Thymos

A wearable device that allowed people with Alexithymia to connect with the wider world by making their emotions more comprehensible to others.

10.2022 - 12.2022 / 9 weeks

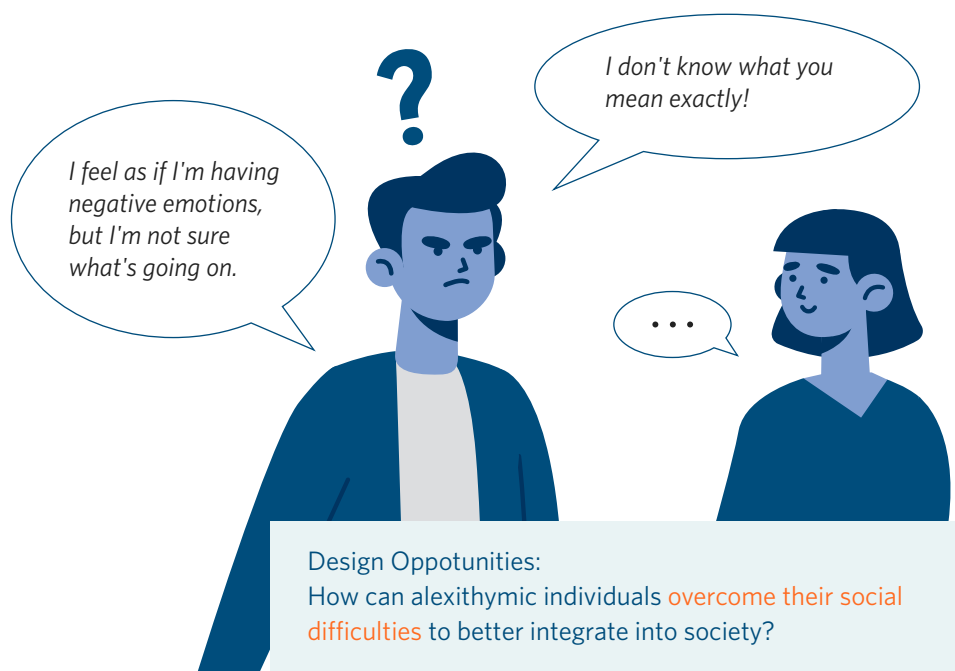Group work: Myself, Ice Jiang, Siwei Zhu, Xiaoyang Chen

BACKGROUND

In our daily lives, we experience a variety of emotions - happiness, sadness, fear, etc. - which contribute to rich social interactions. However, a vast majority of alexithymic individuals ('emotional blindness') in the world are currently unable to have such experiences. They appear to be markedly detached from people.

10% of the world population have alexithymia

40-65% of autistic people have alexithymia

730,000,000 people have alexithymia

▮ What alexithymic individuals feels like in social situations?

I feel as if I'm having negative emotions, but I'm not sure what's going on.

?

I don't know what you mean exactly!

...

Design Oppotunities:
How can alexithymic individuals overcome their social difficulties to better integrate into society?

