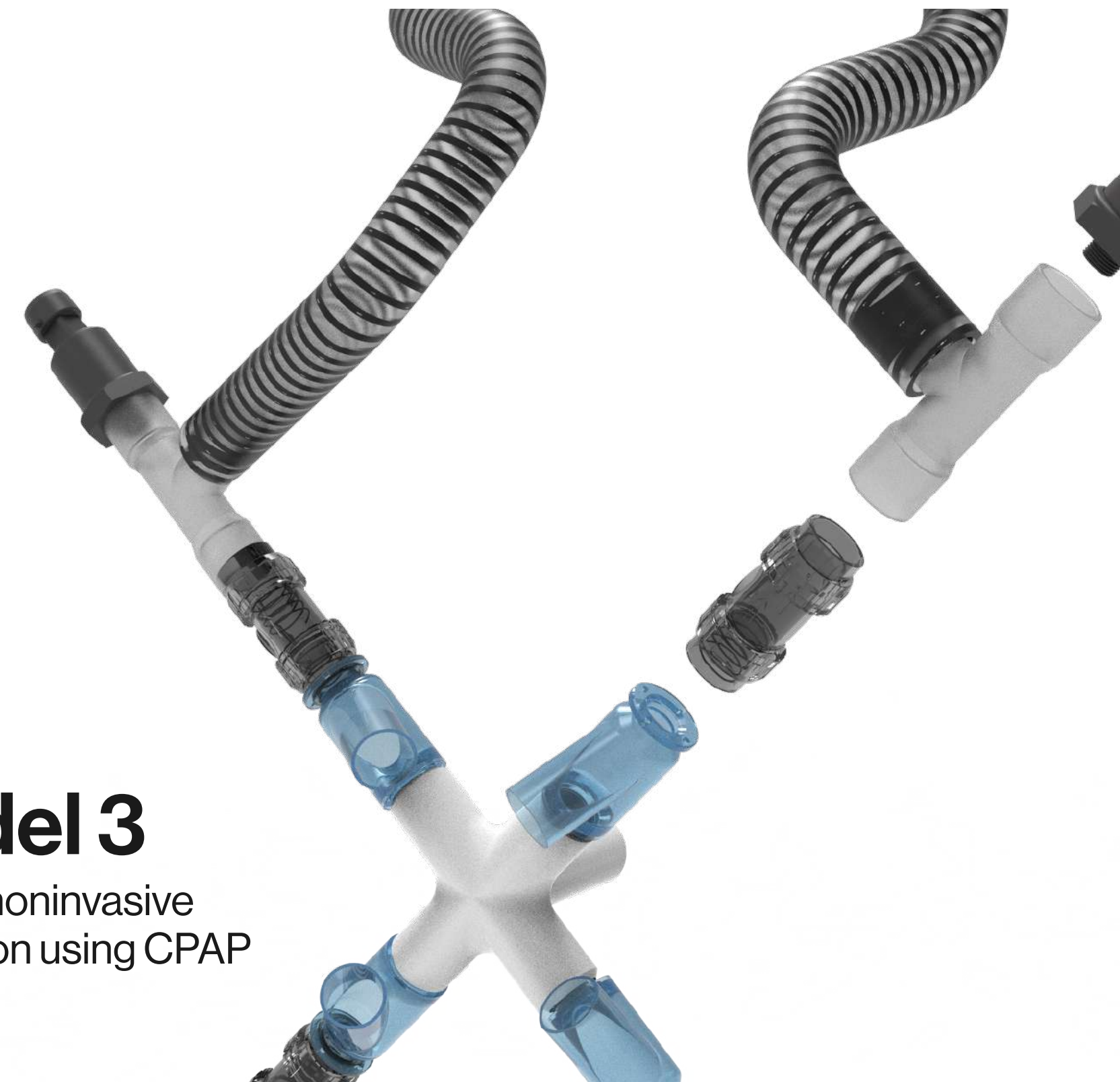
## Model 1

Minimum Viable Product to test  
airflow across individual lines



## Model 2

Development of inspiratory &  
expiratory limbs for invasive ventilation



## Model 3

Shift to noninvasive  
ventilation using CPAP



# Prana



Connect up to four patients



Individual patient controls



Dashboard for monitoring



Free from cross-contamination



Standard 22mm connectors





# Vitals

A wearable corset that changes color and grows "tumors" in response to people's positive and negative sentiments when they speak to you.

## Contributions

Hardware Design  
Electronics  
Materials Testing  
Photorealistic 3D Rendering  
Customer Discovery Interviews



Have you ever been in a toxic or negative conversation or social situation?



Did that situation have a physical or mental effect on you?



Did they know they hurt you?



**How might we create a wearable that makes the invisible visible in the conversations we have every day?**



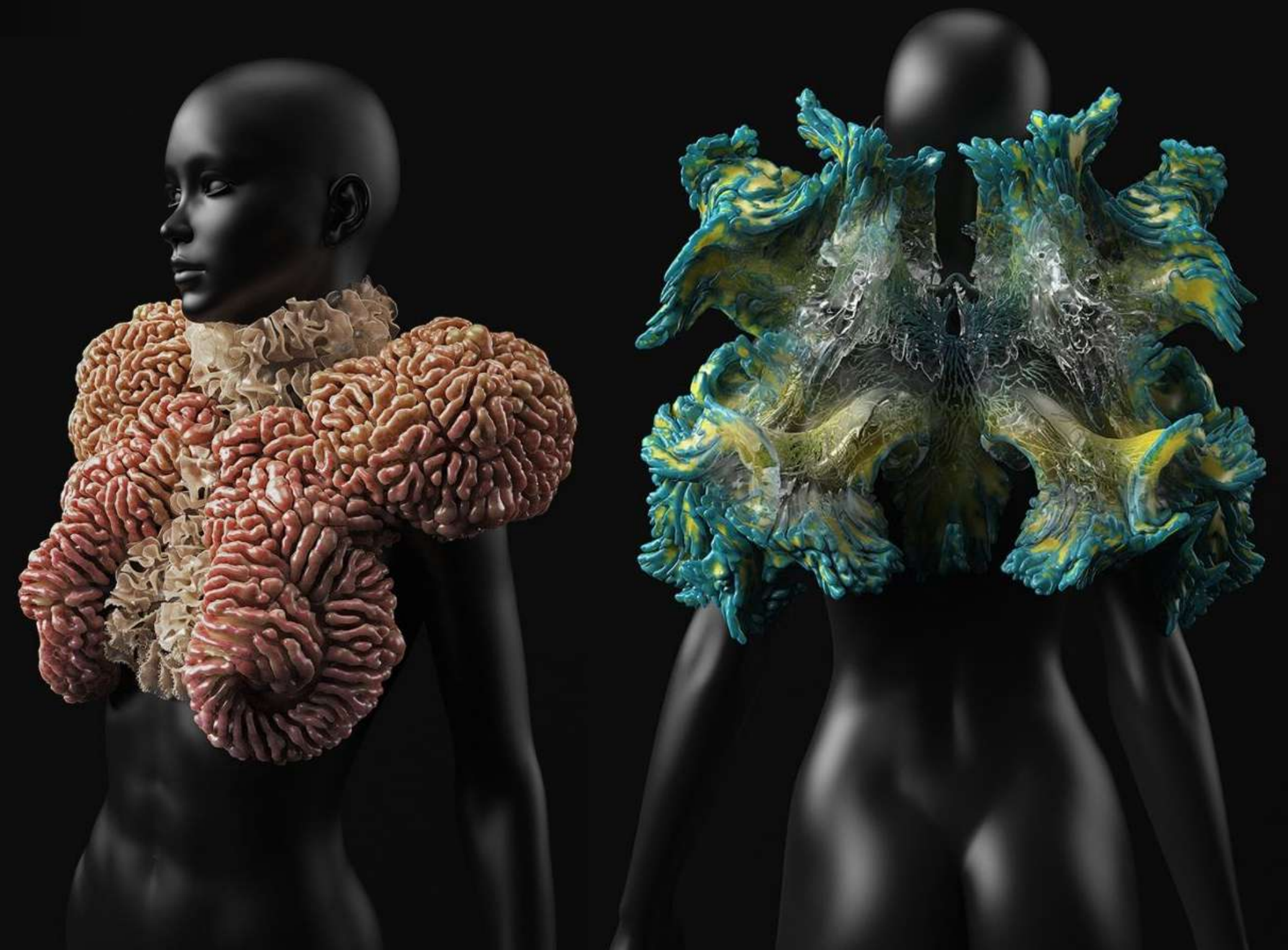


## Georgia O'Keeffe's Form & Symmetry

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In an attempt to make a wearable influenced by organic shapes and forms, the works of artists and designers was used for inspiration

