Skin Electronics: Skin On a Lab

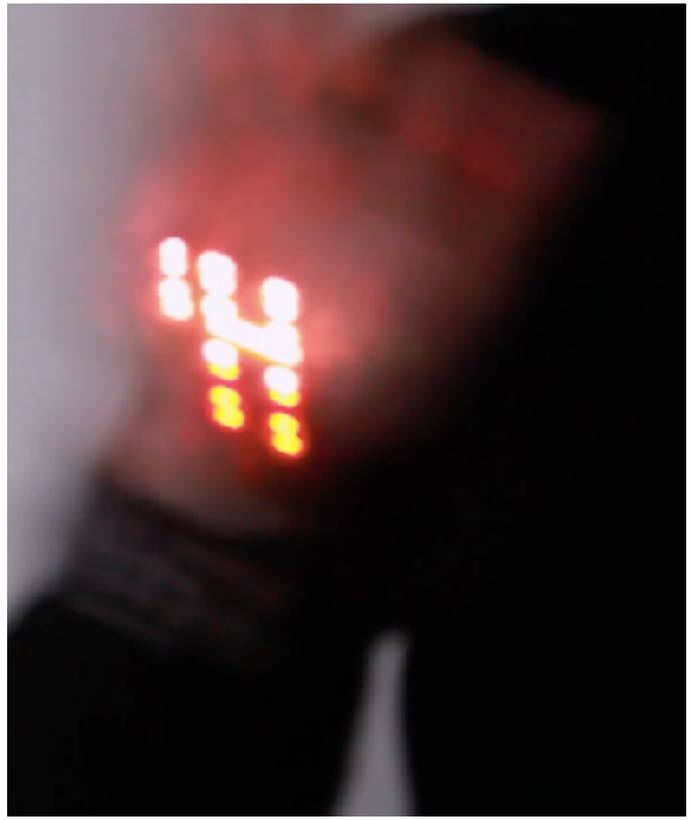
Beauty Technology

Katia Vega
katiavega.com

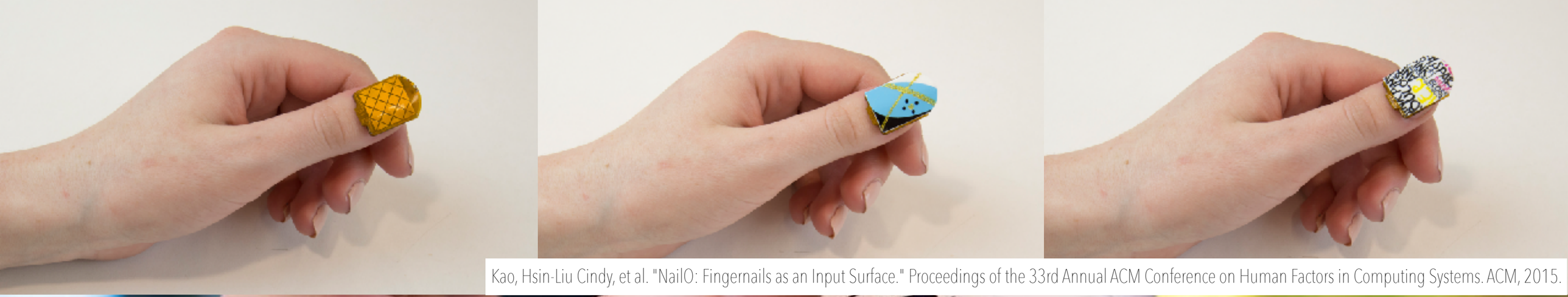
Agenda

Fabricademy

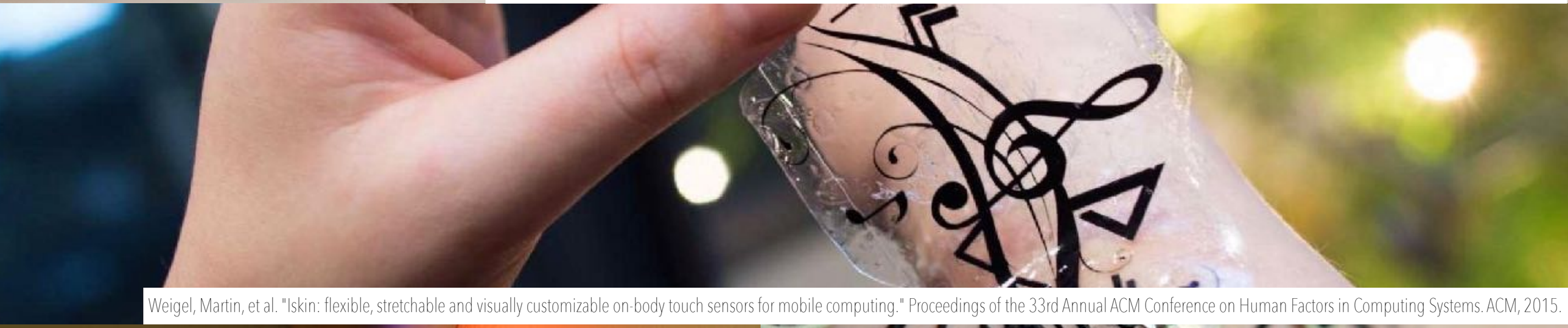
Beyond wearables
On-skin rapid prototyping
Beauty Technology: from invisible to visible on-body interfaces
Project Assignment: : Skin Masquerade Party and RFID Nails.



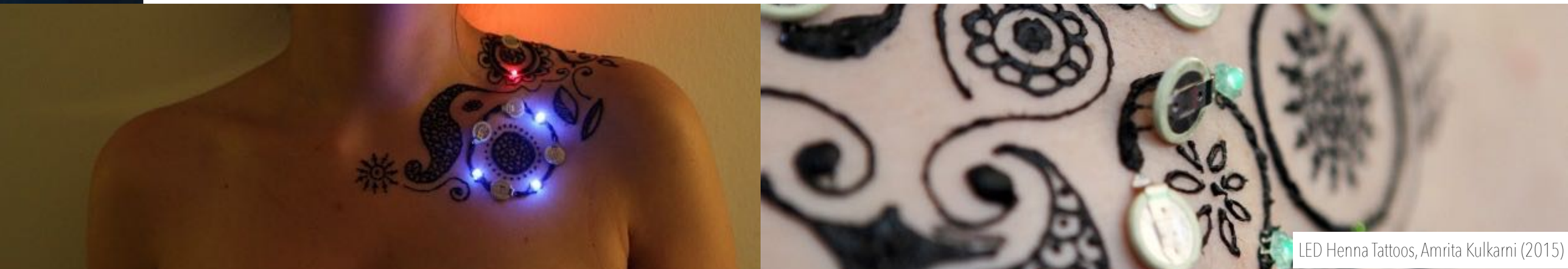
beyond wearables



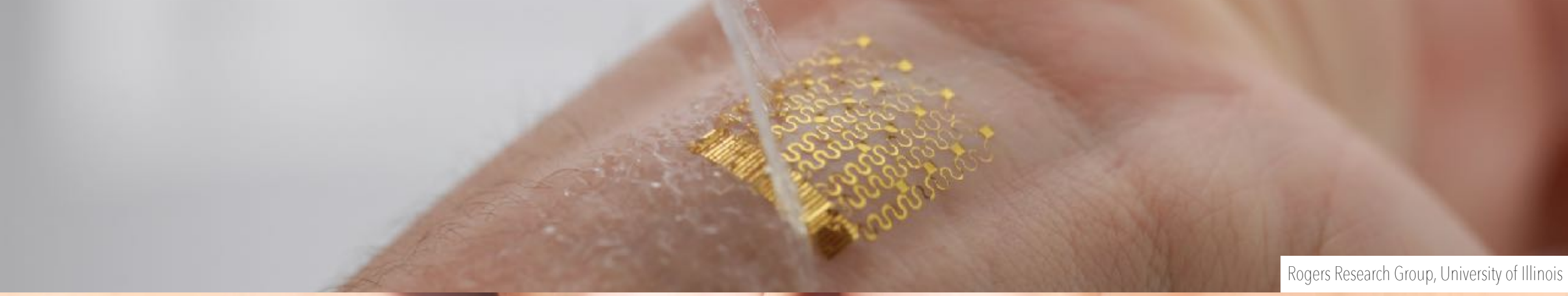
Kao, Hsin-Liu Cindy, et al. "NailO: Fingernails as an Input Surface." Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems. ACM, 2015.



Weigel, Martin, et al. "Iskin: flexible, stretchable and visually customizable on-body touch sensors for mobile computing." Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems. ACM, 2015.



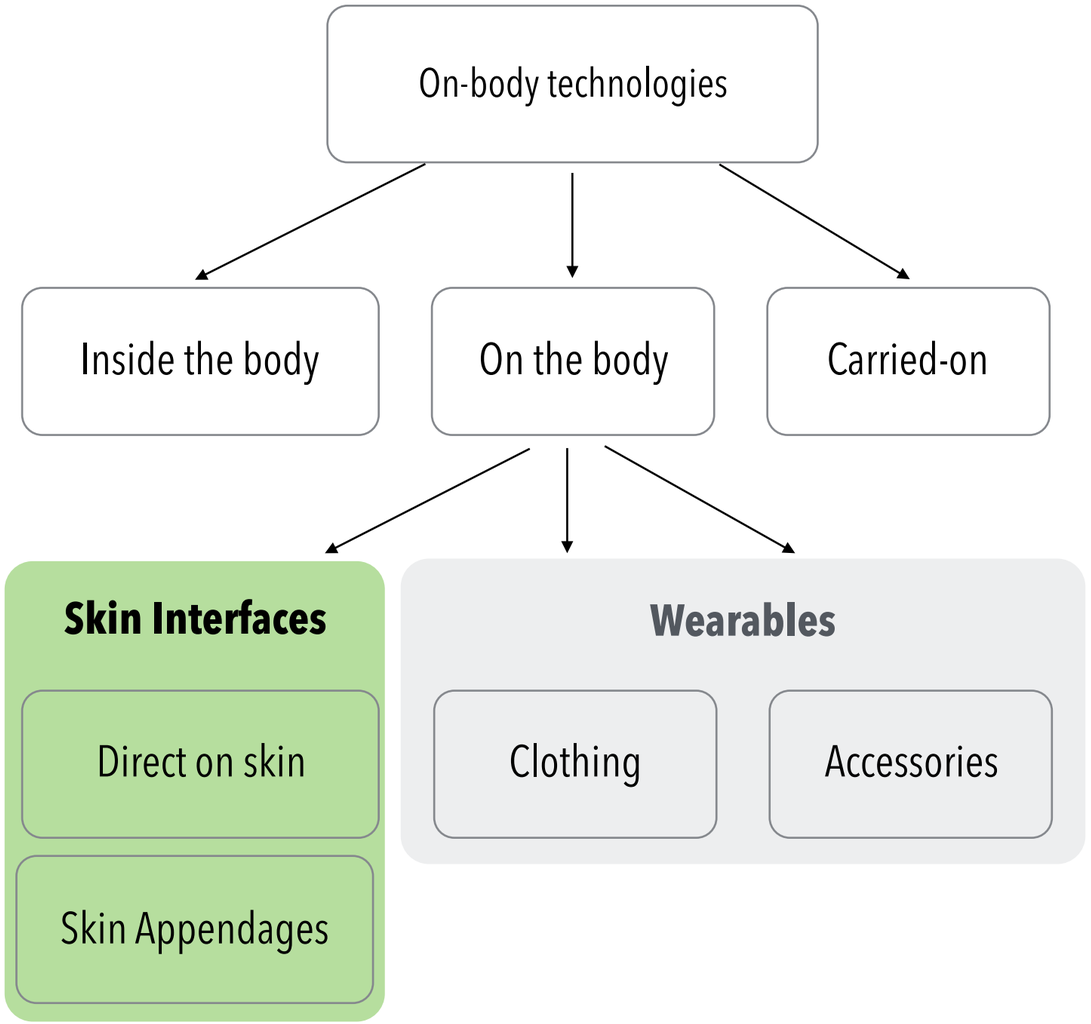
LED Henna Tattoos, Amrita Kulkarni (2015)



