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

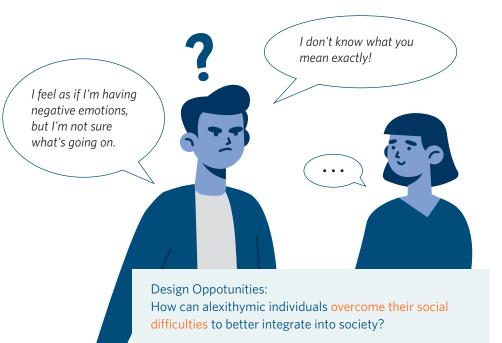
BACKGROUND

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

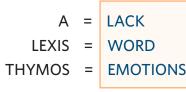
730,000,000 people have alexithymia

What alexithymic individuals feels like in social situations?



SECONDARY RESEARCH

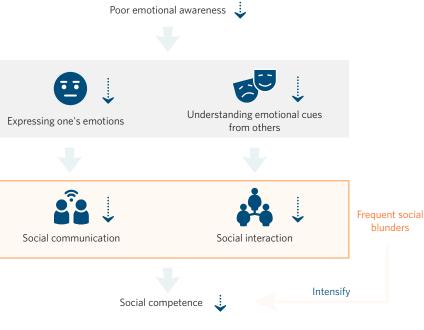
What is Alexithymia?

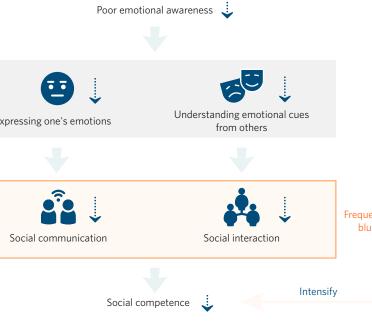


The term was introduced by Peter Emanuel Sifneos in 1972

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.





Insight:

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

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.

"

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 **66** commonly used measures of alexithymia.)

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:

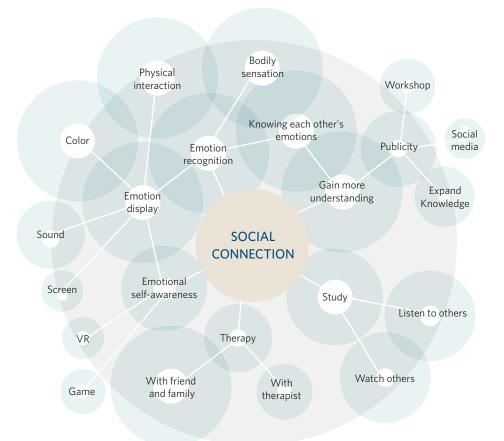
1. Struggle to find words to describe his emotions. 2. Be aware of his bodily symptoms, but don't know how to express them.

3. Social relationships are affected.

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



VALUE PROPOSITION

For	Alexthymia 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.
Ву	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.



Technology study - sensor-based recognition (SBR)

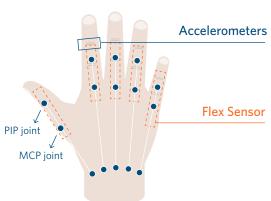
Dynamic Gesture





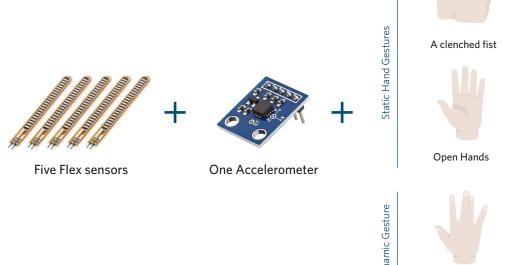


A mechanism of hand gesture recognition using flex sensors, accelerometers, and Arduino UNO



Accelerometers are put on dynamic fingers in order to detect its motion, shock, and vibration.

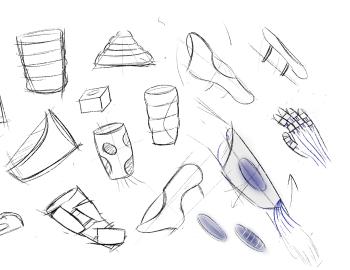
Flex sensors along each finger and thumb will be fixed on the glove, and are utilized to recognize the **bowing** based developments of fingers.