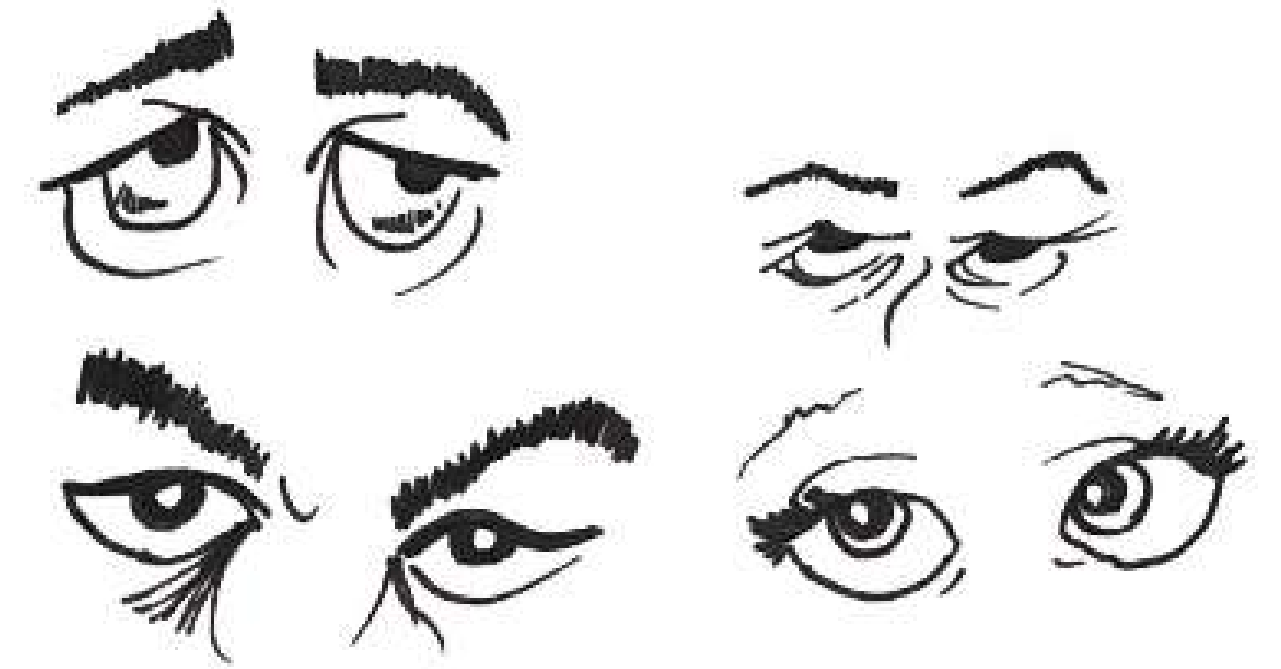
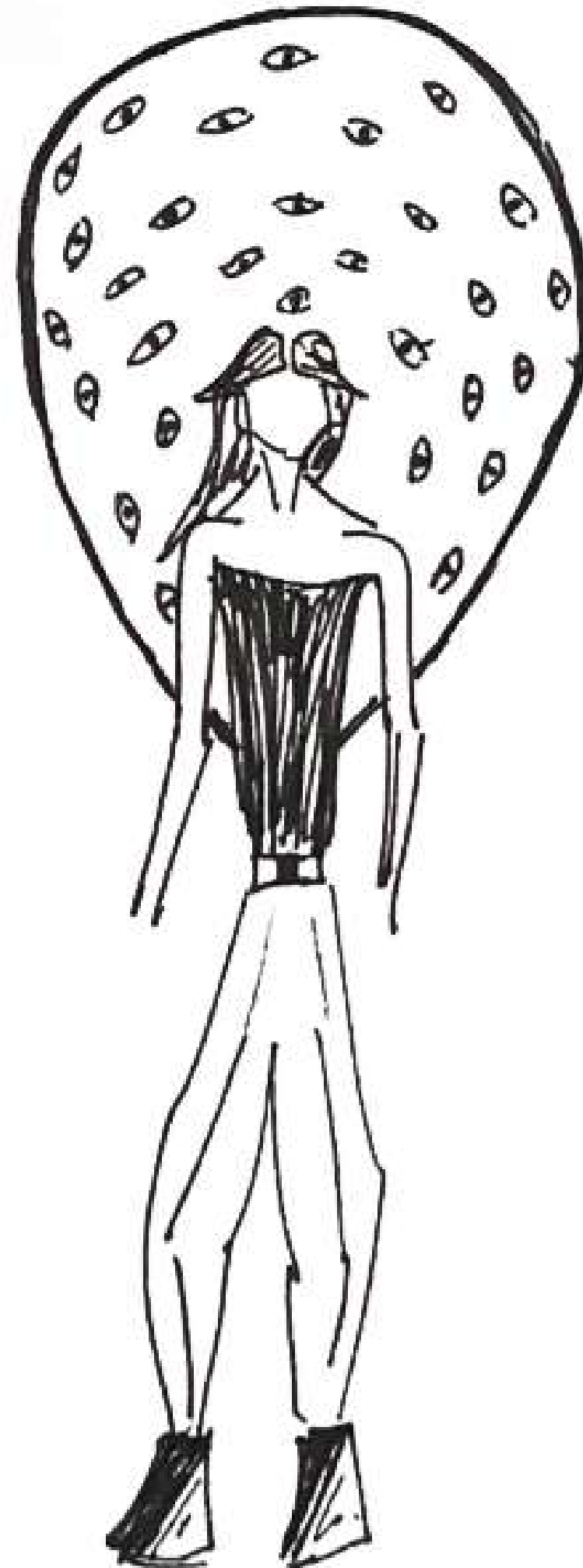
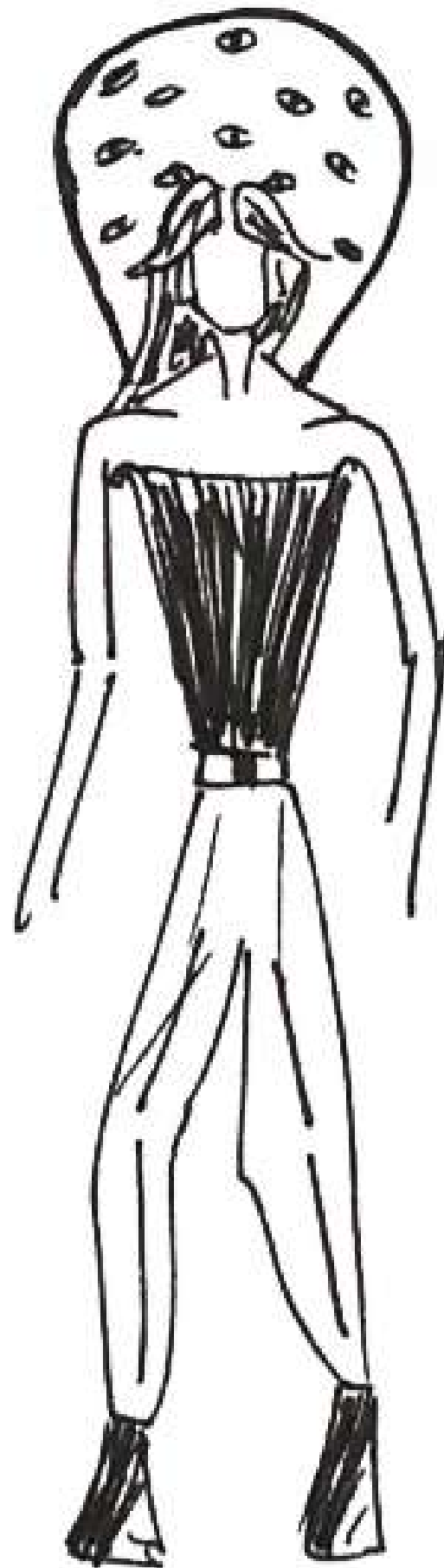
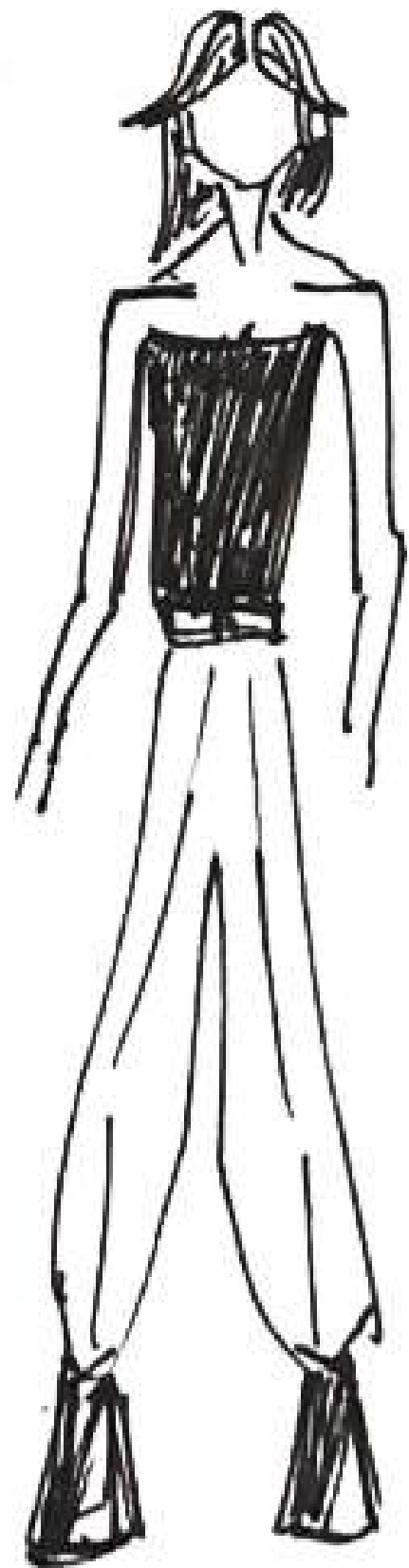
## Neri Oxman's Materiality