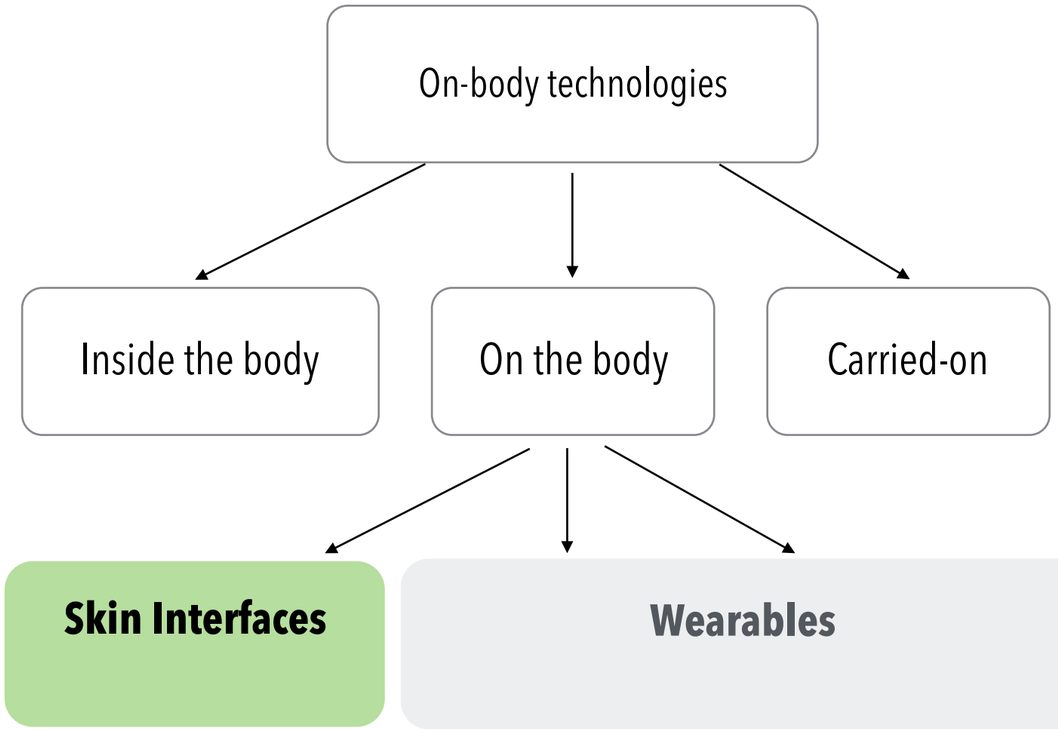
Rogers Research Group, University of Illinois

L'Oreal My UV Patch (2015)

BioStamp Research Connect™,MC10 (2015)



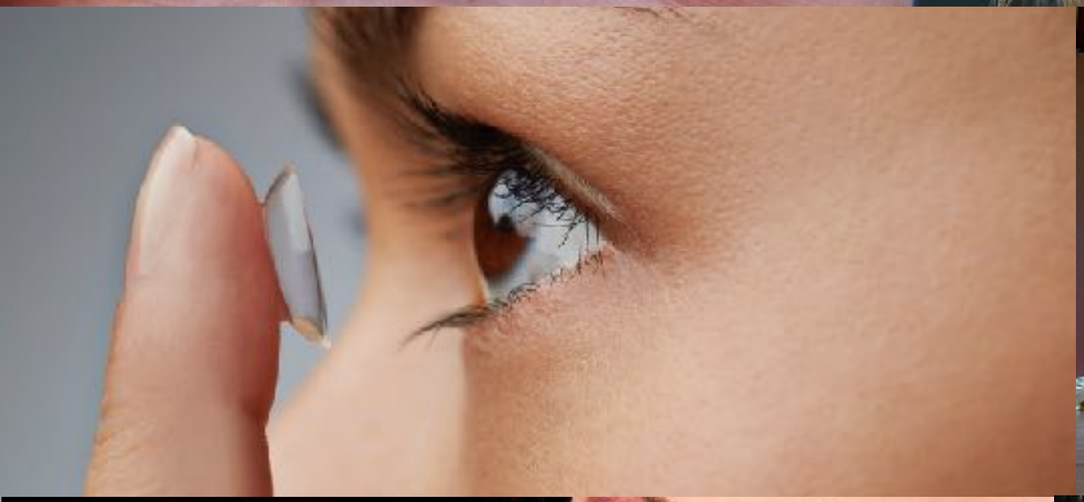
Liu, Xin, et al. "Wearability Factors for Skin Interfaces." Proceedings of the 7th Augmented Human International Conference 2016. ACM, 2016.



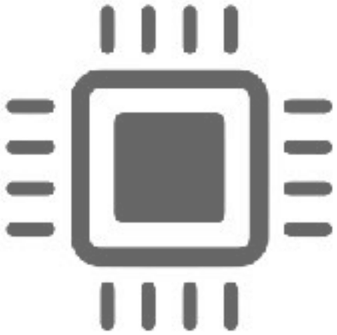
Body characteristics:	skin types, wrinkles, moisturization	Size, shape, muscle strength

Liu, Xin, et al. "Wearability Factors for Skin Interfaces." Proceedings of the 7th Augmented Human International Conference 2016. ACM, 2016.

acne, wound
sensitive, dry skin
body hair
cosmetic use
wrinkles



location, body movements and body characteristics



attachment methods, weight, insulation, accessibility, communication

interaction, aesthetics, conductors, device care and connection, battery life

Liu, Xin, et al. "Wearability Factors for Skin Interfaces." Proceedings of the 7th Augmented Human International Conference 2016. ACM, 2016.

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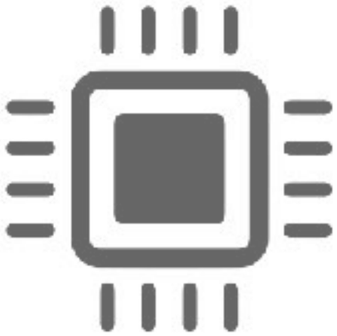
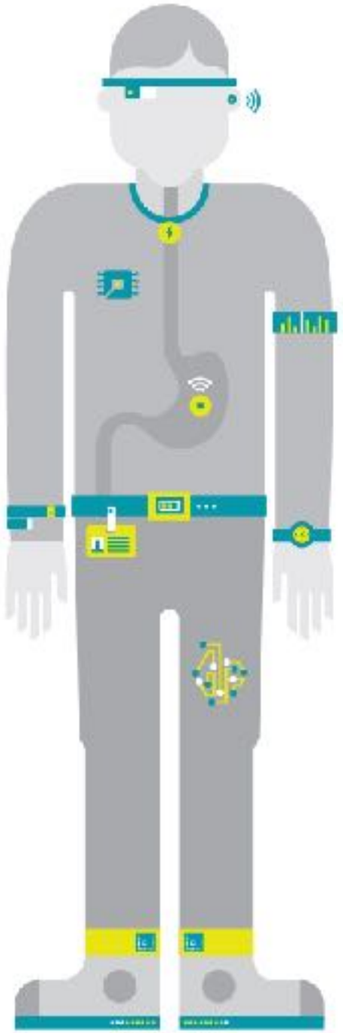


attachment methods, weight, insulation, accessibility, communication

interaction, aesthetics, **conductors**, device care and connection, battery life

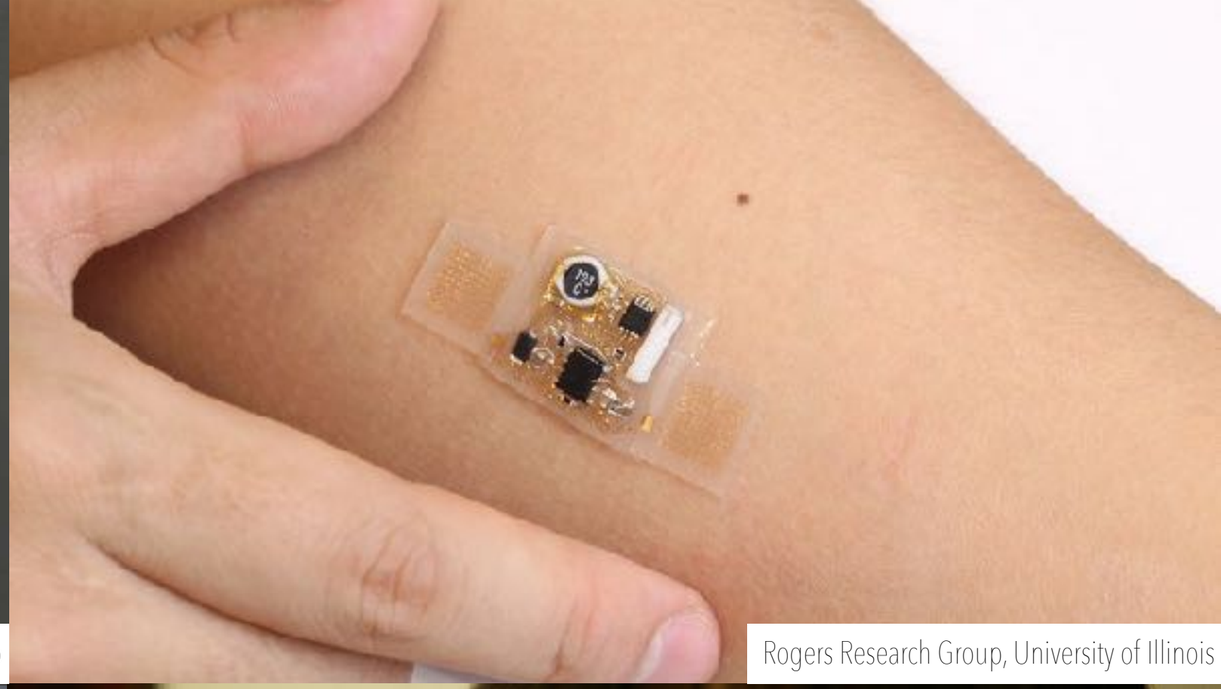
Liu, Xin, et al. "Wearability Factors for Skin Interfaces." Proceedings of the 7th Augmented Human International Conference 2016. ACM, 2016.