SECONDARY RESEARCH
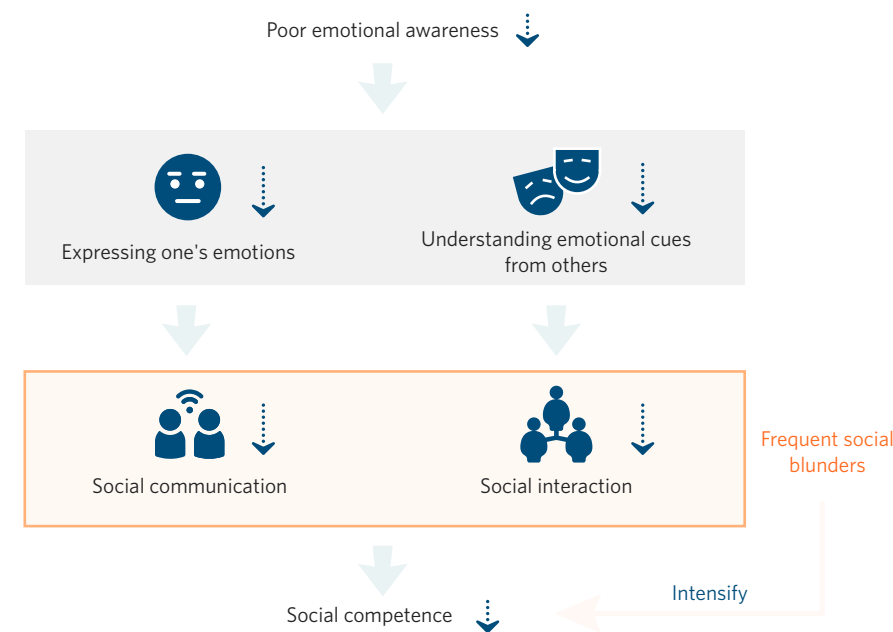
▮ What is Alexithymia?

A	=	LACK
LEXIS	=	WORD
THYMOS	=	EMOTIONS

Alexithymia is a personality trait characterized by the inability to encode, identify, and describe one's own and other people's emotions.

The term was introduced by Peter Emanuel Sifneos in 1972

▮ Why do people with alexithymic have social difficulties?

Recent studies suggested that alexithymia does result from an emotion processing problem. It leads to have trouble generating and interpreting social cues, which can make their social interactions uncomfortable, and ultimately unsuccessful, making it difficult to relate to others.

Poor emotional awareness

Expressing one's emotions

Understanding emotional cues from others

Social communication

Social interaction

Frequent social blunders

Social competence

Intensify

Insight:
Enhance alexithymic individuals awareness and expression of emotions as well as their social experience, will improve their social competence.

▮ *Literature Review - User Personas*

I collected and analyzed data from the paper "A Qualitative Exploration of the Feelings of Alexithymic Individuals" by Marcus and Myrna. Authors interviewed 12 participants with alexithymia to learn about their actual social experiences, which assisted in defining our user personas.

Name: Ken
Age: 41
Occupation: Insurance
Location: Penna.

Biography:

He is 41 years old, married with one child. In his live, he always struggle with descriptions of his feelings from bodily symptoms. He mostly can express his emotions in a few words briefly. This made it difficult for him to establish good social relationships with others because no one could understand what he was trying to express. Although he sometimes tells what others are feeling by their facial expressions or the tones of their voices, she spoke of how she does not know how to respond.

Motivations:

1. Eager and work hard to connect with others.
2. Be more understanding of his family and thus know how to help them.

Frustrations:

1. Struggle to find words to describe his emotions.
2. Be aware of his bodily symptoms, but don't know how to express them.
3. Social relationships are affected.

"It's hard for me to find words for my feelings. Because it's hard for me...to be in touch with them and figure out what they are."