- CHANGE THE MEMORIES ASSOCIATED W/ THE OLD PEACOCK DRESS FROM THE BRITISH EMPIRE.
- BRING AN IMPORTANT SOCIAL ISSUE TO THE WORLD'S ATTENTION. — MALE GAZE, TOUCH, HARASSMENT



THE EYES ARE THE MOST EXPRESSIVE BODY PART

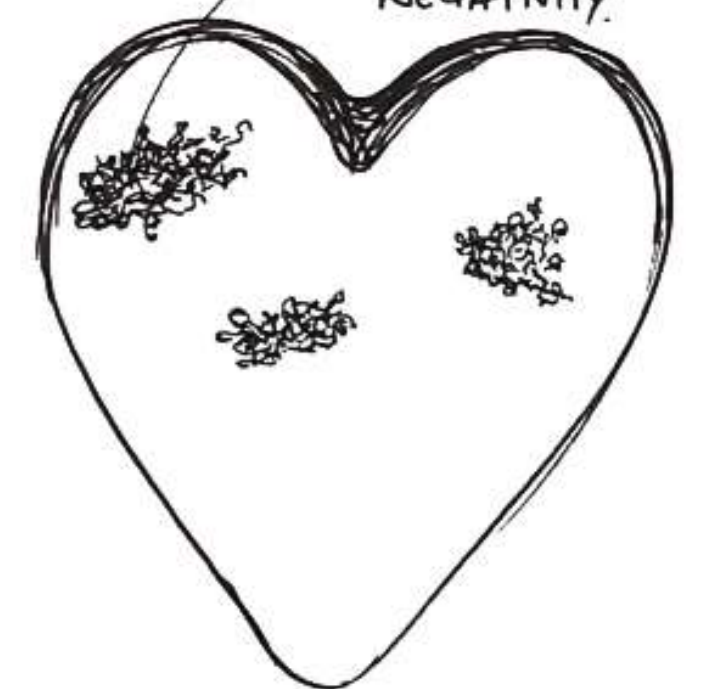
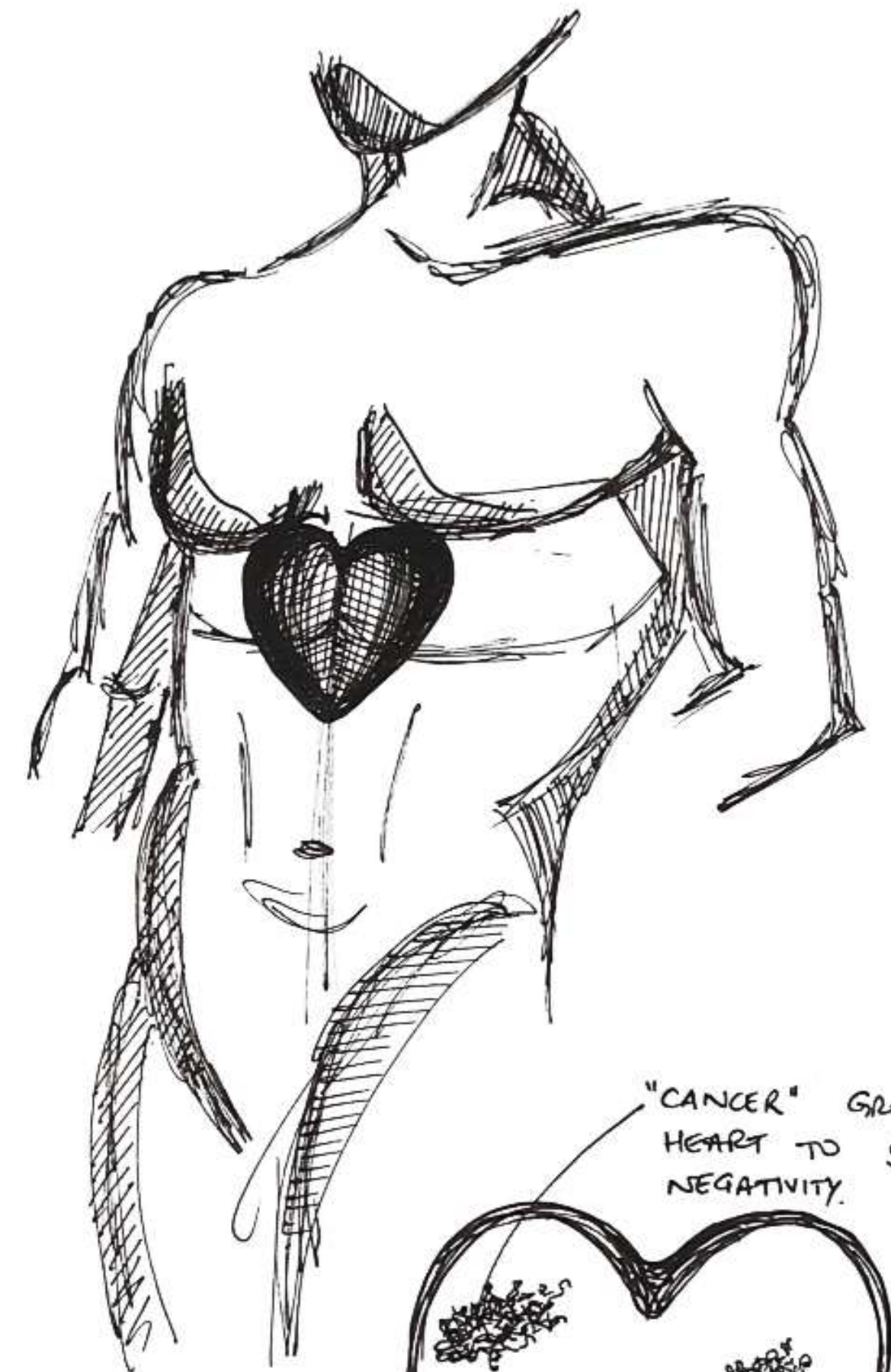
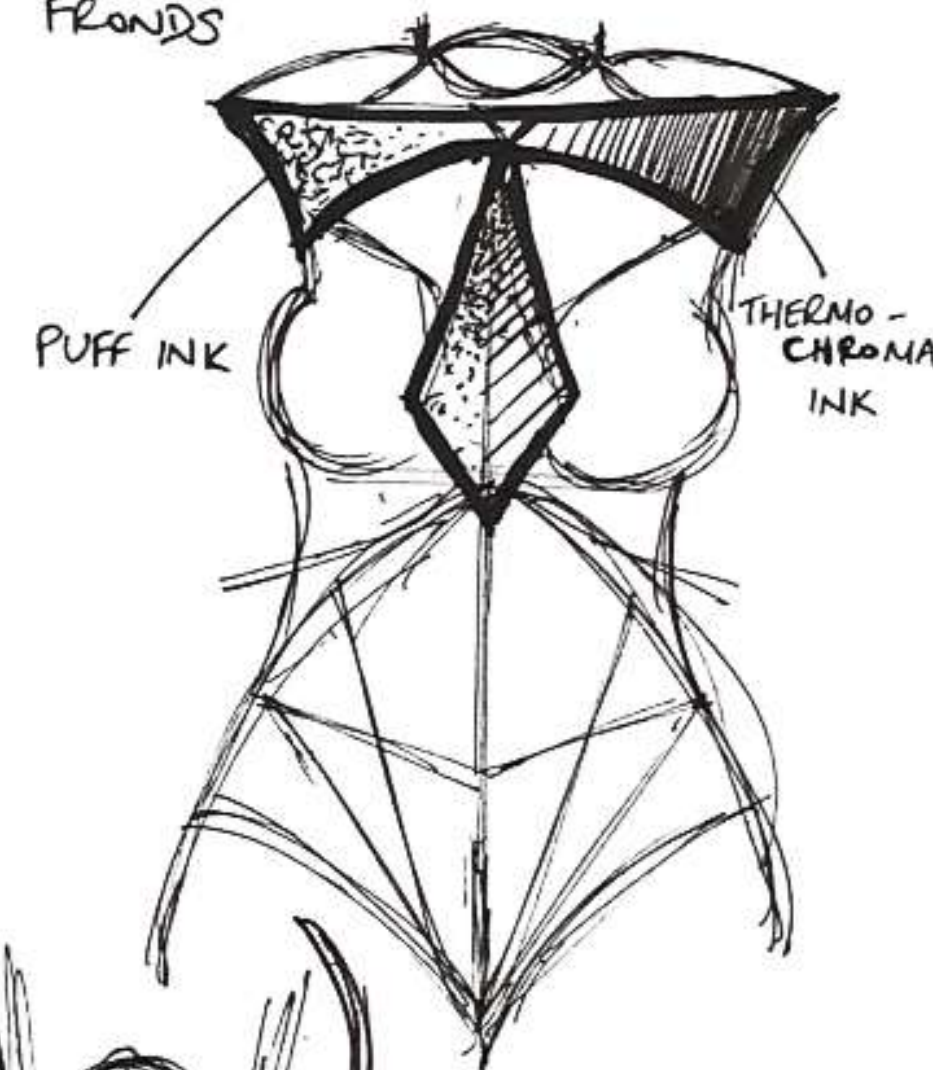