ATTACHMENT

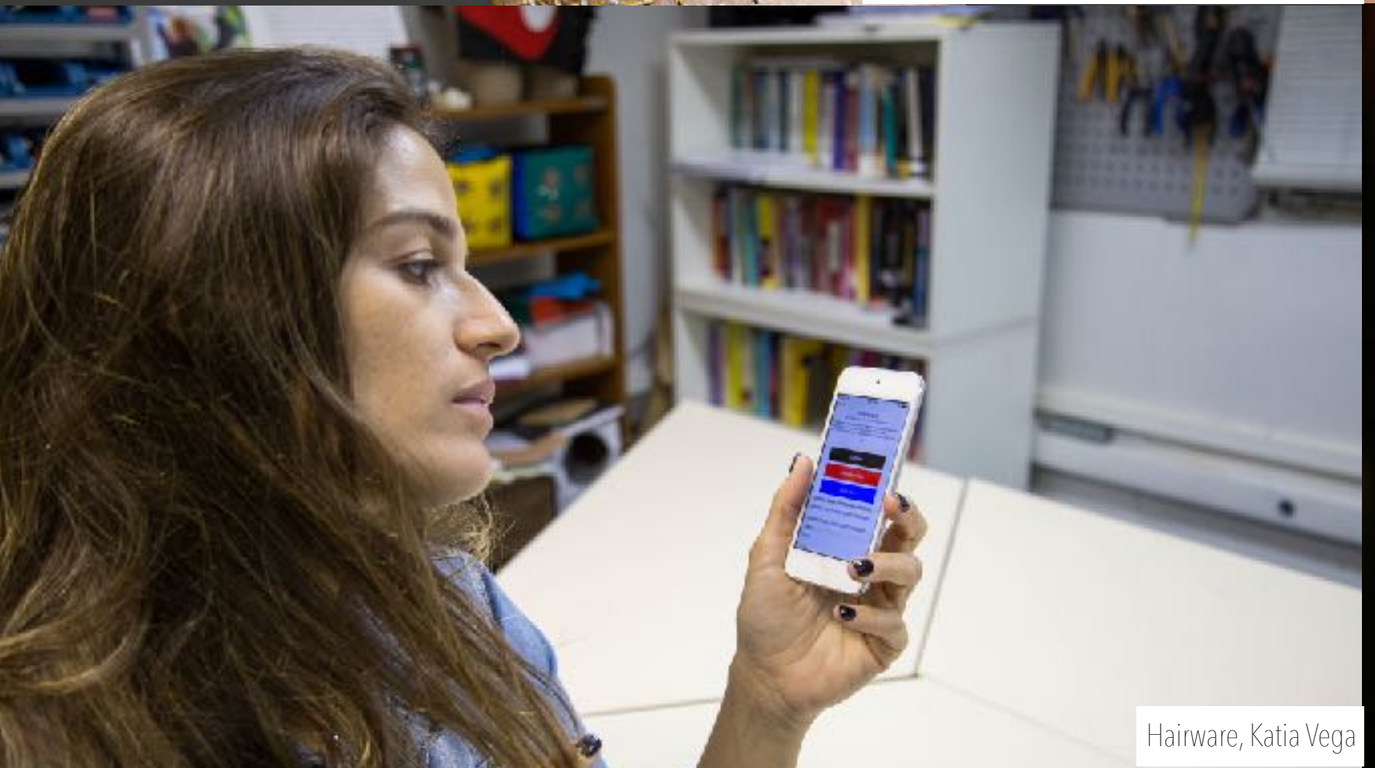


Picture resource: http://dupress.com/articles/2014-tech-trends-wearables/

Someya-Sekitani Group, The University of Tokyo



Rogers Research Group, University of Illinois

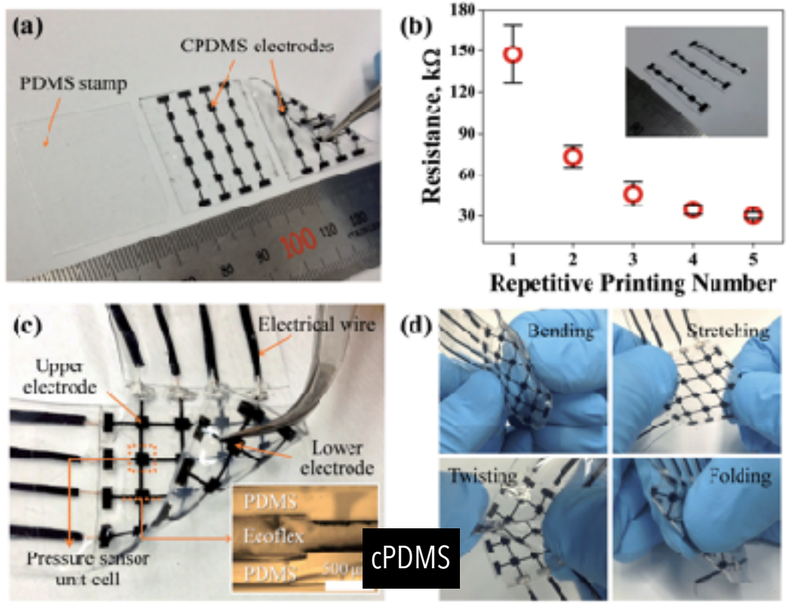


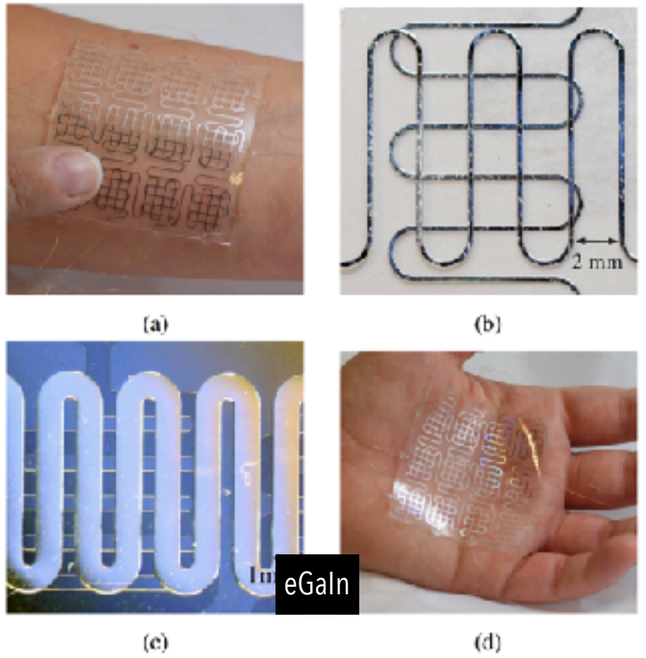
Hairware, Katia Vega

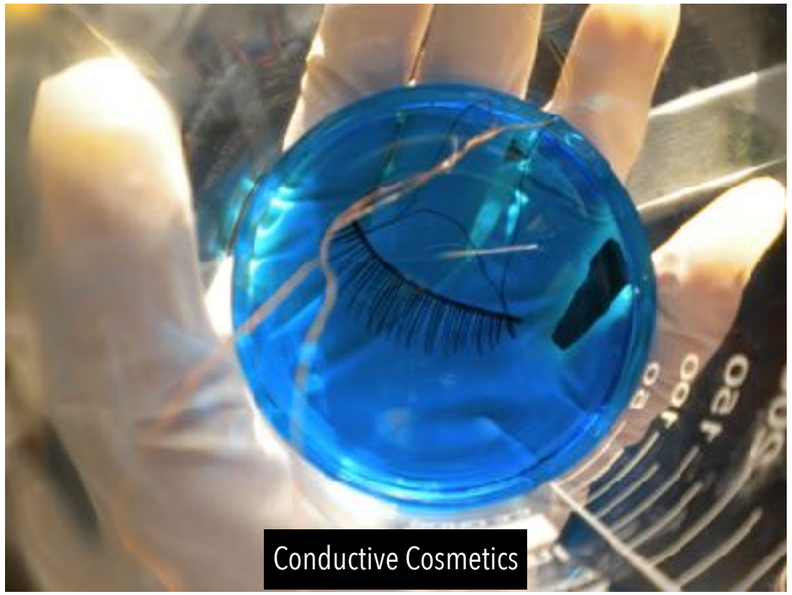
LED Eyelashes, Soomi Park

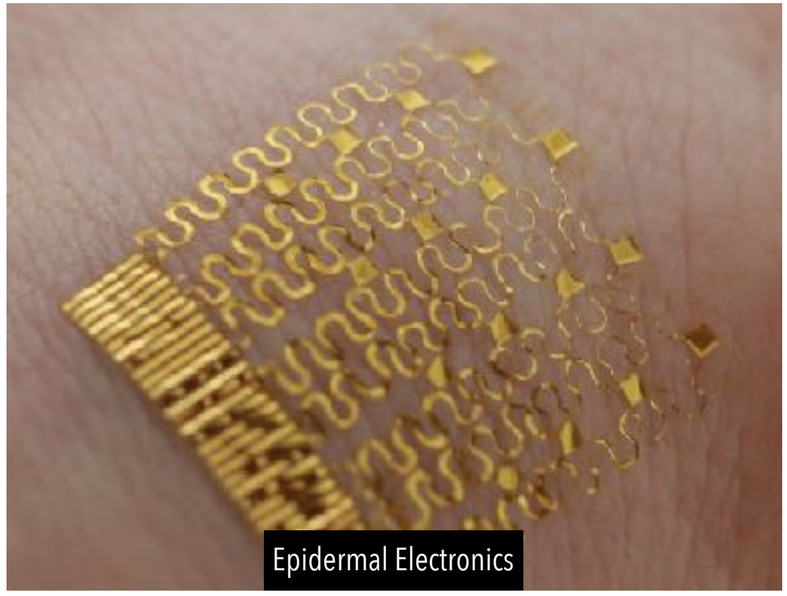
CONDUCTORS

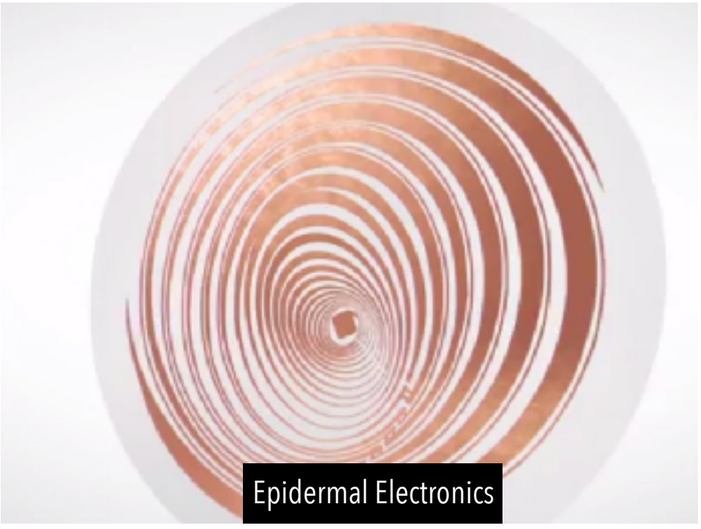
Conductive ink


(a)
CPDMS electrodes
PDMS stamp
(b)
Resistance, kΩ
180
150
120
90
60
30
1
2
3
4
5
Repetitive Printing Number
(c)
Electrical wire
Upper electrode
Lower electrode
PDMS
Ecoflex
PDMS
Pressure sensor unit cell
(d)
Bending
Stretching
Twisting
Folding
cPDMS