TAS-20 scores:
(one of the most commonly used measures of alexithymia.)
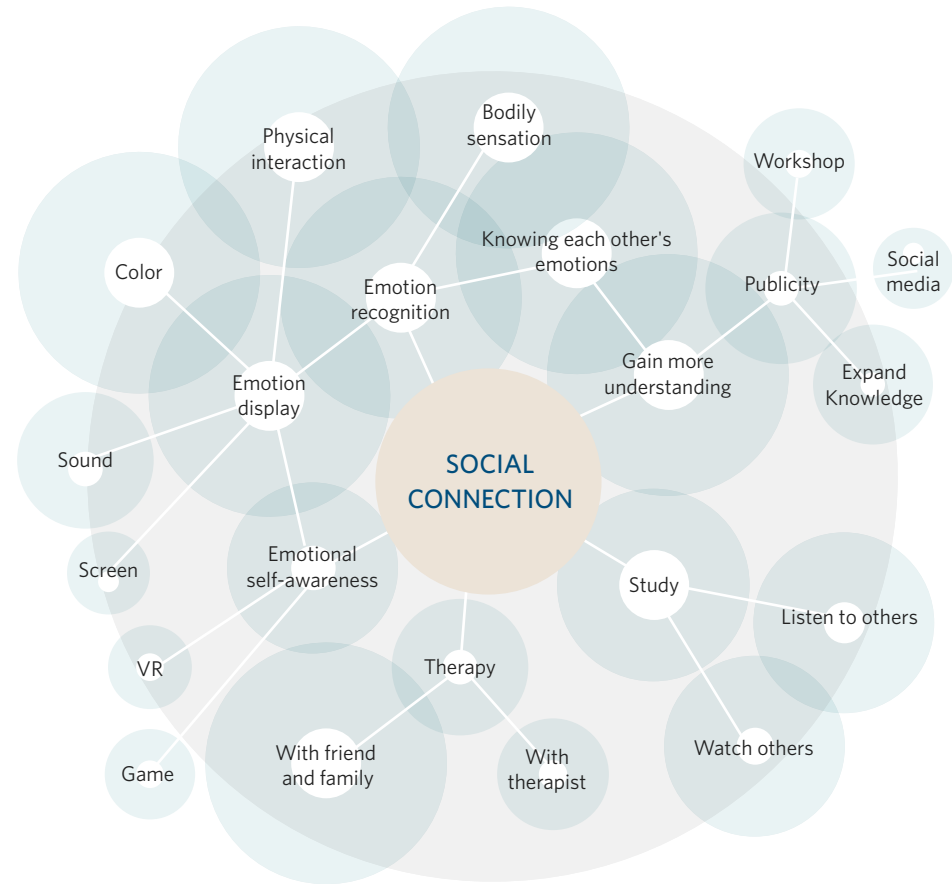
66

Core needs:

1. Build social relationships with others.
2. Easily gain other people's understanding of him.
3. Be aware of what the emotions are in the bodily symptoms and express them.

MIND MAP

Bubbles surrounding central node **SOCIAL CONNECTION**:
Physical interaction, Bodily sensation, Workshop, Color, Knowing each other's emotions, Emotion recognition, Publicity, Social media, Emotion display, Gain more understanding, Expand Knowledge, Sound, Screen, Emotional self-awareness, Study, Listen to others, VR, Therapy, Watch others, Game, With friend and family, With therapist

VALUE PROPOSITION

For	Alexithymia individuals **struggle to use words to express the emotions** from their bodily sensations.
Who	People who are disconnected from society due to their incapacity to **recognize and express their emotions**. Nonetheless, they still wish **to be comprehended, to develop social interactions with people,** and to be genuinely accepted by society.
(Our)	A device that can improve the **public's understanding** of the user's emotions, providing users with **a better social experience** in which **they can learn about their feelings and express them.**
By	Using technology to **identify the user's emotions** and then **express them in an easily understandable way** to others.

EMOTION RECOGNITION

Relationships between hand gesture & emotion

Wickramasekera (1986) stated that people who monotonously recount their physical symptoms, rather than their emotions, and **alexithymic individuals are inclined "to express psychological states (e.g., depression) in body language**.

Body language is an external signal of a person's inner emotional state. Numerous studies showed that **gesture not only conveys semantic meaning but also emotional information.**

Anger	Relaxed	Fretful
A clenched fist	Open Hands	Trembling hands
Static Hand Gestures		Dynamic Gesture

Technology study - sensor-based recognition (SBR)