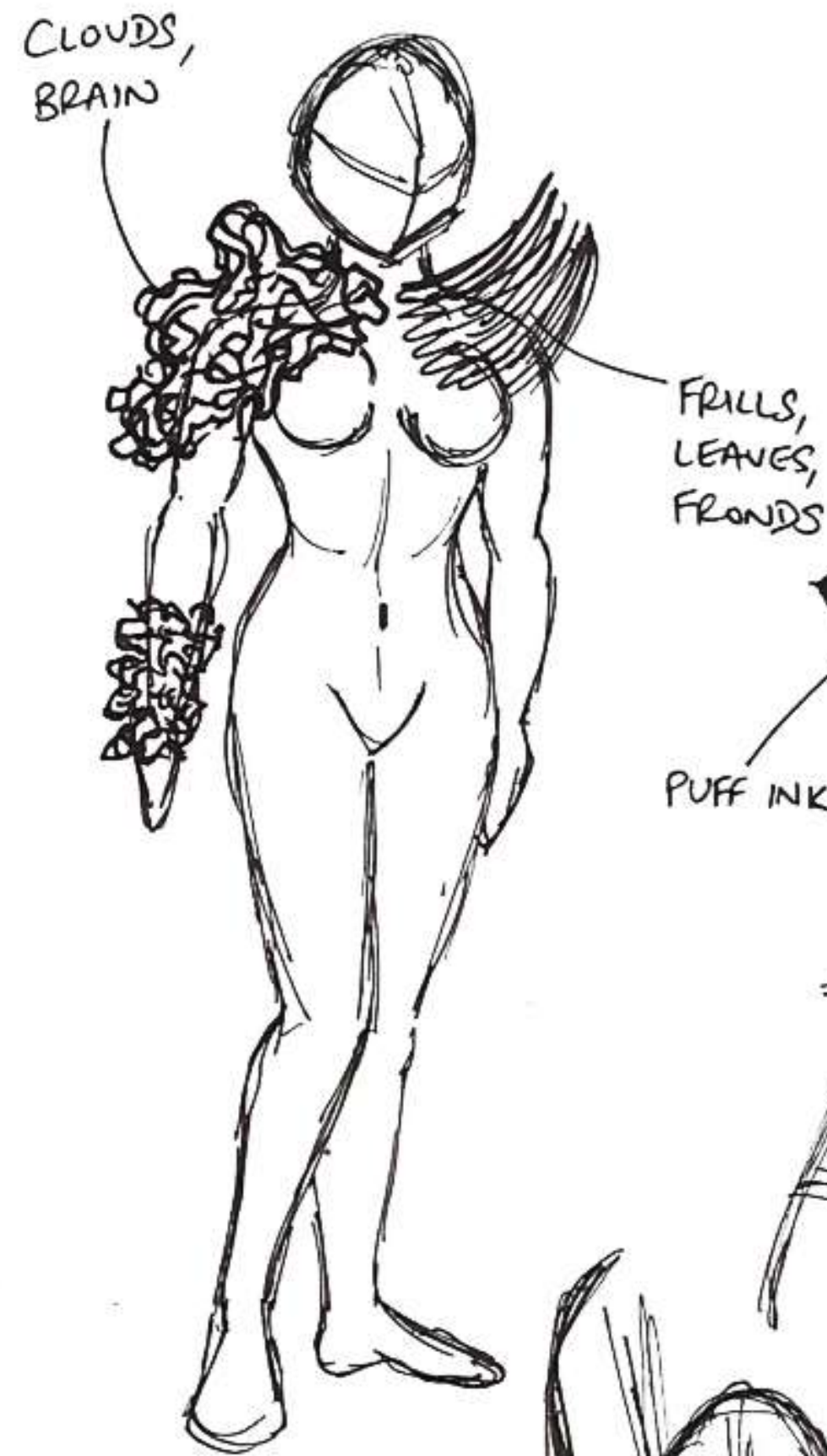
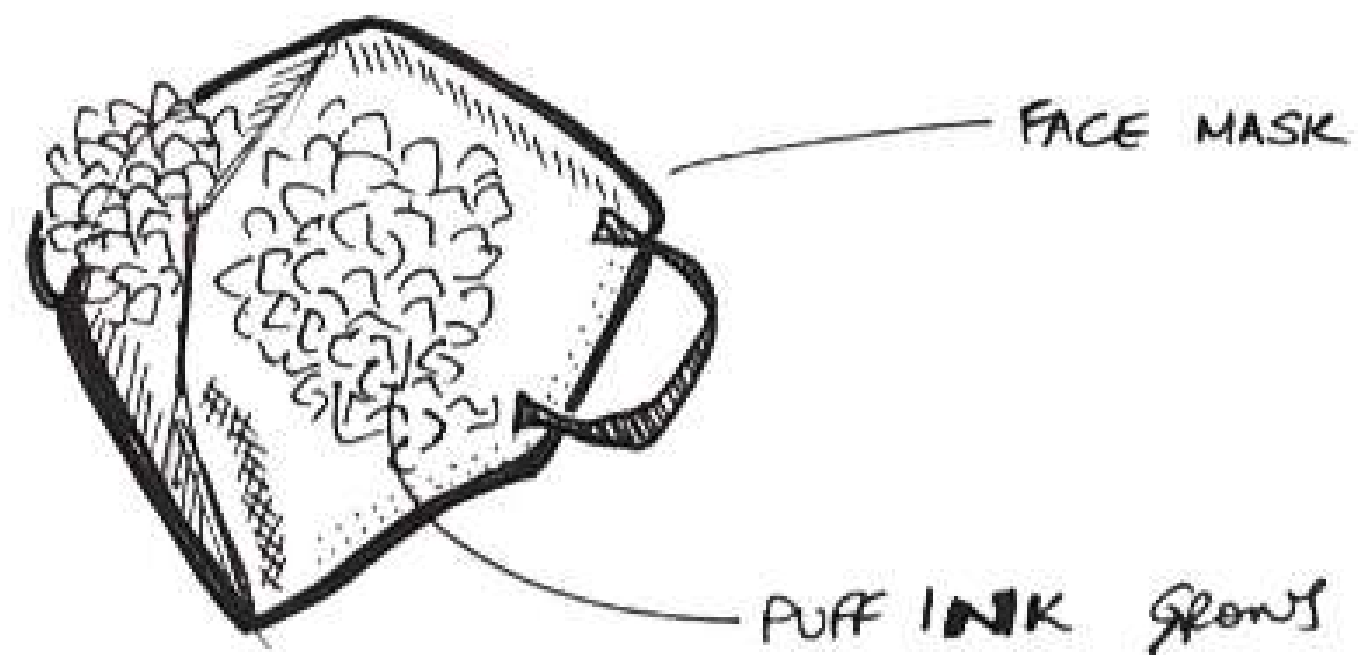
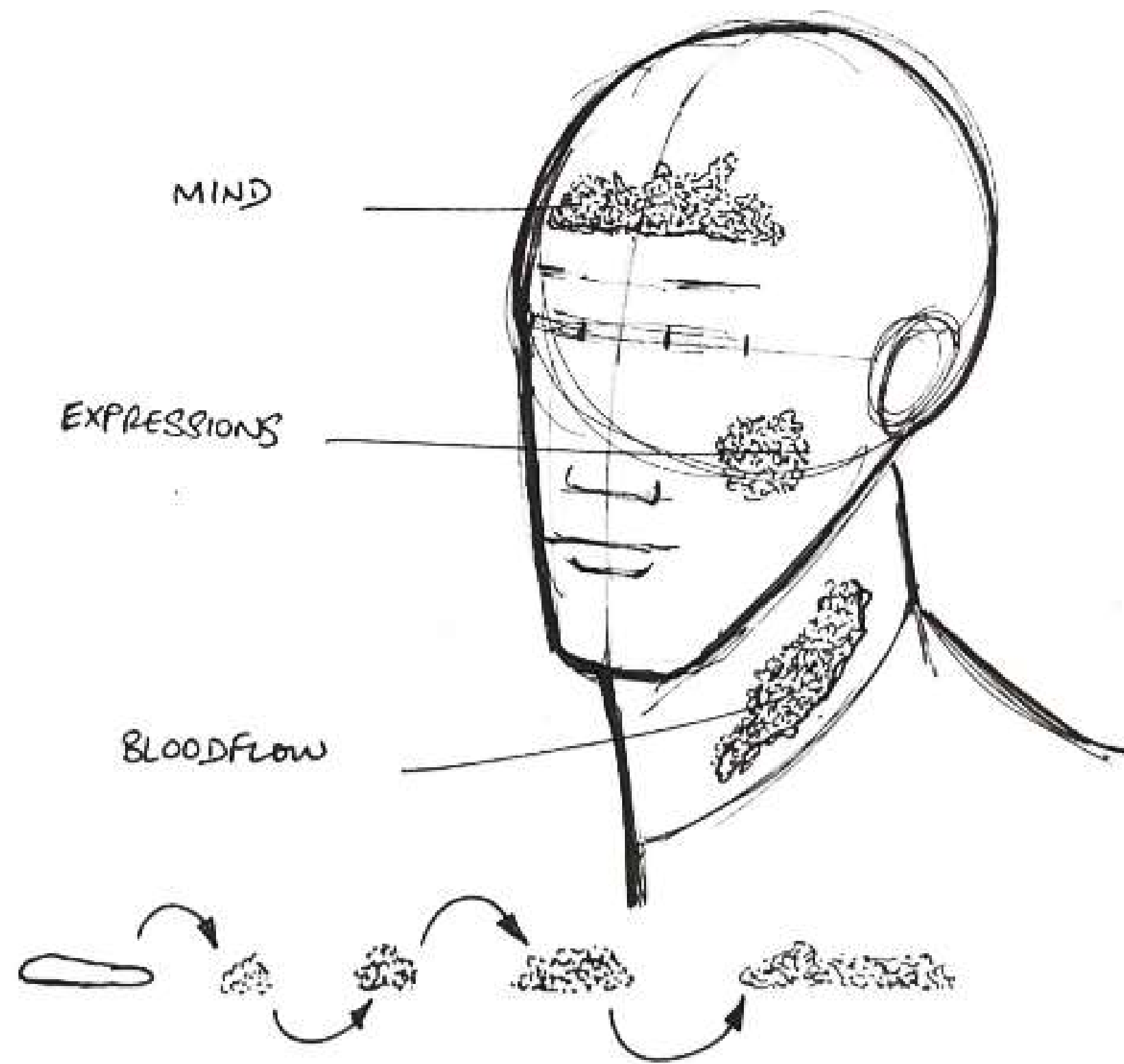
↓  
COULD WE CREATE A LANGUAGE  
TO COMMUNICATE W/ OUR EYES?