2 mm
(a)
(b)
(c)
(d)
eGaIn


Conductive Cosmetics


Epidermal Electronics


Epidermal Electronics

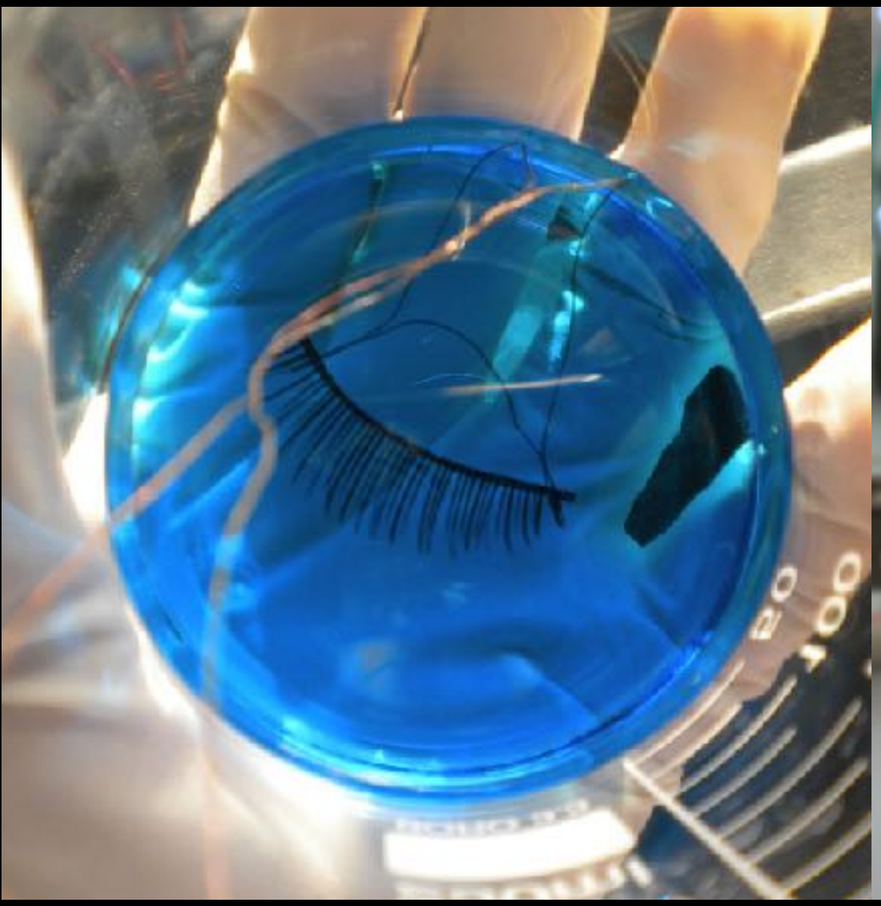
Cosmetics?

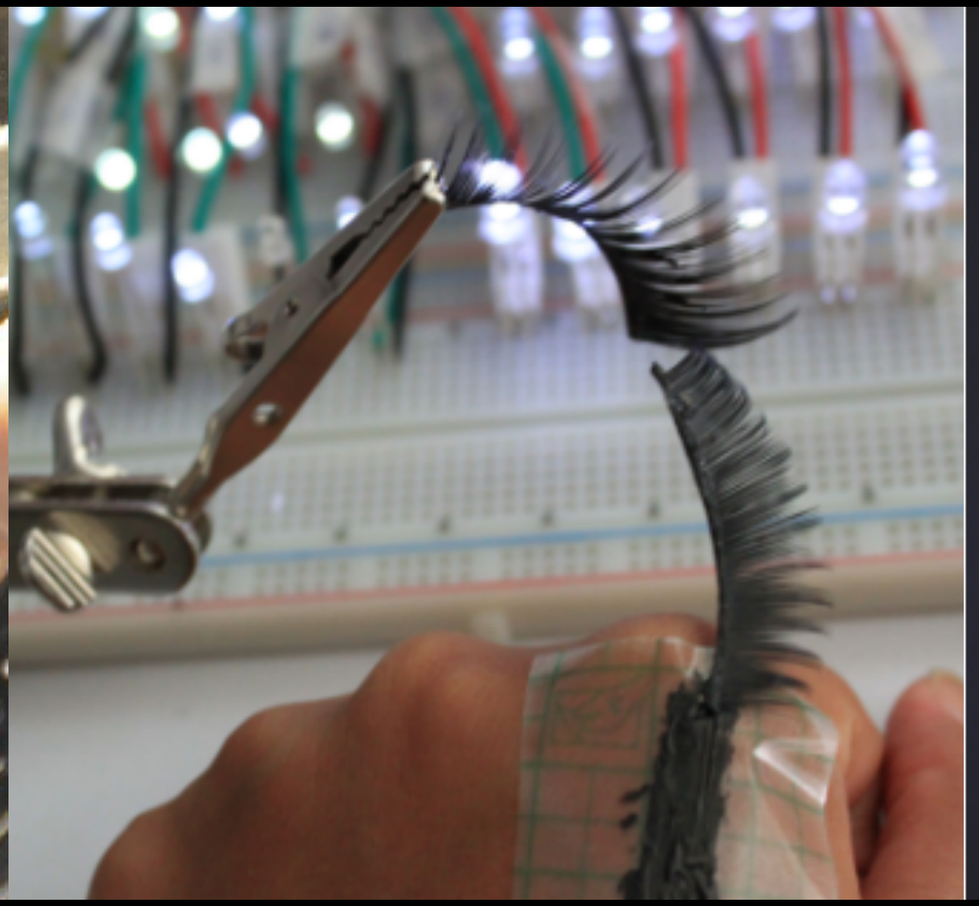
Beauty Technology is:

a wearable computing subfield that uses the body surface as an interactive platform by integrating technology into beauty products to be applied directly to one's skin, fingernails, and hair.

Conductive Makeup

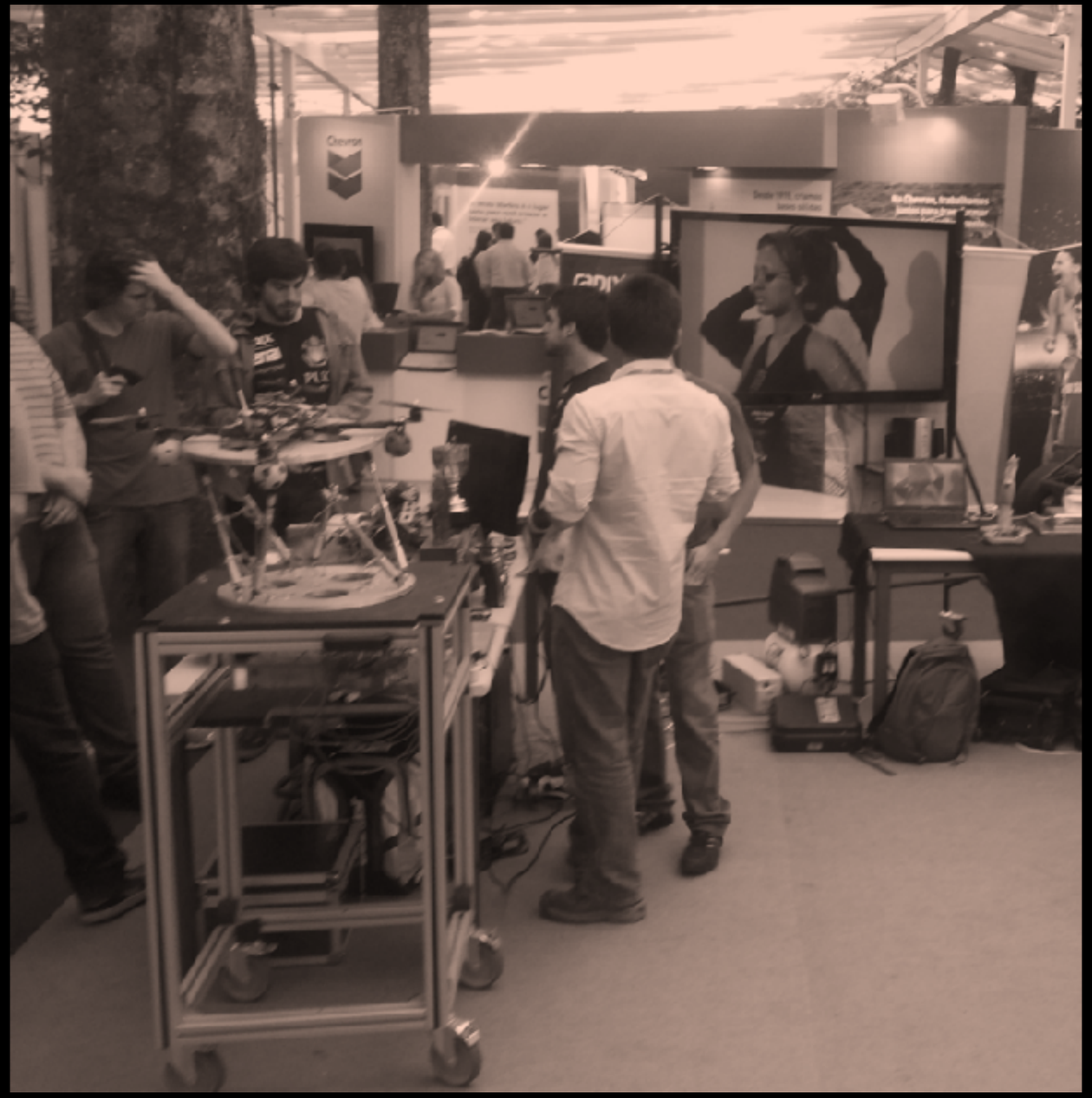
What if you could active the world with just a wink?