A mechanism of hand gesture recognition using flex sensors, accelerometers, and Arduino UNO
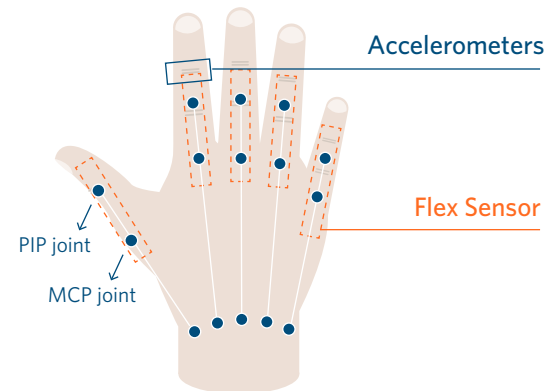
Accelerometers are put on **dynamic fingers** in order to detect its motion, shock, and vibration.
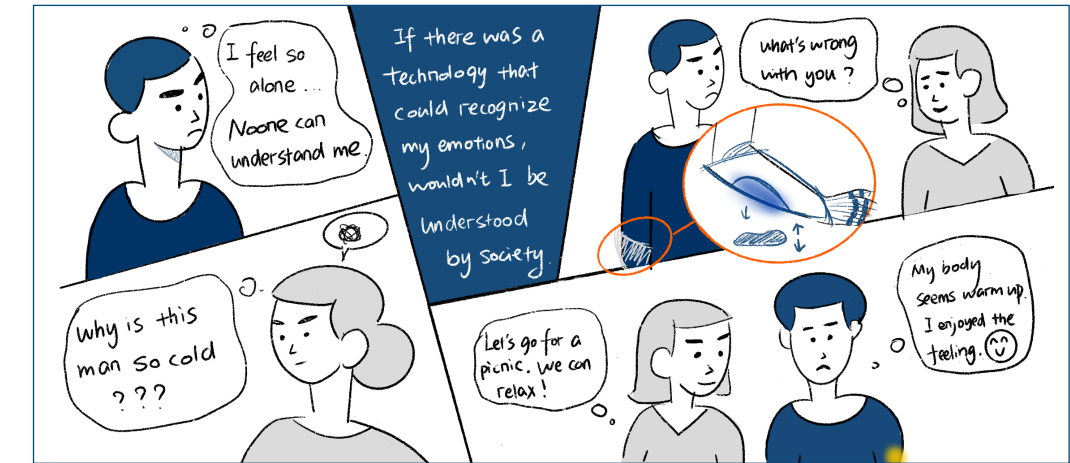
Flex sensors along each finger and thumb will be fixed on the glove, and are utilized to recognize the **bowing based developments of fingers**.
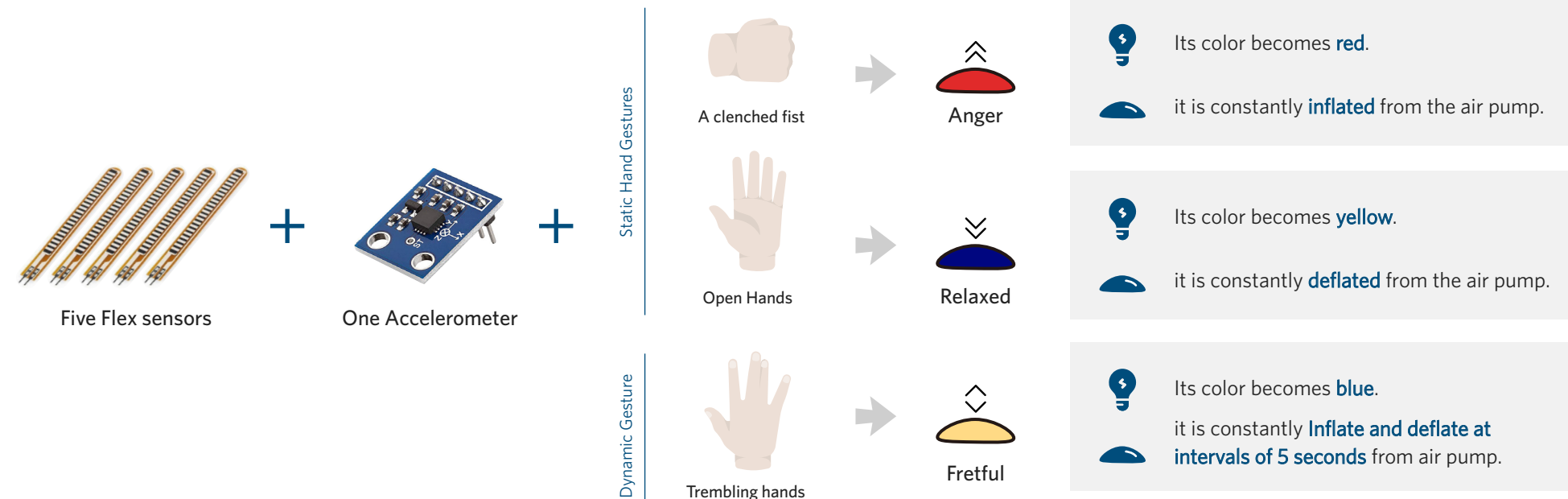
PIP joint
MCP joint