FACE TATTOO/STICKER  
PLACED AROUND THE  
MOST EXPRESSIVE PART  
OF THE FACE

SENSES FACIAL  
MOVEMENTS &





YOU TAKE SOME THINGS TO HEART. THIS IS A WAY TO VISUALIZE THAT.

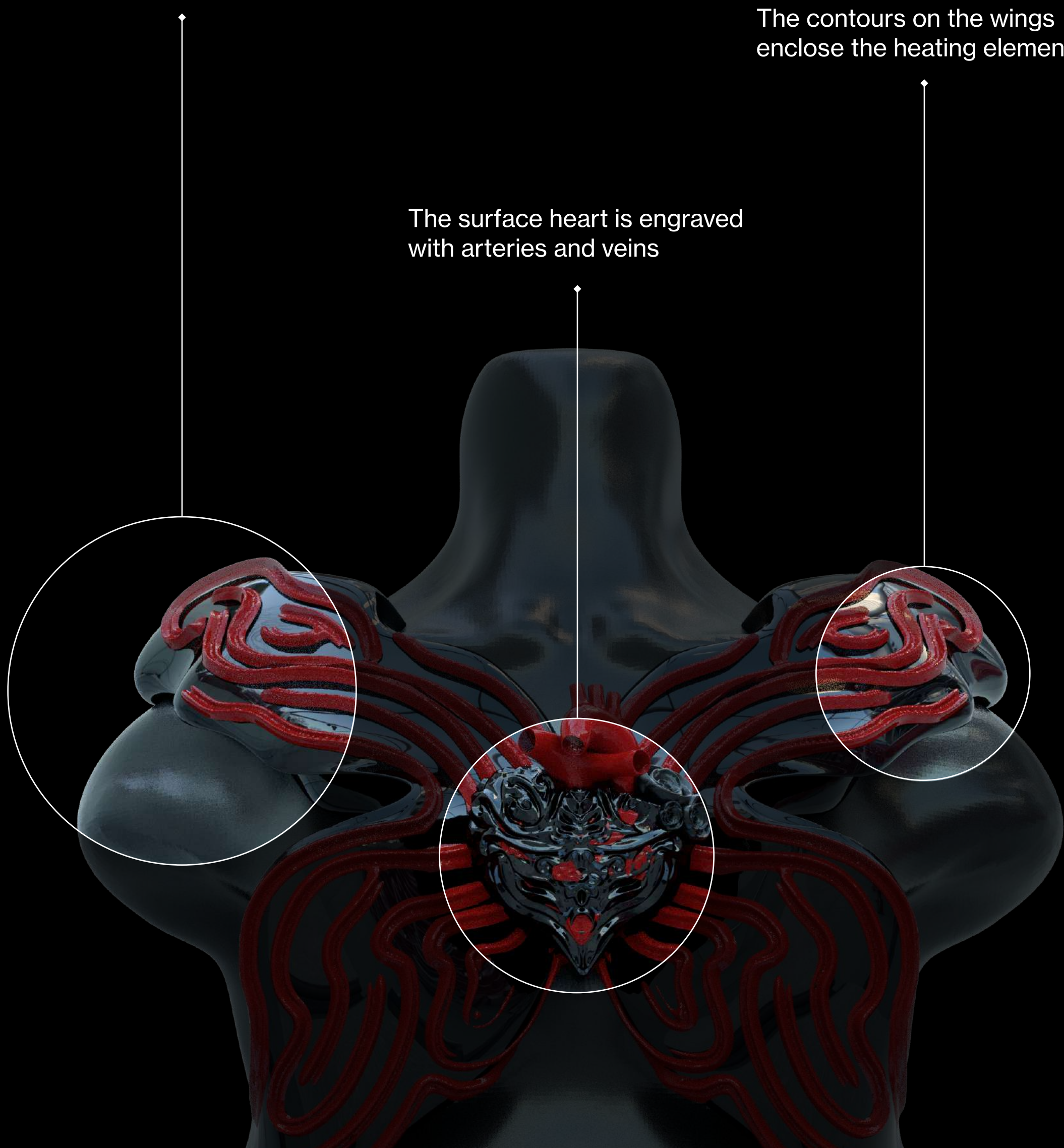


# Evolution of Form Factor

The entire wearable structure design starts from the heart

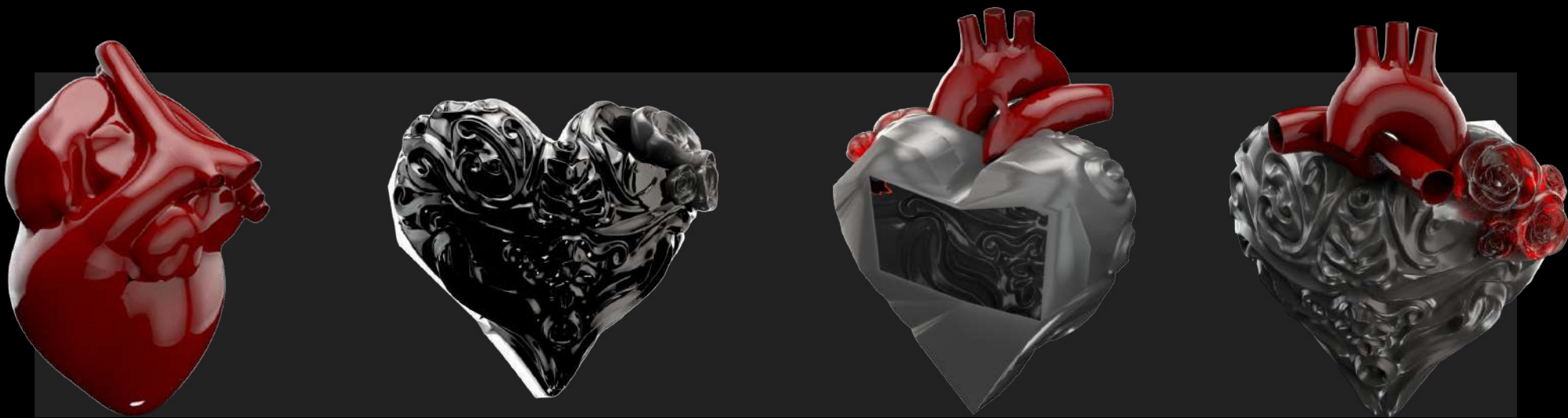
The contours on the wings enclose the heating elements

The surface heart is engraved with arteries and veins



## The Wings

The four “wings” resemble the four chambers of the human heart.



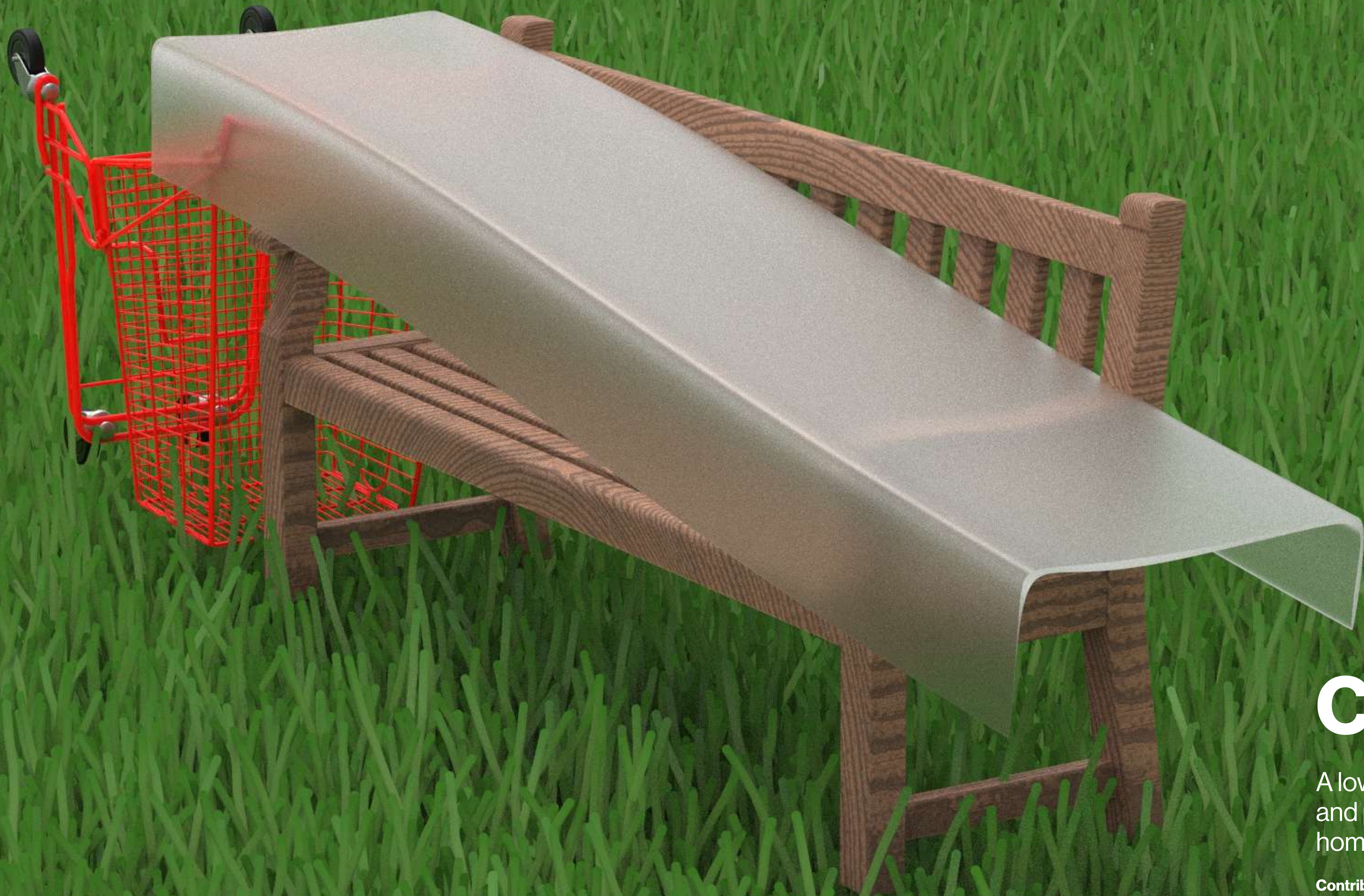
## The Heart

The most prominent arteries and veins were added to the heart before engraving a pattern on it.