Collaboration with Tricia Flanagan

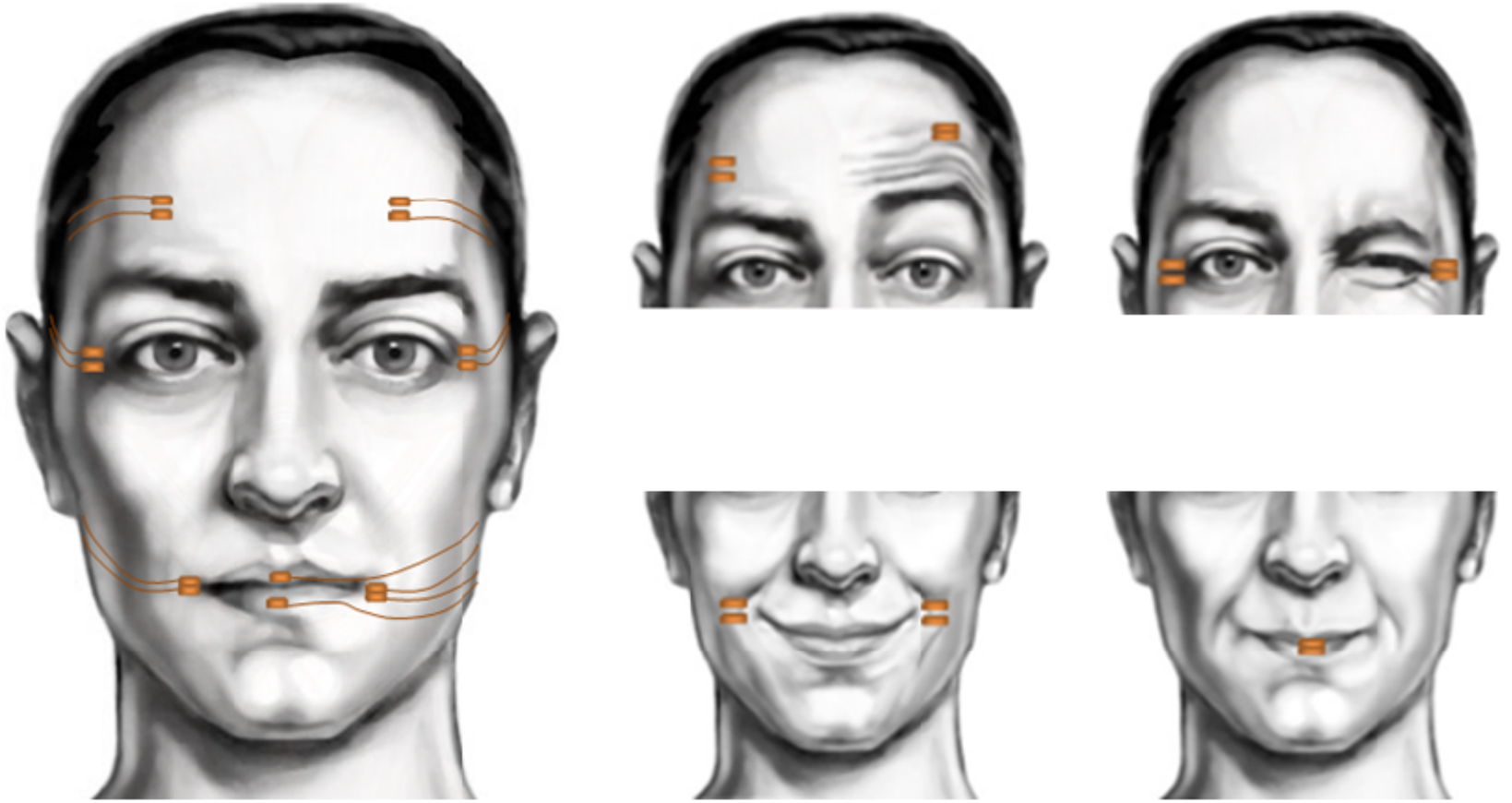
Katia Vega, Tricia Flanagan



Collaboration with Felipe Esteves

FX e-makeup

Could your skin become an interface?



Winkymote

Kinisi

"Could your skin act as an interface?"

Kinisi could change the world with a smile, a wink, raising her eyebrow and closing her lips.

Video:
http://kinisi.katiavega.com

κίνηση

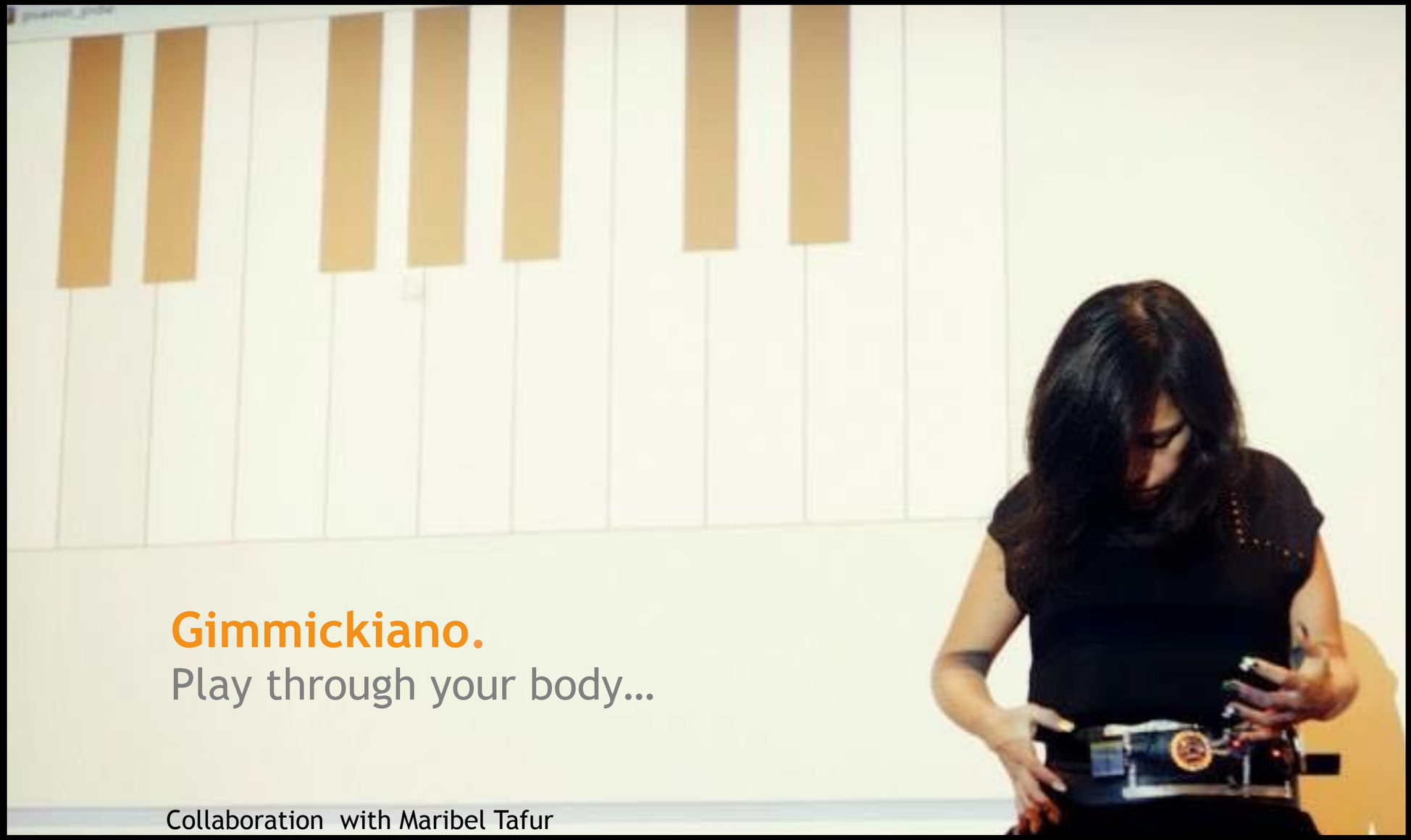
KÍNISI

TechNails

Imagine that you don't need a card for opening your door, or for paying for the metro. Just point and have it, everything at your fingertips: your nails.

Fashionable, inexpensive and wireless devices attached to fingernails in order to interact with the ambient in different ways.

Twinkle Nails.
Play in the air…



http://katiavega.com/?page-portfolio=gimmickiano

AquaDJing.

Play through water…

http://aquadjing.katiavega.com

Hair

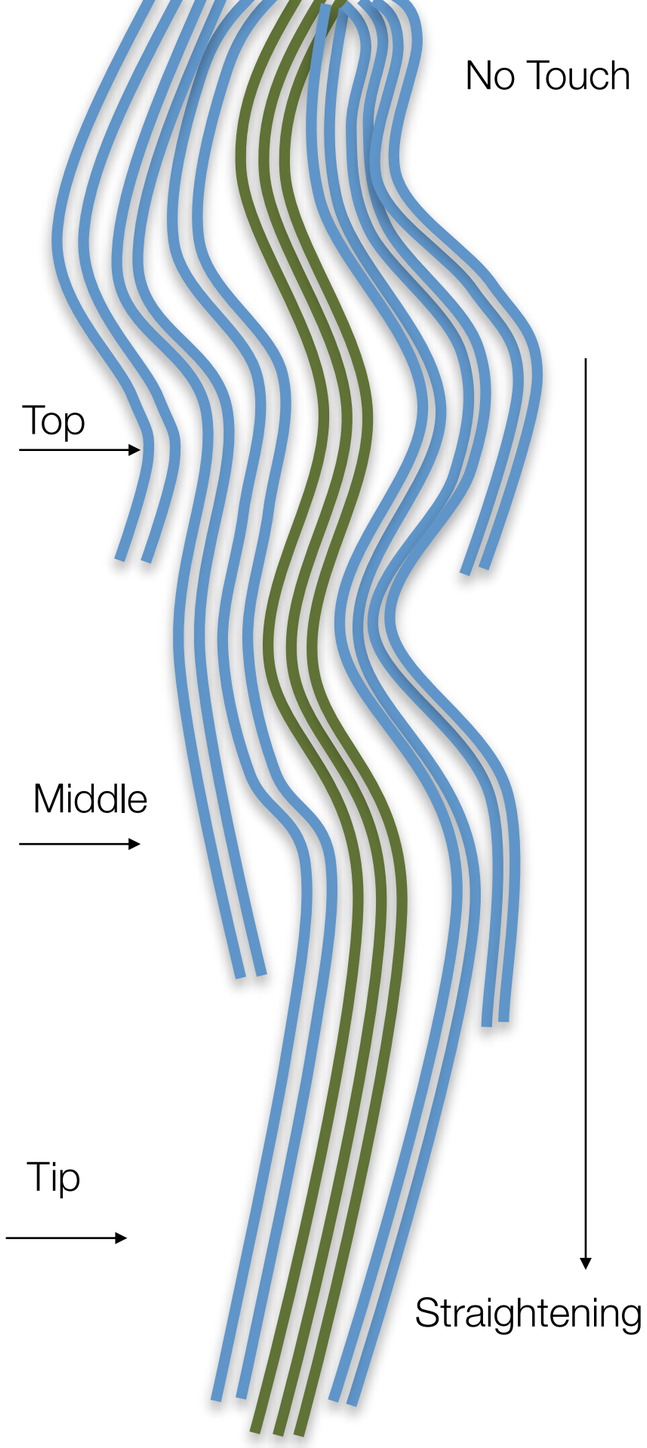
Unconscious Auto-contact Behaviors

Hairware.- … connects chemically metalized hair extensions to a microcontroller turning it into an input device for triggering different objects.