Sketch

D

CONCEPT DEVELOPMENT



Story Board

Trembling hands



Output: light & inflatable materials

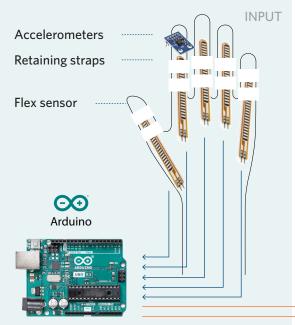
Interaction design

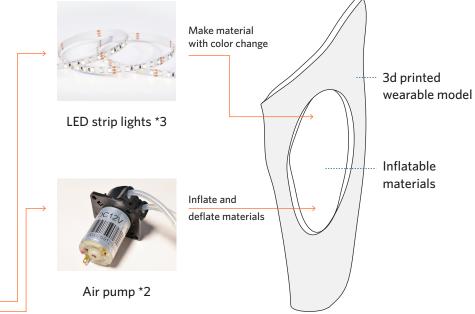
Input: Hand gesture recognition

 $\boldsymbol{\varsigma}$ Its color becomes **red**. \approx it is constantly **inflated** from the air pump. Anger 3 Its color becomes yellow. it is constantly **deflated** from the air pump. Relaxed 5 Its color becomes **blue**. \Diamond it is constantly Inflate and deflate at intervals of 5 seconds from air pump. Fretful