CONCEPT DEVELOPMENT

Sketch

Story Board

Interaction design

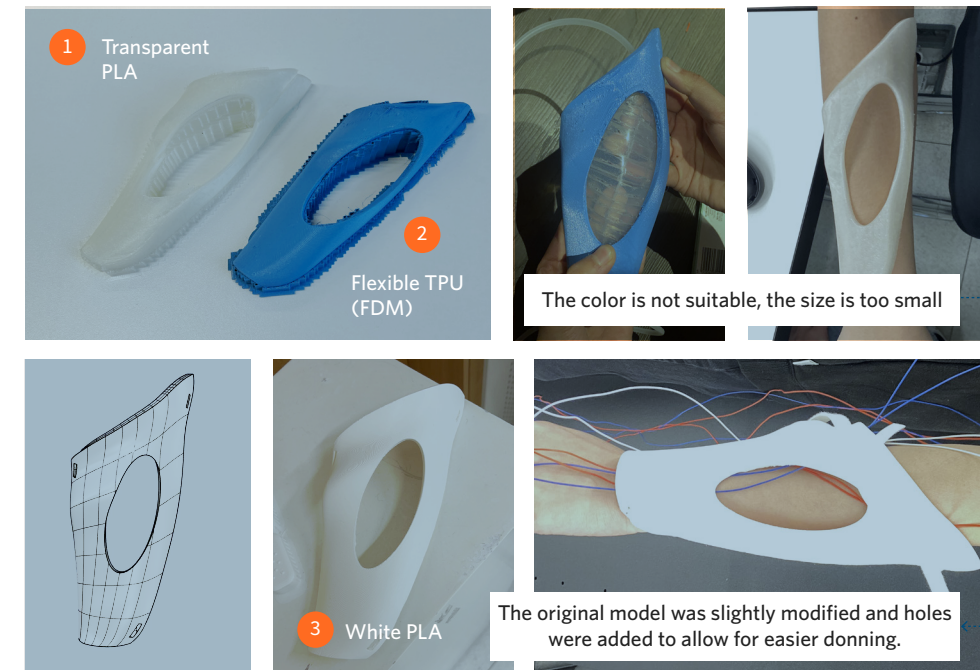Input: Hand gesture recognition

Output: light & inflatable materials

Five Flex sensors + One Accelerometer +

Static Hand Gestures

A clenched fist → Anger	Its color becomes **red**.
	it is constantly **inflated** from the air pump.
Open Hands → Relaxed	Its color becomes **yellow**.
	it is constantly **deflated** from the air pump.

Dynamic Gesture

Trembling hands → Fretful	Its color becomes **blue**.
	it is constantly **Inflate and deflate at intervals of 5 seconds** from air pump.

PROTOTYPE TESTING & DEVELOPMENT

Structure & function

INPUT

- Accelerometers
- Retaining straps
- Flex sensor

Arduino

LED strip lights *3

Make material with color change

3d printed wearable model

Air pump *2

Inflate and deflate materials

Inflatable materials

Inflatable materials iteration

Stage 1: Balloons

Hard to combine with lights and readily leaks.

Stage 2: Plastic films

It is difficult to make thin plastic with thermoplastic.

Hard and soft plastics are more extensibility but lack aesthetics.