Capacitor Sensor Values in the different touches

Non conductive Hair Extension. 3 layers

Conductive Hair Extension



HAIRWARE

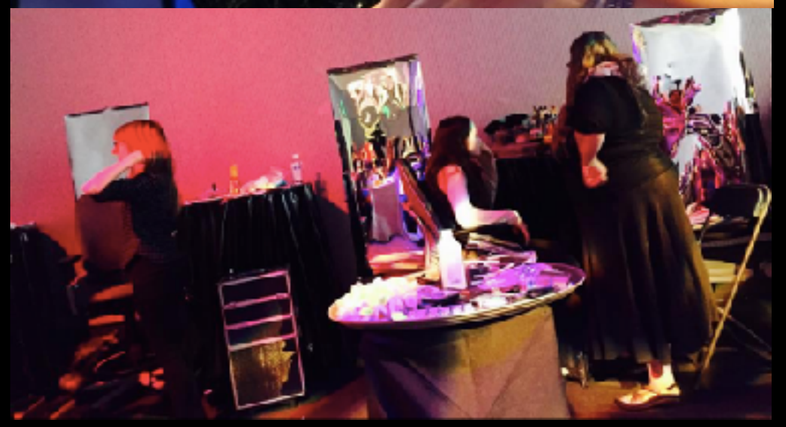
the power of your hair

Katia Vega, Xin Liu
MIT Media Lab

Carnival Masks

- interactive masks that lights with the music beats -

Katia Vega, Xin Liu
MIT Media Lab



Could you change your makeup?

...automatically?

Chromoskin

Chromoskin is an interactive eye shadow that dynamically changes colours leveraging the skin as a display.

Katia Vega, Cindy Kao, Manisha Mohan
MIT Media Lab

Beauty Technology

Skin

Nails

Hair

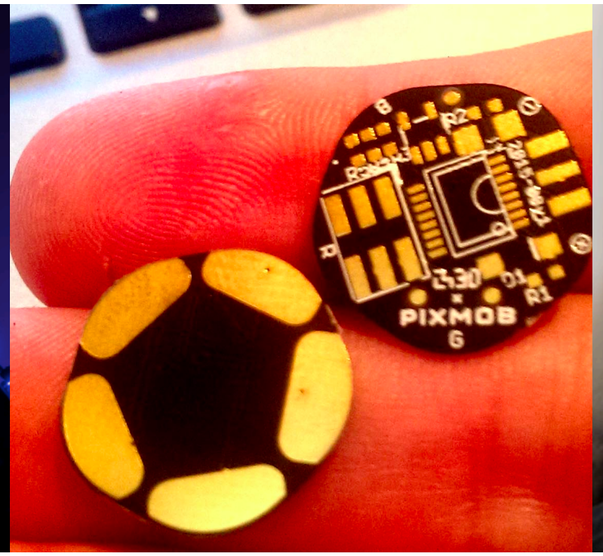
- Beauty Technology: Wearable Computing subfield.
- Towards interactive cosmetics
- Novel materials.
- Different contexts: medical, arts, music, theatre…

on-skin rapid prototyping

First Option

my first skin interface

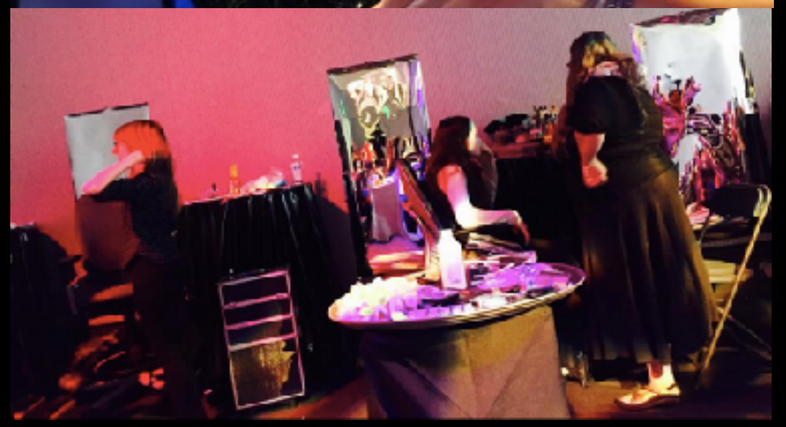
Inspiration



Carnival Masks

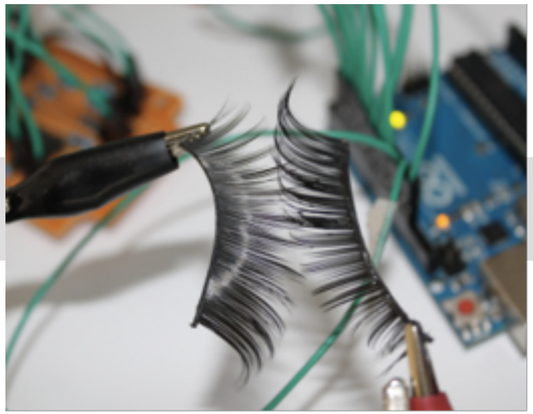
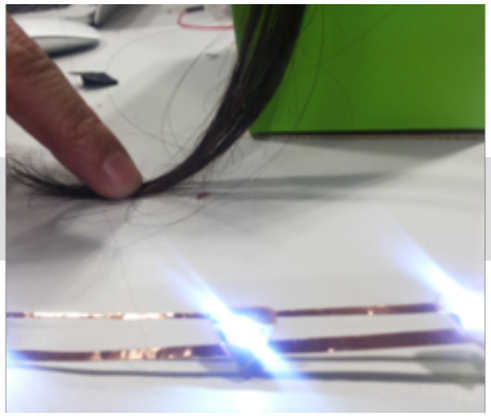
- interactive masks that lights with the music beats -

Katia Vega, Xin Liu
MIT Media Lab



Katia Vega, Xin Liu
MIT Media Lab

Workshop materials

Participant materials

1 Adafruit GEMMA board or Arduino Pro Mini
3 Adafruit FLORA NeoPixels
1 Coincell battery holder
2 CR2032 batteries

Collaborative tools

Thin wire
Wire strippers, flush snips, and tweezers
Soldering iron and solder
E6000 craft glue
Liquid latex and sponge applicators

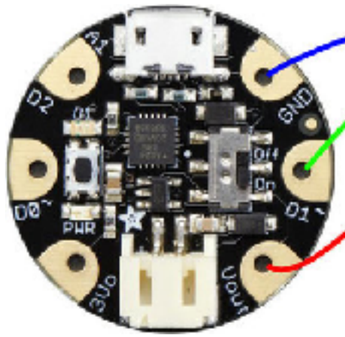
We are lighting up our skin masks!

Electronics	LEDs, fine wires, insulation
FX-makeup	liquid latex, skin glue, glitter

Step 1. Plan it!

more electronics?

hidden device



Mask

Electronics Design

materials: glitter, paint?
latex takes more than
1 hour in drying

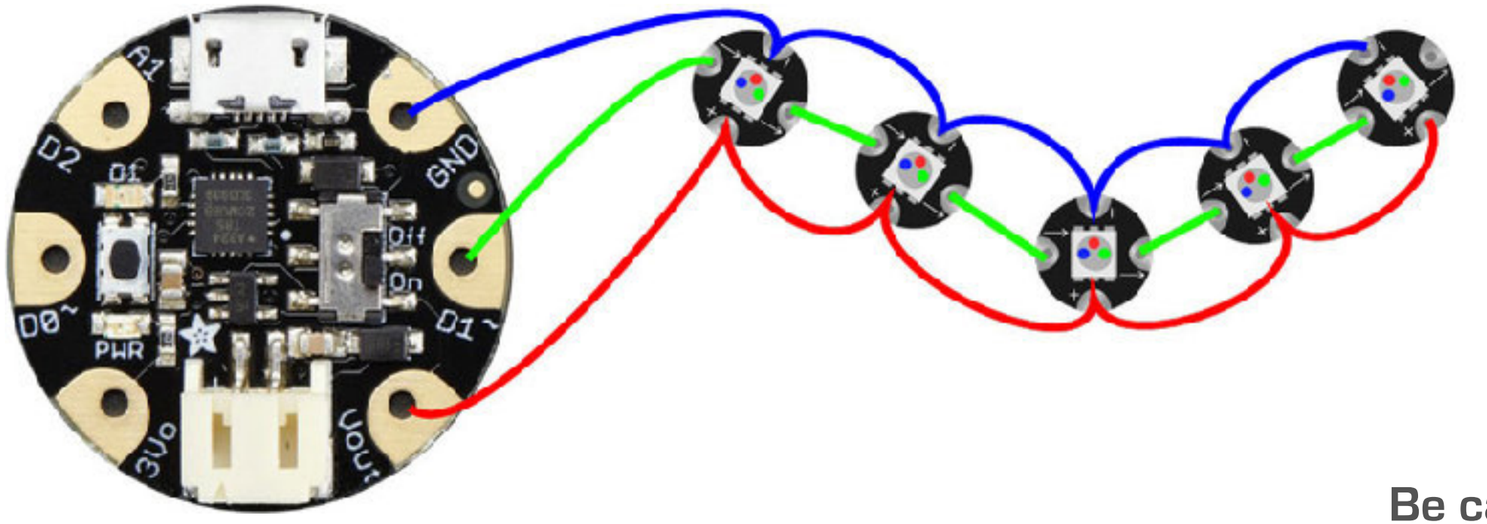
Step 2. Skin first layer

Add vaseline /release to the mask

Make your design
Add a first **thin** layer of glitter/paint
Add more layers as necessary

Let it dry!

Step 3. The circuit



Be careful with the order:

Gemma D1 to Din first LEDs

LEDs-> Dout to Din

Insulate: Add E600 to the components

Step 4. The code

Program the neopixels
(adafruit masks)

https://learn.adafruit.com/led-masquerade-masks/

```
#include <Adafruit_NeoPixel.h>

#define PIN 1

// Parameter 1 = number of pixels in strip
// Parameter 2 = Arduino pin number (most are valid)
// Parameter 3 = pixel type flags, add together as needed:
//   NEO_KHZ800  800 KHz bitstream (most NeoPixel products w/WS2812 LEDs)
//   NEO_KHZ400  400 KHz (classic 'v1' (not v2) FLORA pixels, WS2811 drivers)
//   NEO_GRB     Pixels are wired for GRB bitstream (most NeoPixel products)
//   NEO_RGB     Pixels are wired for RGB bitstream (v1 FLORA pixels, not v2)
Adafruit_NeoPixel strip = Adafruit_NeoPixel(5, PIN, NEO_GRB + NEO_KHZ800);

// IMPORTANT: Avoid connecting on a live circuit...if you must, connect GND first.

void setup() {
  strip.begin();
  strip.setBrightness(100); //adjust brightness here
  strip.show(); // Initialize all pixels to 'off'
}

void loop() {
  rainbow(20);
}


void rainbow(uint8_t wait) {
  uint16_t i, j;

  for(j=0; j<256; j++) {
    for(i=0; i<strip.numPixels(); i++) {
      strip.setPixelColor(i, Wheel((i+j) & 255));
    }
    strip.show();
    delay(wait);
  }
}
```