# Chris-Cross

A low-cost mobile shelter that attaches to shopping carts and park benches, designed for the population experiencing homelessness in the San Francisco Bay Area.

## Contributions

Research & User Interviews  
Hardware Design  
3D CAD Modeling  
Materials Testing  
Photorealistic 3D Rendering  
Fabrication & Testing





**John, 66**

Homeless since 2015  
📍 Civic Center Park

“I wish I was  
sleeping inside.”



**David, 60**

Homeless since 2017  
📍 9th Street

“I lost [my left leg]  
in a tent fire.”



**Mitch, 59**

Homeless since 2014  
📍 Civic Center Park

“My legs were  
losing strength.”

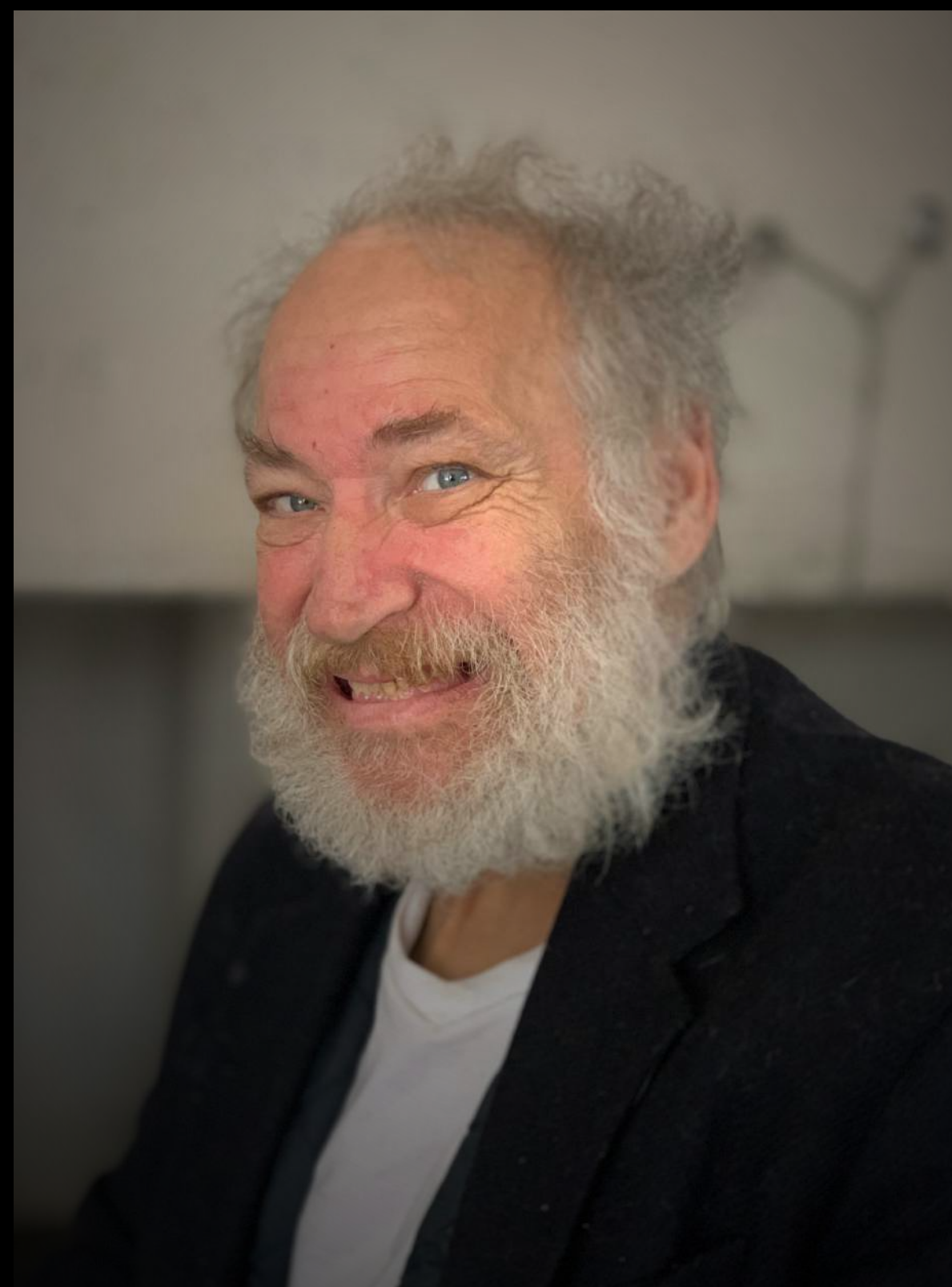




**Matthew, 76.5**

Homeless since 2013  
📍 4th Street

“I get \$2,000  
every month.”



**Christopher, 61**

Homeless since 2018  
📍 Bancroft Way

“I don’t feel safe  
at night.”



**Latanya, 64**

Homeless since 2008  
📍 7-Eleven

“They crawl up  
next to you.”





## Observational Studies





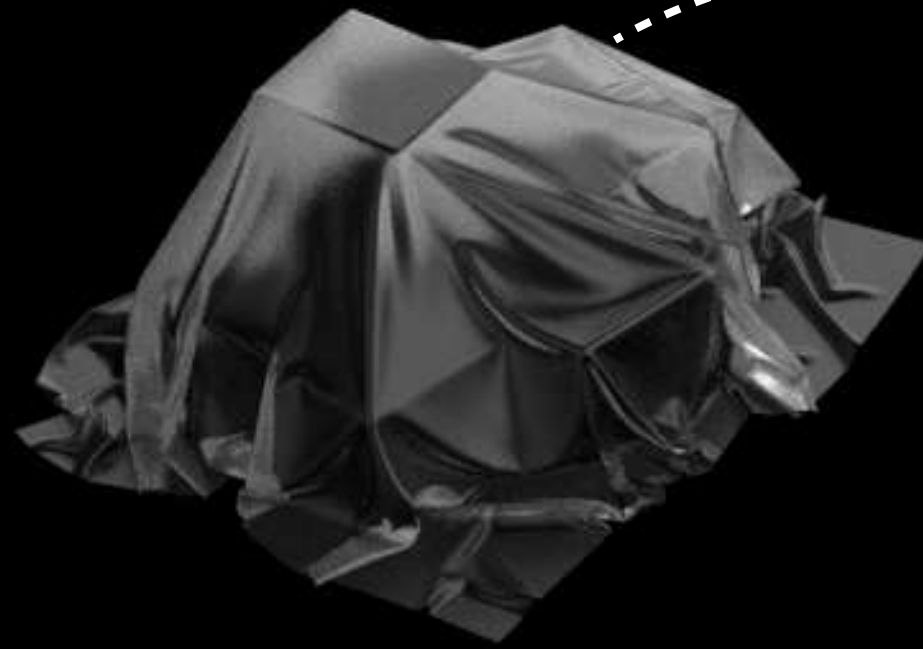
**Bodystorming**



**The mobile shelter can be conceived for less than \$10 using the principles of ‘design for extreme affordability’ & ‘jugaad innovation’**



Shopping Cart (\$0)



Tarp (\$6)



Bungee Cords x2 (\$2)