Stage 3: Silicone gel

Sketch | 3d printing | Demoulding

Mold casting | Inflatable testing

Final Choice

It was tested successfully, but works unstable.

I've been looking for mold issues, silicone leaks, etc. several times, and trying to fix it, but it only works smoothly when testing.
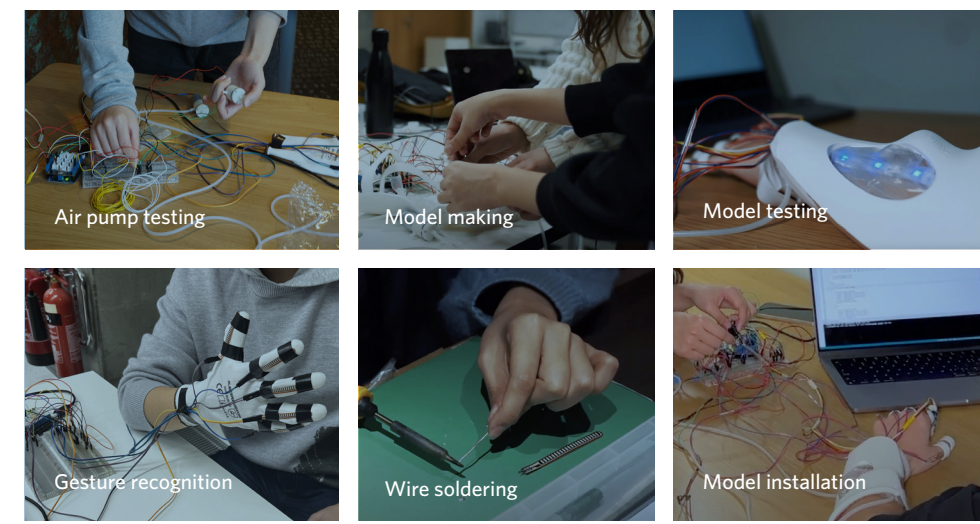
3d model iteration

1 Transparent PLA

2 Flexible TPU (FDM)

The color is not suitable, the size is too small

3 White PLA

The original model was slightly modified and holes were added to allow for easier donning.