PROTOTYPE TESTING & DEVELOPMENT

Structure & function





3d model iteration



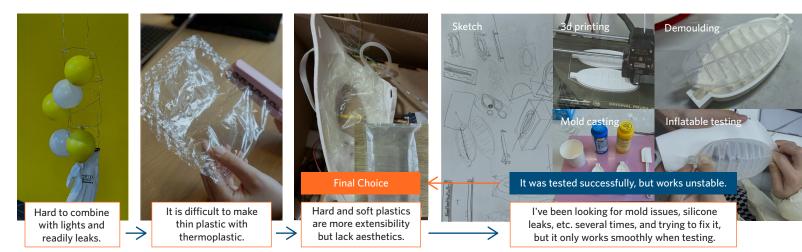


Inflatable materials iteration

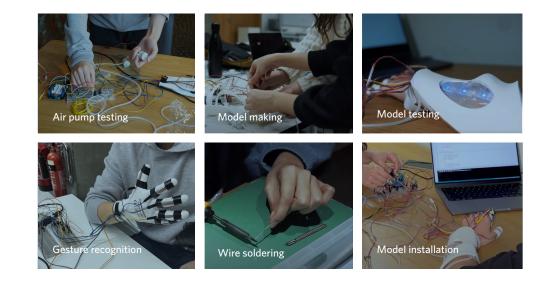
Stage 1: Balloons

Stage 2: Plastic films

Stage 3: Silicone gel



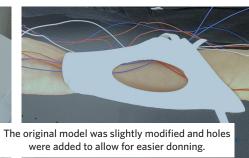
Model installation and testing



Coding



The color is not suitable, the size is too small

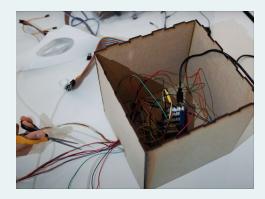


••		🔤 body is a map Arduino IDE 2.0.0	Angry		
		Select Board Debug - No board			
V					
	body is a m 225	<pre>leds[1] = CRGB::Black; FastLED.show();</pre>			
57	226 • 227	<pre>leds[2] = CRGB::Black; FastLED.show();</pre>			
	228 229	<pre>// angry emotion, fist if (value1 < 120){</pre>	Red light		
	230	<pre>time = millis();</pre>	-		
	231 232	<pre>FastLED.setBrightness(255); leds[0] = CRGB::Red; FastLED.show();</pre>	inflatable		
\$	233 234	<pre>leds[1] = CRGB::Red; FastLED.show(); leds[2] = CRGB::Red; FastLED.show();</pre>			
0	235 236	<pre>analogWrite(pwmPin, 255); analogWrite(pwmPin2, 0);</pre>			
	237	}			
	238 239	// almost angry, making a fist			
	240 241	<pre>else if (value1 <= 150) { time = millis();</pre>			
	242 243	<pre>brightness = pow(map(value1, 140, 160, 250, FastLED.setBrightness(brightness);</pre>	0), 3) * 240 / pow(250, 3) + 5;		
	244	<pre>leds[0] = CRGB(map(value1, 140, 160, 255, 0)</pre>			
	246	<pre>leds[1] = CRGB(map(value1, 140, 160, 255, 0) leds[2] = CRGB(map(value1, 140, 160, 255, 0)</pre>			
	247 248	<pre>analogWrite(pwmPin, 255); analogWrite(pwmPin2, 0);</pre>			
	249 250	}			
	251 252	<pre>// peaceful emotion else {</pre>			
	253	<pre>Serial.print(5);</pre>			
	254	Serial.print(", "); Ln 32, C	ol 51 UTF-8 × No board selected 🗘		
			Relaxed		
••	•	body is a map Arduino IDE 2.0.0	Relaxed		
••	•	Select Board +			
••	body is a r	Select Board 👻			
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	body is a r 248 249 250 251 252 253 254 255 256	<pre>Select Board nap.ino analogWrite(pwmPin2, 0); } // peaceful emotion else { Serial.print(5); Serial.print(", "); if (millis() - time < 8000) {</pre>	Blue light		
	→ (body is a r 248 249 250 251 252 253 254 255	<pre>Select Board nap.ino analogWrite(pwmPin2, 0); } // peaceful emotion else { Serial.print(5); Serial.print(5); if (millis() - time < 8000) { FastLED.setBrightness(5); leds(80 = CR68:8lue; FastLED.show(); </pre>	Blue light		
	body is a r 248 249 250 251 252 253 254 255 256 257	<pre>Select Board analogWrite(pwmPin2, 0); } // peaceful emotion else { Serial.print(5); Serial.print(", "); if (millis() - time < 8000) { FattED.setBrightness(5); leds[0] = CR68:18Ue; FastLED.show(); leds[1] = CR68:18Ue; FastLED.show(); </pre>	Blue light		
	 Dody is a r 248 249 250 251 252 253 254 255 256 257 258 259 260 261 	<pre>Select Board analogWrite(pwmPin2, 0); } // peaceful emotion else { Serial.print(5); Serial.print(5); Serial.print(7, "); if (millis() - time < 8000) { FastLED.setBrightness(5); Leds[0] = CRGB:18Uue; FastLED.show(); Leds[1] = CRGB:18Uue; FastLED.show(); leds[2] = CRGB:18Uue; FastLED.show(); analogWrite(pwmPin, 0); </pre>	Blue light		
	 Dody is a r 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 	<pre>Select Board analogWrite(pwmPin2, 0); } // peaceful emotion else { Serial.print(5); Serial.print(5); Serial.print(7, "); if (millis() - time < 8000) { FastLED.setBrightness(5); leds(1) = CR60:Blue; FastLED.show(); leds(1) = CR60:Blue; FastLED.show(); leds(2) = CR6</pre>	Blue light Deflation		