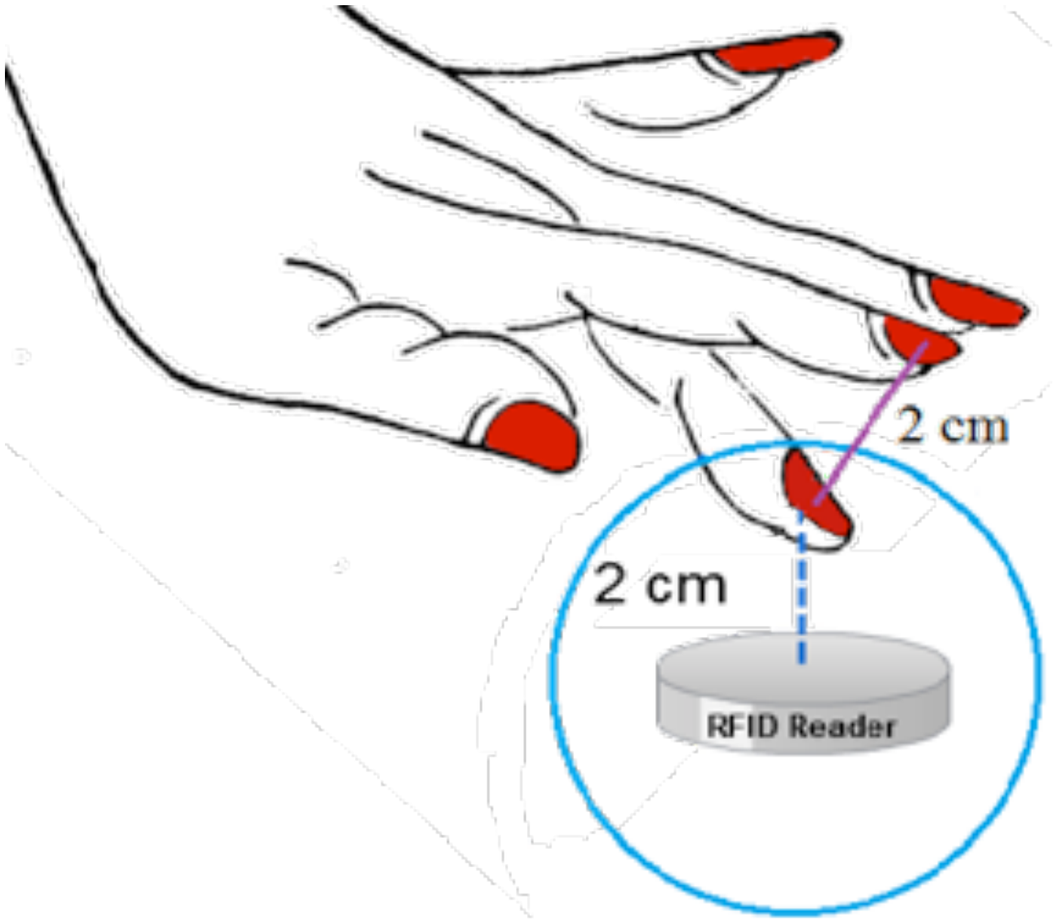
Step 5. Assembly

Glue the circuit to the first skin layer.
Add more latex to covering.
(and glitter if necessary)
Let it dry!

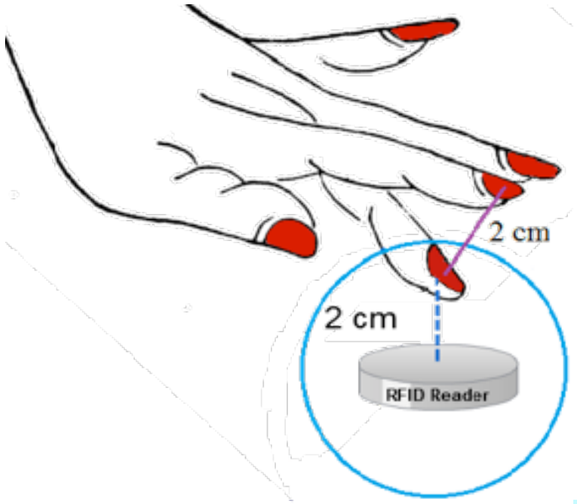
Second Option

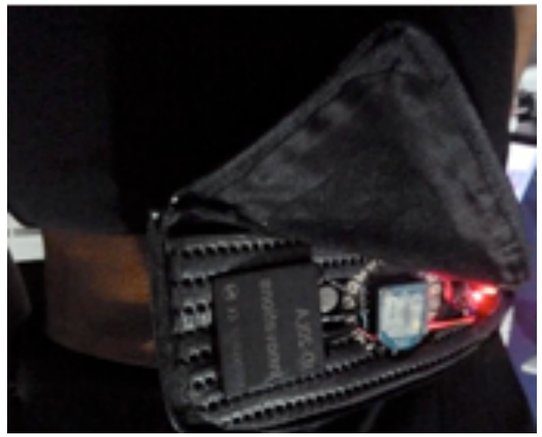
my first nail interface

TechNails Functionality



Other options

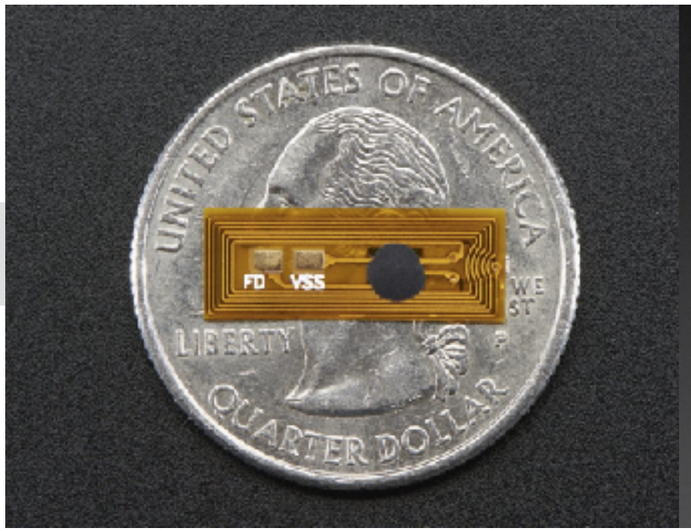


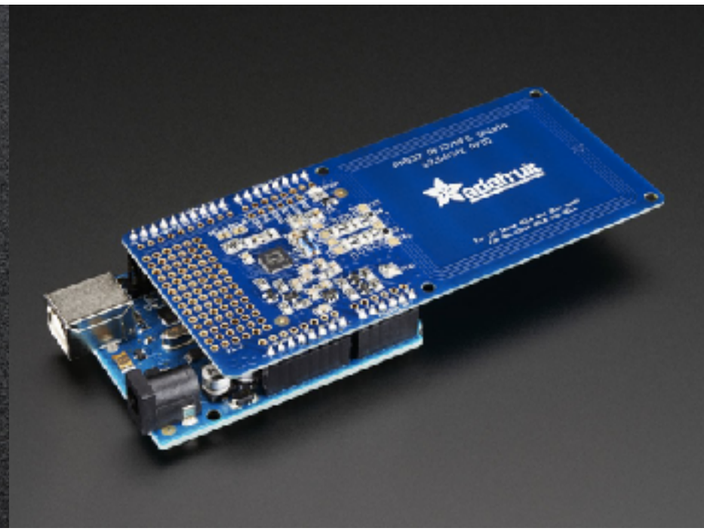


Electronics into a Belt

Water Interfaces

Workshop materials

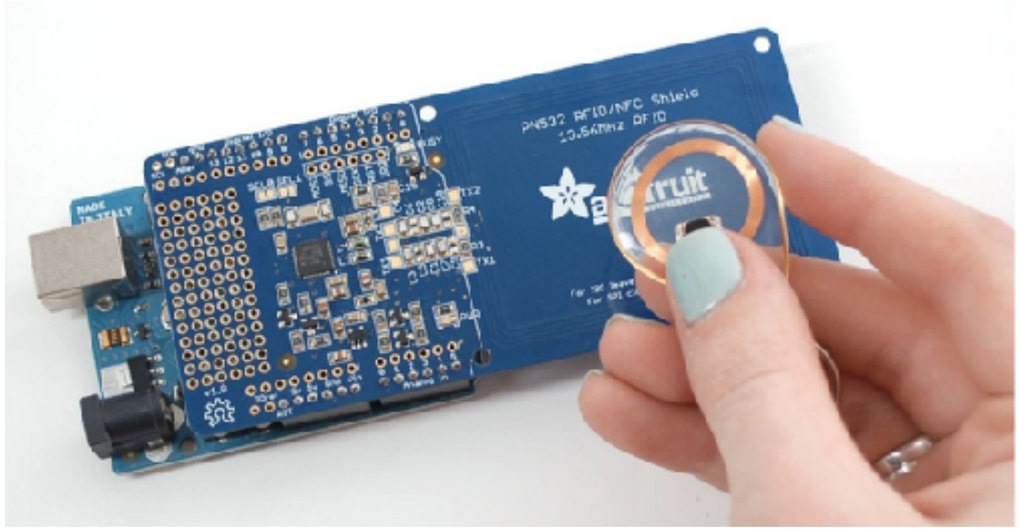




1 Arduino Uno
5 RFIDs
1 RFID Reader and shield
Brushes
Fake nails
Acrylic Nail liquid, glue and powder
Wire
Wire strippers, flush snips, and tweezers
Soldering iron and solder
Multimeter

Step 1. Plan it!

more
electronics?
How is the feedback?
Light, speaker, motors?

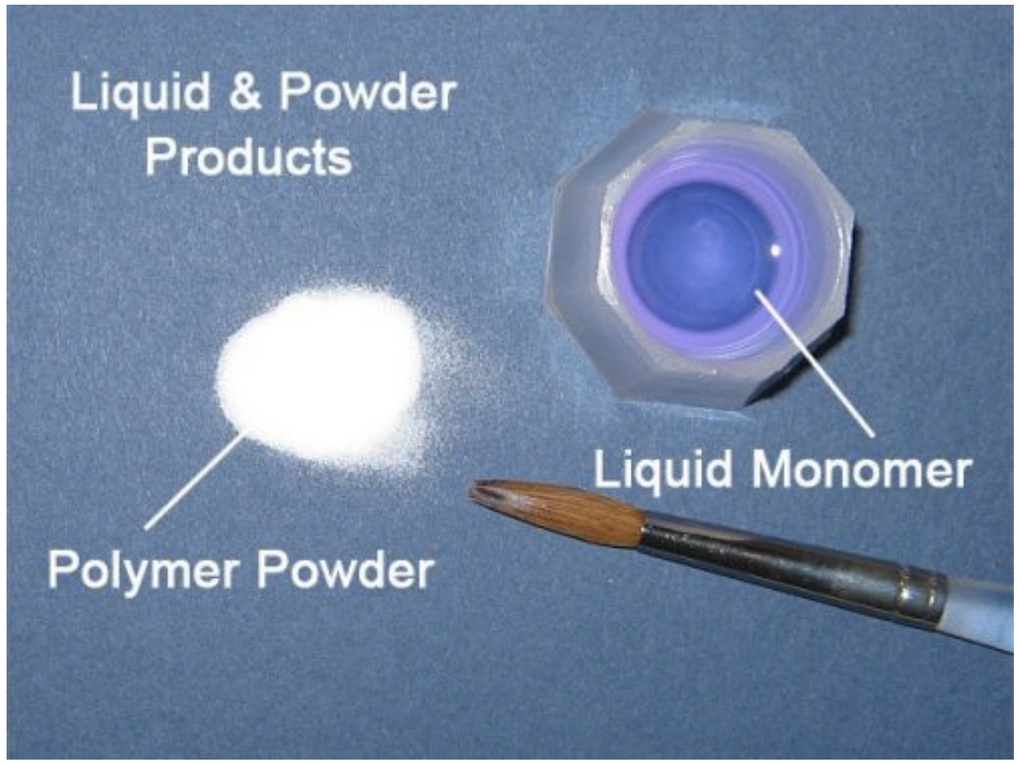


Electronics

Design

materials: Box? Belt? Aquarium?