Model installation and testing

Air pump testing | Model making | Model testing

Gesture recognition | Wire soldering | Model installation

Coding

Angry
Red light inflatable

Relaxed
Blue light Deflation

Fretful
Flashing yellow light

Inflate and deflate at intervals of 5 seconds

FINAL WORK

For the final exhibition, we made a wooden box in which we put all the wiring as well as the power supply. This way, we can conveniently carry our final product and display it.
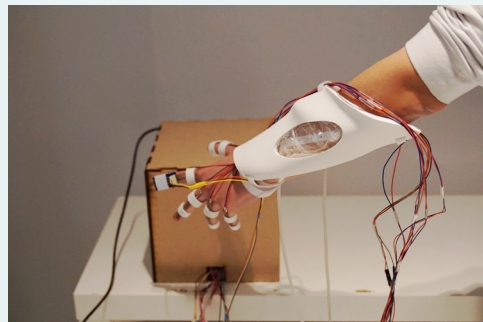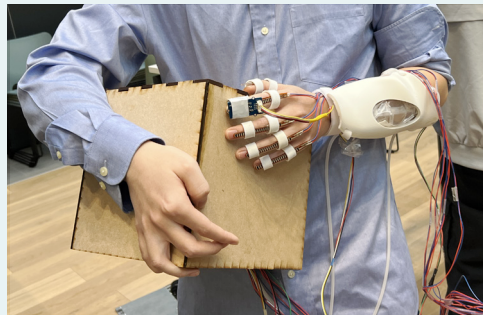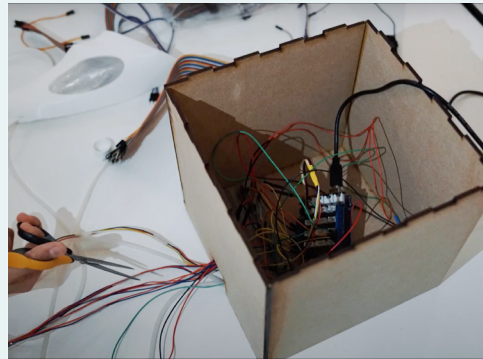
Lighting Effect
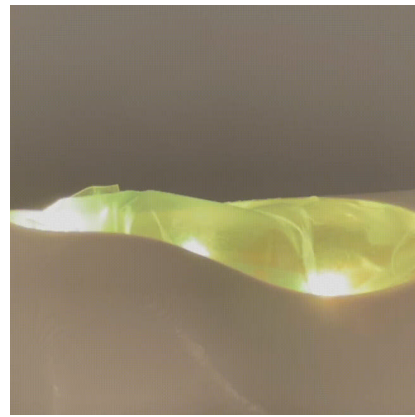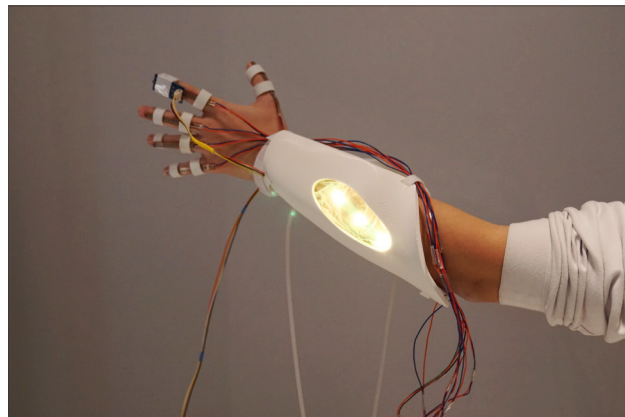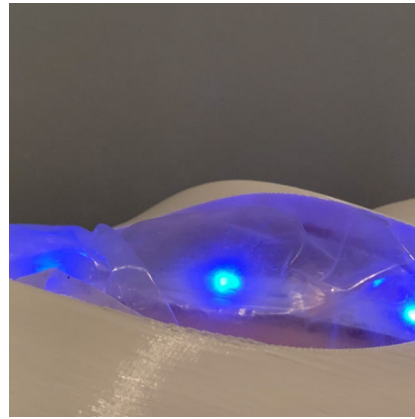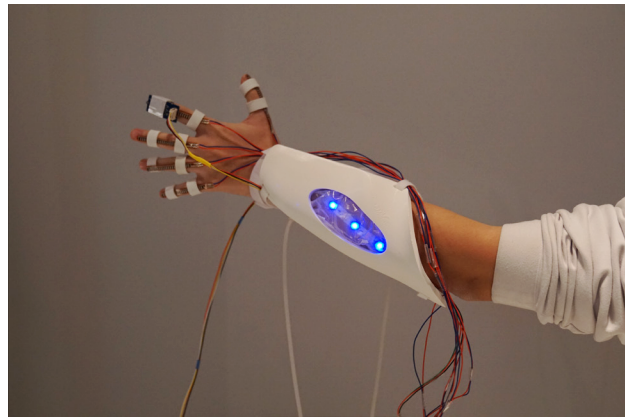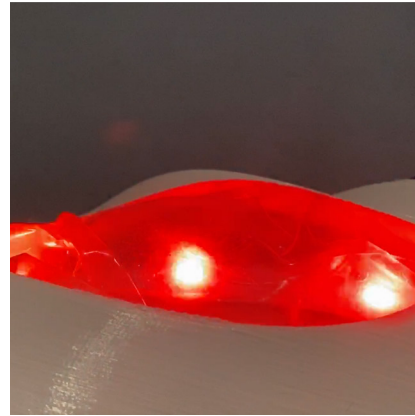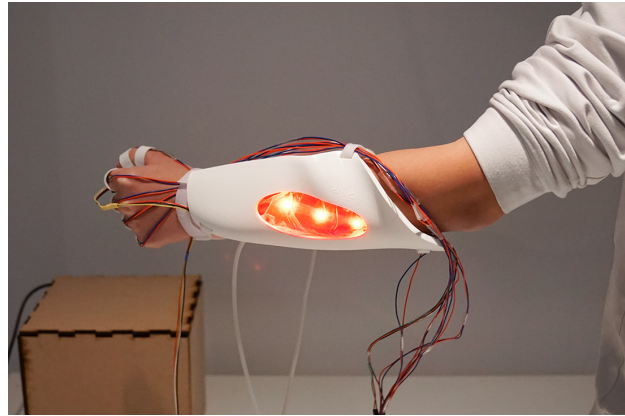
Angry