	Decdy is a r 248 249 250 251 252 253 254 255 256 257 258 259 260 261 252 253 254 255 256 260 261 262 263 264 265	<pre>Select Board nap.ino analogWrite(pwmPin2, 0); } // peaceful emotion else { Serial.print(5); Serial.print(", "); if (millis() - time < 8000) { FastLED.setBrightness(5); leds[0] = CR68:18/ue; FastLED.show(); leds[1] = CR68:18/ue; FastLED.show(); analogWrite(pwmPin, 0); analogWrite(pwmPin2, 255); } // after getting peaceful for a while, evert else</pre>	Blue light Deflation		
	 Dody is a r 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 	<pre>Select Board analogWrite(pwmPin2, 0); } // peaceful emotion else { Serial.print(5); Serial.print(", "); if (millis() - time < 8000) { FastLED.setBrightness(5); leds(10) = CRGB::Rlue; FastLED.show(); leds(11) = CRGB::Rlue; FastLED.show(); leds(12) = CRGB::Rlue; FastLED.show(); analogWrite(pwmPin, 0); analogWrite(pwmPin, 0); } // after getting peaceful for a while, ever </pre>	Blue light Deflation		
	body is a r 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268	<pre>Select Board analogWrite(pwmPin2, 0); } // peaceful emotion else { Serial.print(", "); if (millis() - time < 8000) { FatLED.setBrightness(5); leds[0] = CRGB::Blue; FastLED.show(); leds[1] = CRGB::Blue; FastLED.show(); analogWrite(pwmPin2, 255); } // after getting peaceful for a while, evert else { FastLED.setBrightness(0); leds[0] = CRGB::Black; FastLED.show(); else(1] = CRGB::Black; FastLED.show(); else(2] = CRGB::Black; FastLED.show();</pre>	Blue light Deflation		
	Dody is a r 248 249 251 252 253 254 255 256 257 258 259 261 263 264 255 269 261 265 266 267 268 269 261 265 266 267 268 269 261 265 266 267 268 269 261 265 266 267 268 269 261 262 263 264 265 266 267 268 269 269 </th <th><pre>Select Board analogWrite(pwmPin2, 0); } // peaceful emotion else { Serial.print(5); Serial.print(5); Serial.print(7, "); if (millis() - time < 8000) { FastLED.setBrightness(5); leds[0] = CRGB::Bue; FastLED.show(); leds[1] = CRGB::Bue; FastLED.show(); analogWrite(pwmPin2, 255); } // after getting peaceful for a while, evert else { FastLED.setBrightness(0); leds[1] = CRGB::Buck; FastLED.show(); leds[1] = CRGB::Buck; FastLED.show(); leds[2] =</pre></th> <th>Blue light Deflation</th>	<pre>Select Board analogWrite(pwmPin2, 0); } // peaceful emotion else { Serial.print(5); Serial.print(5); Serial.print(7, "); if (millis() - time < 8000) { FastLED.setBrightness(5); leds[0] = CRGB::Bue; FastLED.show(); leds[1] = CRGB::Bue; FastLED.show(); analogWrite(pwmPin2, 255); } // after getting peaceful for a while, evert else { FastLED.setBrightness(0); leds[1] = CRGB::Buck; FastLED.show(); leds[1] = CRGB::Buck; FastLED.show(); leds[2] =</pre>	Blue light Deflation		
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	Dody is a r 248 249 251 255 256 257 258 259 260 261 262 263 264 265 266 267 288 269 261 262 263 264 265 266 267 268 269 270 271 272 273	<pre>Select Board nap.ino analogWrite(pwmPin2, 0); } // peaceful emotion else { Serial.print(5); Serial.print(5); Serial.print(7, "); if (millis() - time < 8000) { FastLED.setBrightness(5); leds[1] = CKGB::Blue; FastLED.show(); leds[1] = CKGB::Blue; FastLED.show(); analogWrite(pwmPin2, 255); } // after getting peaceful for a while, evertelse { FastLED.setBrightness(0); leds[2] = CKGB::Black; FastLED.show(); leds[2] = CKGB::Black; FastLED.show</pre>	Blue light Deflation		
	Dody is a r 248 249 251 252 253 254 255 256 257 258 261 252 266 266 266 266 266 266 267 270 271 273 274 275	<pre>Select Board</pre>	Blue light Deflation		