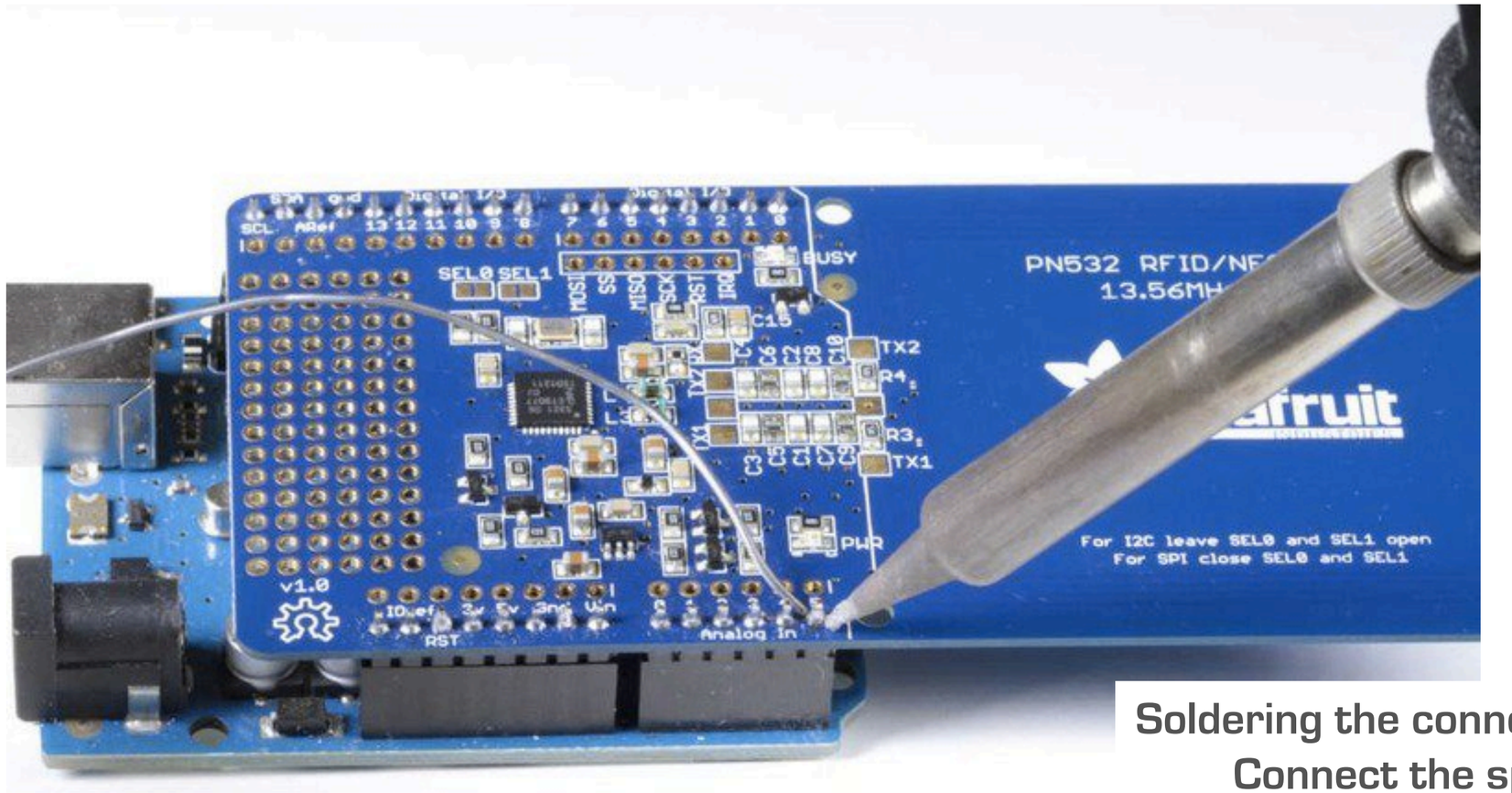
Step 2. Hide NFC with nail's products



Dip your brush in the liquid monomer and then in the powder (small amount).
Place one bead of acrylic right on top of your fake nail.
Attach the NFC tag on the top of the nail.
Add another layer of acrylic powder and liquid.

Let it dry!

Step 3. The circuit



Soldering the connectors to the Shield's pins
Connect the speaker the pin 8 and GND

Step 4. The code

Program the NFC nails

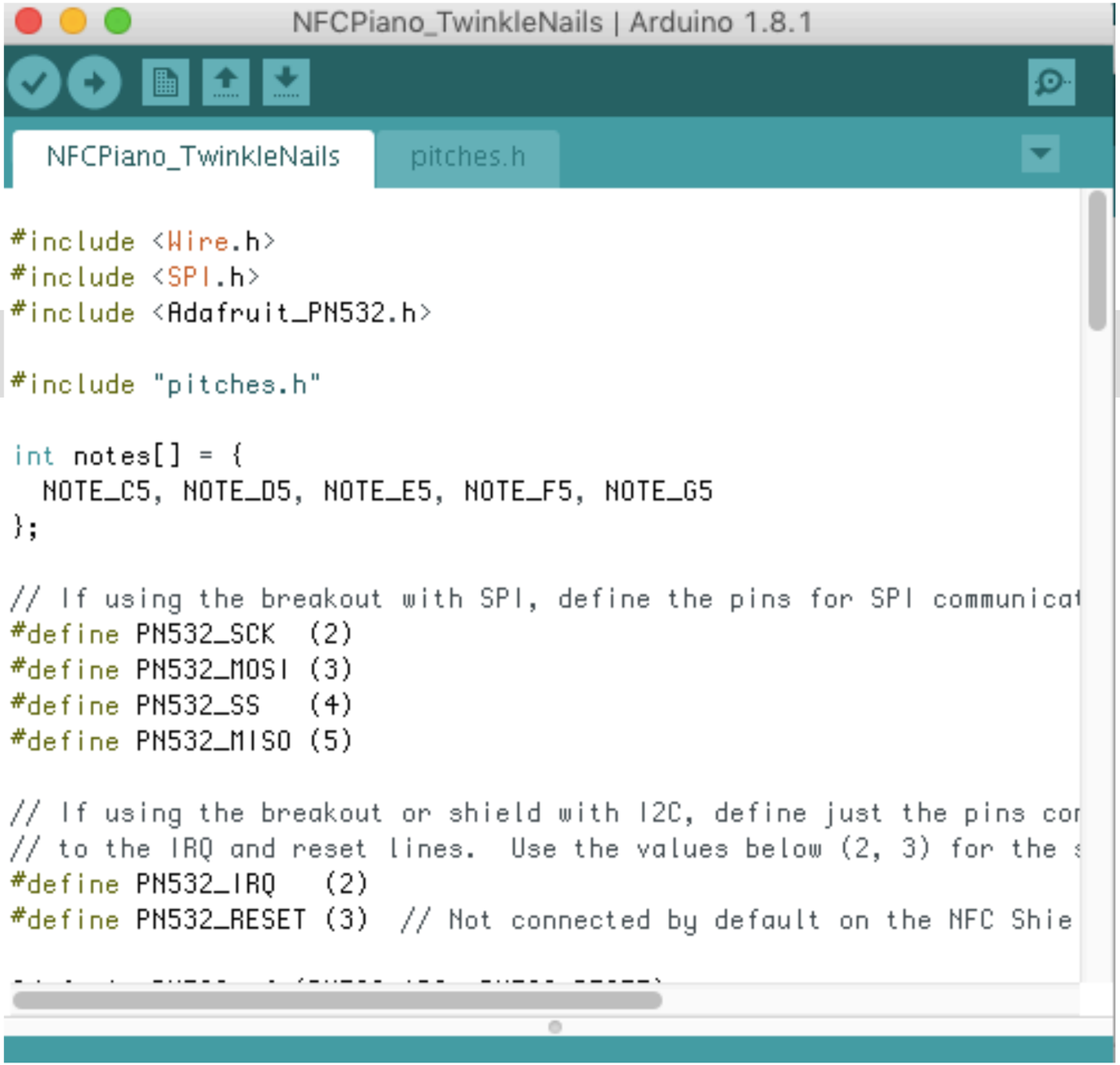
https://github.com/katiavega/BeautyTech_NFCTwinkleNails

Don’t forget the PN532 library

https://github.com/adafruit/Adafruit-PN532

For more information of the Shield:

https://learn.adafruit.com/adafruit-pn532-rfid-nfc/arduino-library



Step 5. Test it

Add an ID to future identification.
Attach your nails using fake nails glue.

Assignment

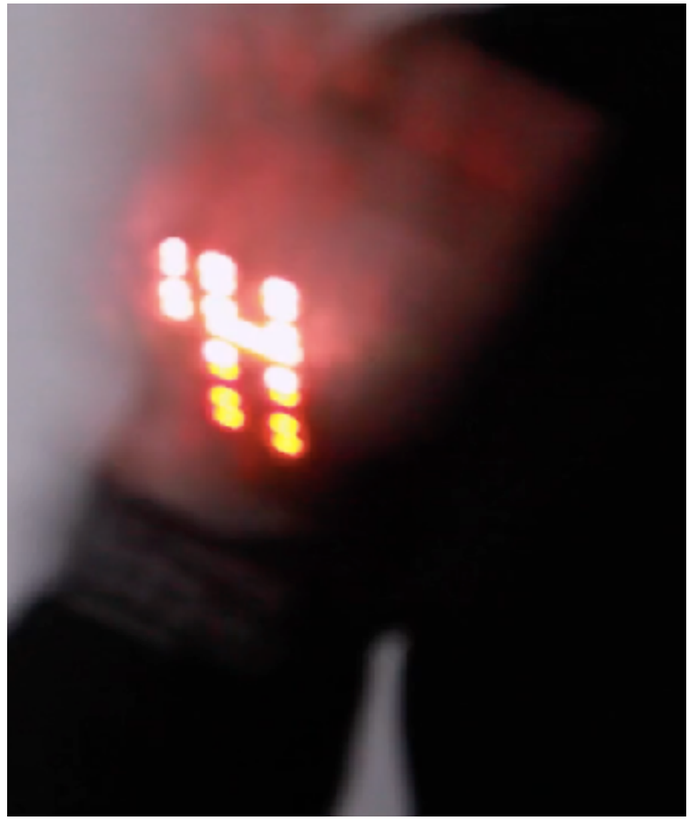
- Use one of the project’s option (carnival masks or tech nails).
- Personalize it with your project: change/add electronics (LEDs, acceremoter, etc).
- Improve the design: change the colors, add some crystals or other 3D elements.
- Presentation: explain your motivation and how you personalized your project.

Agenda

Fabricademy

Beyond wearables
Beauty Technology: from invisible to visible
on-body interfaces
- Skin, hair and nails interfaces
- Skin as a display

On-skin rapid prototyping
Final Presentations



Skin Electronics: Skin On a Lab

Beauty Technology

Katia Vega
katiavega.com