When people make a fist, the device will have a red light effect and the plastic film will begin to inflate.
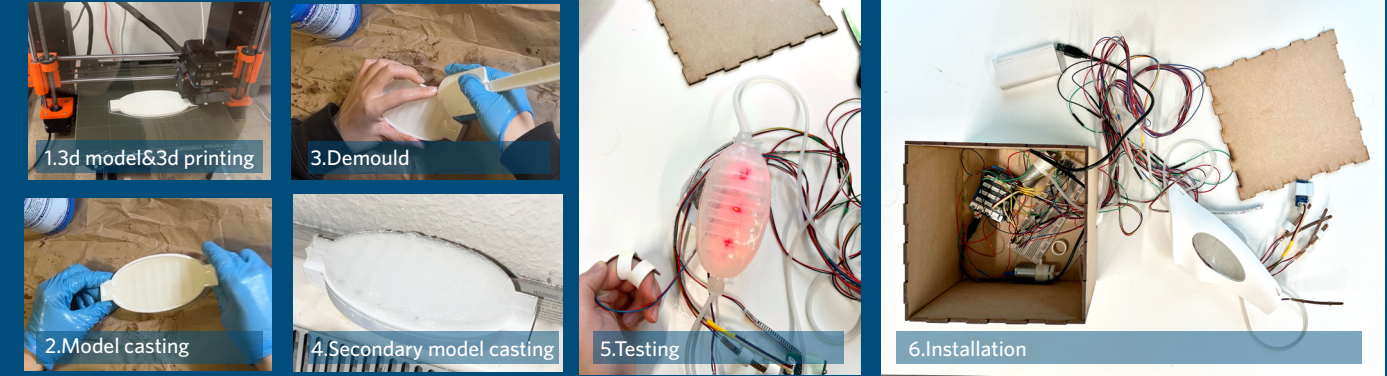
Relaxed

When people open their hands, the device will have a blue light effect and the plastic film will begin to deflate.

Fretful

When people's hands tremble, the device will have a yellow light effect and the plastic film will begin to alternately inflate and deflate.

PROTOTYPE ITERATION

We did not use the silicone material in the final presentation due to its unstable performance in testing.
So, after teamwork, I spent extra time re-experimenting with the material, iterating on our final prototype.

1.3d model&3d printing
2.Model casting
3.Demould
4.Secondary model casting
5.Testing
6.Installation

USER TESTING

The Toronto Alexithymia Scale (TAS-20) is a 20-item, self-administered questionnaire that identify alexithymia, which is one of the most commonly used measures of alexithymia.

The TAS-20 uses cutoff scoring:

Score	Interpretation
0–51	No alexithymia
52–60	Possible alexthymia
61–100	Alexithymia present

So, I invited 5 students from UoE to fill out the online version of TAS-20 questionnaire .
https://embrace-autism.com/toronto-alexithymia-scale/

	Total: 64	Total: 51	Total: 47	Total: 54	Total: 41
Difficulty Describing Feelings:	16	12	15	18	7
Difficulty Identifying Feelings:	24	16	15	14	18
Externally–Oriented Thinking:	24	23	17	22	16
	Yang	Ice	Boya	Grace	Andy

The highest scorers finally participated in our user test.

"The installation recognizes some of my base emotions, which I feel will make it easier for others to understand my emotions. However, I don't think it is comfortable to wear and not very portable."