•	🔤 body is a map Arduino IDE 2.0.0	Fretful
€ 🗧	Select Board -	~
body is a	map.ino	\sim
101 162	// detect if there is finger shaking	
163	if (counter < CYCLE){ // maximum detection inter	
164	<pre>if(gz * reverser > 30) { // if gz > 30</pre>	
165	detector += 1;	Flashing
166 167	<pre>reverser = -reverser; counter = 0;</pre>	-
168	}	yellow ligł
169	counter += 1;	
170	}	
171 172	<pre>else { // reset counter = 0;</pre>	Inflate an
173	reverser = 1;	deflate a
174	detector = 0;	
175	}	intervals o
176 177	// "star trek" mode	
178	if (value1 > 200 & value2 > 200 & value3 > 200	seconds
179	ChangePalettePeriodically();	
180		
181 182	<pre>static int startIndex = 0;</pre>	
182	<pre>startIndex = startIndex + 1; FillLEDsFromPaletteColors(startIndex);</pre>	
184	FastLED.setBrightness(255);	
185	FastLED.show();	
186	FastLED.delay(10);	
187 188	}	
189	<pre>// if gz > 30 and it changes between positive and</pre>	d negative for more tha
190	if (detector > 6) { // fretful emotion, finger goes	
191	FastLED.setBrightness(100);	
192	<pre>time = millis();</pre>	
193	<pre>time = millis(); if (isshake == 0){</pre>	
	<pre>time = millis();</pre>	
193 194 195 196	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0;</pre>	
193 194 195 196 197	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; }</pre>	
193 194 195 196 197 198	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1;</pre>	
193 194 195 196 197	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash</pre>	
193 194 195 196 197 198 199	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds(0) = CRGB:rellow; FastLED.show();</pre>	
193 194 195 196 197 198 199 200 201 202	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds[0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show();</pre>	
193 194 195 196 197 198 199 200 201 202 203	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds[0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); </pre>	
193 194 195 196 197 198 199 200 201 202	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds(0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); }</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 205 206	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds(0) = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); } else { leds[0] = CRGB::Black; FastLED.show();</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds[0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); leds[0] = CRGB::Black; FastLED.show(); leds[1] = CRGB::Black; FastLED.show();</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlLing flash if (signal < 3) { leds[0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); } else { leds[0] = CRGB::Black; FastLED.show(); leds[1] = CRGB::Black; FastLED.show(); leds[2] = CRGB::Black; FastLED.show();</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds(0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Rlack; FastLED.show(); leds[0] = CRGB::Black; FastLED.show(); leds[2] = CRGB::Black; FastLED.show();</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlLing flash if (signal < 3) { leds[0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); } else { leds[0] = CRGB::Black; FastLED.show(); leds[1] = CRGB::Black; FastLED.show(); leds[2] = CRGB::Black; FastLED.show();</pre>	
193 194 195 196 197 198 200 201 202 203 204 205 206 207 206 207 208 209 210 211 212	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds[0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Black; FastLED.show(); } signal = (signal + 1) % 6; pumpend = millis(); // alternating inflation and deflation</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 203 204 205 206 207 206 207 206 209 210 211 212 213	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds[0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Black; FastLED.show(); } isignal = (signal + 1) % 6; pumpend = millis(); // alternating inflation and deflation if (pumped - pumpstart > 6000){</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds(0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Rlack; FastLED.show(); leds[0] = CRGB::Black; FastLED.show(); leds[1] = CRGB::Black; FastLED.show(); leds[2] = CRGB::Black; FastLED.show();</pre>	
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193 194 195 196 197 198 199 200 201 202 203 204 203 204 205 206 207 208 209 210 211 212 211 212 213 214 215 216 217	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds[0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Rlack; FastLED.show();</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 207 208 209 210 211 212 213 214 215 216 215 218	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds[0] = CRGB::Vellow; FastLED.show(); leds[1] = CRGB::Vellow; FastLED.show(); leds[2] = CRGB::Vellow; FastLED.show(); leds[2] = CRGB::Black; FastLED.show();</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 206 207 208 208 209 210 211 211 212 213 214 215 216 217 218 219	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds(0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Black; FastLED.show();</pre>	
193 194 195 196 197 198 199 200 201 203 204 205 206 207 208 209 207 208 209 210 211 212 213 214 215 216 217 218 219 220	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds[0] = CRGB::Vellow; FastLED.show(); leds[1] = CRGB::Vellow; FastLED.show(); leds[2] = CRGB::Vellow; FastLED.show(); leds[2] = CRGB::Black; FastLED.show();</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 206 207 208 208 209 210 211 211 212 213 214 215 216 217 218 219	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds(0] = CRGB::Yellow; FastLED.show(); leds[1] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Yellow; FastLED.show(); leds[2] = CRGB::Black; FastLED.show();</pre>	
193 194 195 196 197 198 200 201 202 203 204 205 206 207 208 209 210 212 213 214 215 216 217 218 219 220 221 222 223	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds(0) = CRGB::Vellow; FastLED.show(); leds[1] = CRGB::Vellow; FastLED.show(); leds[2] = CRGB::Vellow; FastLED.show(); leds[2] = CRGB::Black; FastLED.show();</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds(0] = CRGB::Vellow; FastLED.show(); leds[1] = CRGB::Vellow; FastLED.show(); leds[2] = CRGB::Vellow; FastLED.show(); leds[2] = CRGB::Rlack; FastLED.show(); t = max; max = min; min = t; pumpstart = pumpend; lanlogWrite(pwmPin, max); analogWrite(pwmPin2, min); else { isshake = 0; leds[0] = CRGB::Rlack; FastLED.show(); isshake = 0; leds[0] = CRGB::Rlack; FastLED.show(</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 217 218 219 220 221 222 223 224 225	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds[0] = CRGB::Vellow; FastLED.show(); leds[1] = CRGB::Vellow; FastLED.show(); leds[2] = CRGB::Vellow; FastLED.show(); leds[2] = CRGB::Black; FastLED.show(); isignal = (signal + 1) % 6; pumpend = millis(); // alternating inflation and deflation if (pumpend = pumpstart > 6000){ t = max; max = min; min = t; pumpstart = pumpend; } analogWrite(pvmPin, max); analogWrite(pvmPin, max); analogWrite(pvmPin2, min); else { isshake = 0; leds[0] = CRGB::Black; FastLED.show(); leds[1] = CRGB::Black; FastLED.show(); leds[1] = CRGB::Black; FastLED.show(); leds[2] = CRGB::Black; Fas</pre>	
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 221 222 223 224	<pre>time = millis(); if (isshake == 0){ pumpstart = millis(); max = 255; min = 0; } isshake = 1; // controlling flash if (signal < 3) { leds(0] = CRGB::Vellow; FastLED.show(); leds[1] = CRGB::Vellow; FastLED.show(); leds[2] = CRGB::Vellow; FastLED.show(); leds[2] = CRGB::Rlack; FastLED.show(); t = max; max = min; min = t; pumpstart = pumpend; lanlogWrite(pwmPin, max); analogWrite(pwmPin2, min); else { isshake = 0; leds[0] = CRGB::Rlack; FastLED.show(); isshake = 0; leds[0] = CRGB::Rlack; FastLED.show(</pre>	