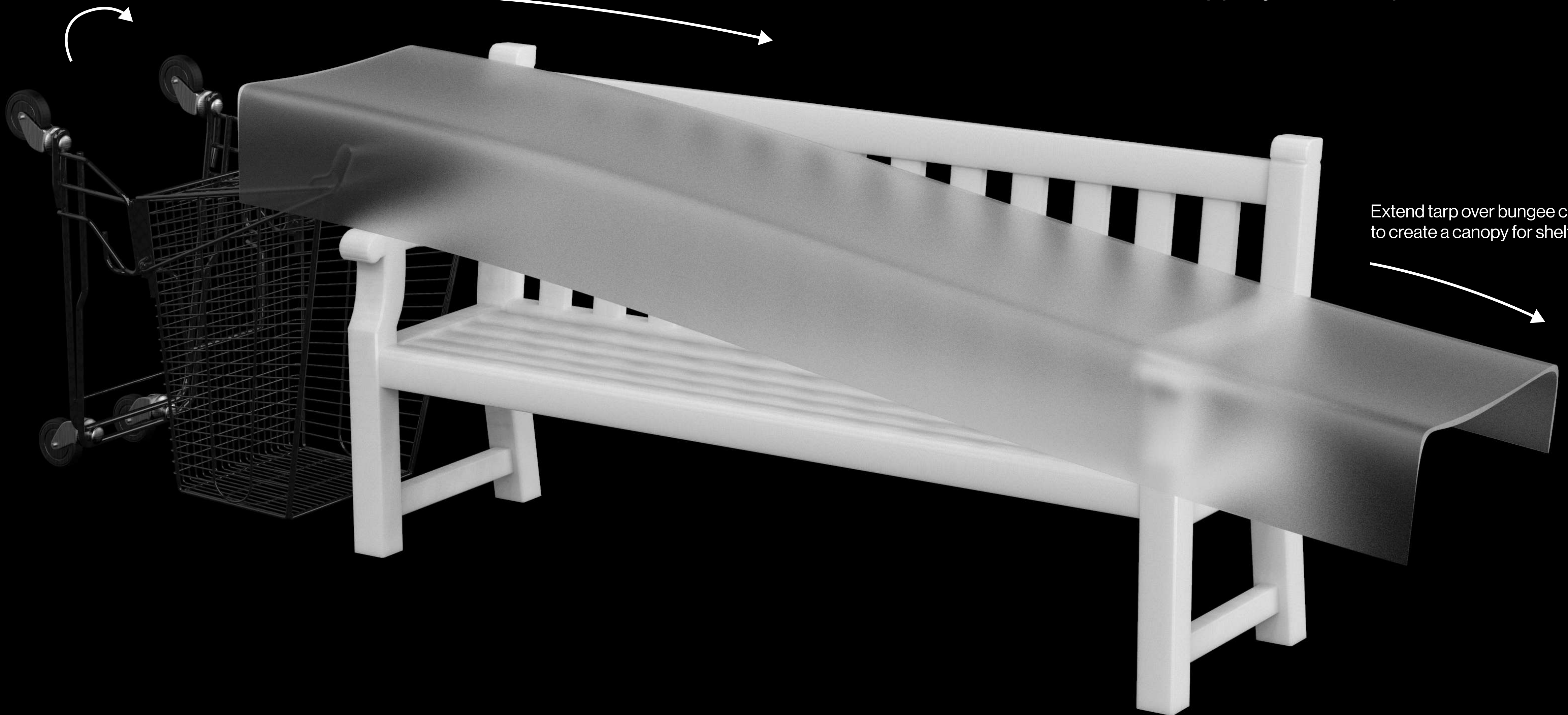
# Chris-Cross

*A low-cost mobile shelter that attaches to shopping carts and park benches.*

Flip shopping cart 90°  
& rest against bench

Stretch bungee cords across bench  
for support & hook on opposite side

Extend tarp over bungee cords  
to create a canopy for shelter



# RESUME

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## EXPERIENCE

**Graduate Student Instructor** Fung Fellowship Honors Track at UC Berkeley  
Berkeley, California, United States  
*Aug 2021 - Present*

- Instructing a class of 24 undergraduate students in a startup lab to help them design solutions for industry partners at the intersection of healthcare or environmental conservation, and technology.
- Designing the curriculum and leading workshops and activities to help students explore, synthesize, and develop their ideas with the principles of human-centered design at their core.

**Co-Founder** Prana Medical  
Berkeley, California, United States  
*Mar 2021 - Present*  
Prana is a medical device aimed at low-resource hospitals that allows up to four patients to share a single ventilator safely.

- Co-founded the company during the pandemic to support the global ventilator shortage.
- Working with partners at UCSF Health, Stanford Children's Health, the American Association for Respiratory Care, and the International Council for Respiratory Care to develop and test a proof of concept medical device for deployment in Africa.

**Accelerators, incubators, & other programs**  
2022 | Berkeley Health Tech CoLab  
2021 | Skydeck Pad-13 Batch 13 - Acceptance rate 1.5%  
2021 | CITRIS Foundry  
2021 | UC StEP  
2021 | Tech Futures Group  
2021 | Bay Area Regional NSF I-Corps (Sept 2021)

- Awards & accolades**
- Winner, Social Impact Award, San Francisco Design Week Awards 2021
  - Gold Award, Medical Devices & Technology - Emergency Equipment, New York Product Design Awards 2021
  - Winner, Promising Company, Indian Achievers' Award 2022
  - Silver Winner, Product Design - Medical Devices, MUSE Design Awards 2022
  - Finalist, Fast Company World Changing Ideas 2021
  - Honoree, Health & Wellness, Core77 Design Awards 2021
  - One of 7 finalists out of 40 from around the world in the Global Health track of the Johns Hopkins Healthcare Design Competition in 2022
  - One of 26 finalists in the Big Ideas Contest out of 354 applications (900+ grad & undergrad students) across all UC campuses in 2021
  - One of 5 projects to be awarded the \$2,000 Innovation Catalysts Grant from the Jacobs Institute for Design Innovation at UC Berkeley
  - Presented at the Kansas Respiratory Care Society's annual conference
  - Featured on BBC Radio Leicester
  - Launched as a Capstone project at Loughborough University for an MSc Design Engineering student

## EDUCATION

**Master of Design (MDes)** University of California, Berkeley  
Berkeley, California, United States  
*Dec 2020 - May 2022 (expected)*  
Grade: 3.9

- Incorporated the Master of Design Student Association (MDSA) in the founding year of the program in 2021.
- Elected as the first-ever Community & Culture Officer of the MDSA.
- Created & launched the MDes Buddy Program with >70% conversion rate to promote inter-cohort mingling.
- Organized the first graduate student-only startup mixer with over 40 attendees from seven different programs.

**BEng (Hons) Product Design Engineering** Loughborough University (Top 10 university in the UK)  
Loughborough, Leicestershire, United Kingdom  
*Sep 2015 - Jul 2019*  
Grade: First Class Honors (77.6% or 4.0 GPA)

- Awarded the 'Appleby Prize' for the best academic performance in the degree program (one winner every year from over 450 students).
- Awarded the 'Institution of Mechanical Engineers Product Design Engineering Best Project Certificate' for designing, prototyping, and testing a smart kitchen speaker in collaboration with Cyrus Audio, a British manufacturer of hi-fi systems (one winner every year from over 450 students).
- The program was accredited by the Institution of Mechanical Engineers, the Institution of Engineering Designers, and the Institution of Engineering and Technology in the UK.

## AWARDS & ACCOLADES

- Winner, Fast Company Linda Tischler Award, 2020 for the SUPERvisor project
- Finalist, Fast Company Innovation by Design Awards 2020 for the SUPERvisor project
- Winner, Graduate Startup of the Year, Loughborough Enterprise Awards 2021, United Kingdom
- Founders of the Future Fellow: One of 75 fellows under the age of 30 in the UK in a private network of the world's leading digital and technology entrepreneurs launched at 10 Downing Street.

## SPEAKING, TEACHING, JUDGING, MENTORING

- Guest Speaker, Entrepreneurship Challenge Lab, University of California, Berkeley - United States, Mar 2022
- Guest Speaker, Lamorinda Sunrise Rotary, Rotary International - United States, Jan 2022
- Panelist, Design and Innovation Ecosystem at UC Berkeley - United States, Nov 2021
- Campus Lead & Design Mentor, Microsoft GroupMe Hackathon, UC Berkeley, U Delaware, Babson U, Boston U - United States, Nov 2021
- Guest Speaker, Kansas Respiratory Care Society Annual Conference, Kansas - United States, Sep 2021
- Guest Speaker, Initiate Program, Loughborough University - United Kingdom, Sep 2021
- Mentor & Design Expert, Entrepreneurship & Corporate Innovation, Harvard University - United States, Aug 2021 - Nov 2021
- Mentor, Guest Speaker & Design Expert, Intro to Entrepreneurship, Harvard University - United States, Jun 2021 - Aug 2021
- Guest Speaker & Mentor, Evolve Program, Loughborough University - United Kingdom, May 2021 - Dec 2021
- Panelist & Mentor, Social Storm Hackathon - United Kingdom, Belgium, Kenya, Nov 2020
- Entrepreneur Roundtable Speaker, Loughborough University Incubator - United Kingdom, Sep 2020