FINALWORK https://youtu.be/3F9ioPYzZ_Q

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.

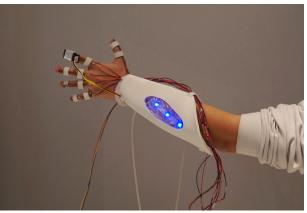


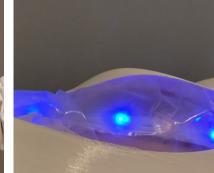


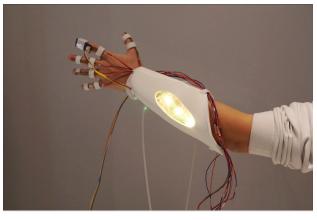


Lighting Effect













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

1.3d model&3d prin

Model casting

4.Secondary model ca

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



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:	Total:	Total:	Total:	Total:	
64	51	47	54	41	
Difficulty Describing Feelings: 16	Difficulty Describing Feelings: 12	Difficulty Describing Feelings: 15	Difficulty Describing Feelings: 18	Difficulty Describing Feelings: 7	
Difficulty Identifying Feelings: 24	Difficulty Identifying Feelings: 16	Difficulty Identifying Feelings: 15	Difficulty Identifying Feelings: 14	Difficulty Identifying Feelings: 18	
Externally-Oriented Thinking: 24	Externally-Oriented Thinking: 23	Externally-Oriented Thinking: 17	Externally-Oriented Thinking: 22	Externally-Oriented Thinking: 16	
Yang	Ice	Воуа	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 not very portable."