

Human-Computer Interaction

Let's look at the questions from the homework!

What is Human-Computer Interaction?

Human-Computer Interaction is an incredibly exciting and diverse field.

It's so much more than UX/Design!

Here is a [Fast Company article that showcases 8 incredible prototypes of Human-Computer Interaction](#)

<https://www.fastcompany.com/3059848/8-incredible-prototypes-that-show-the-future-of-human-computer-interaction>

What is Human-Computer Interaction?

'Human-Computer Interaction (HCI) is a multidisciplinary field of study focusing on the design of computer technology and, in particular, the interaction between humans (the users) and computers. While initially concerned with computers, HCI has since expanded to cover almost all forms of information technology design.'

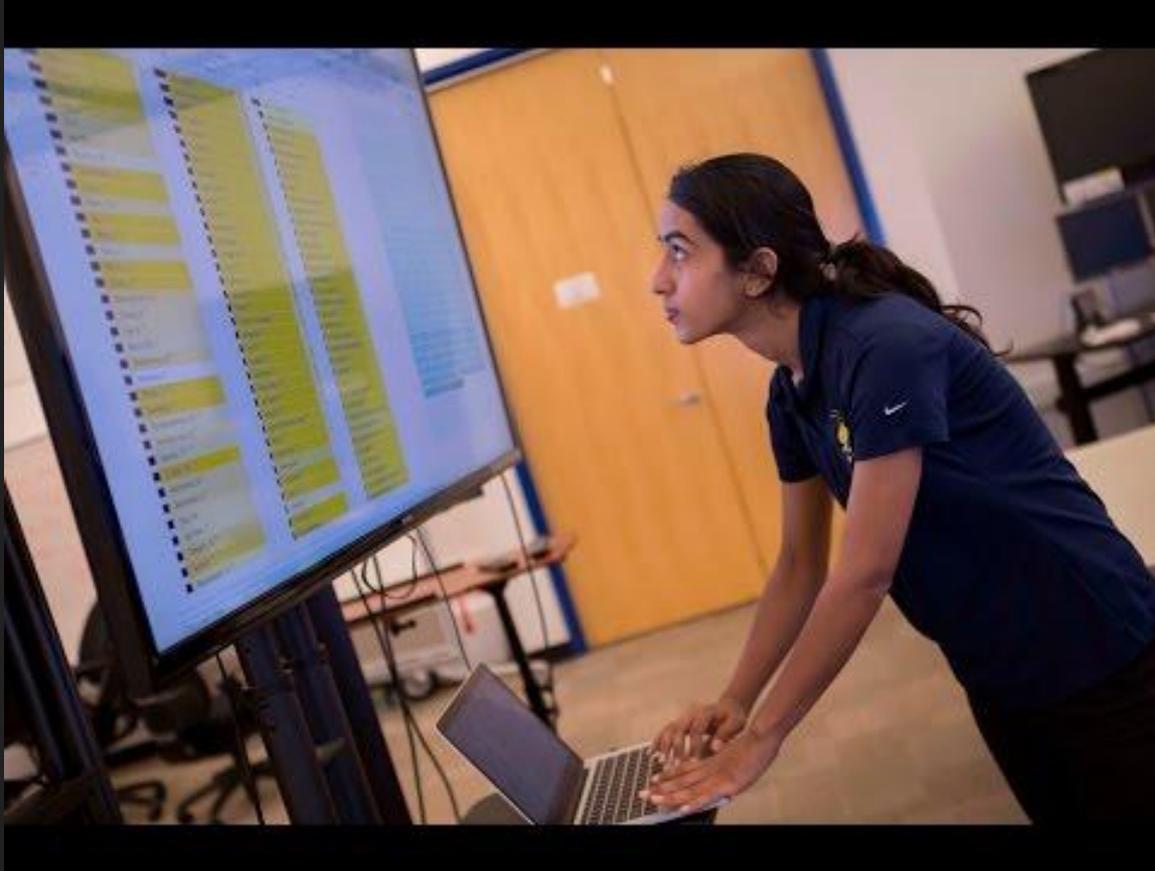
<https://www.interaction-design.org/literature/topics/human-computer-interaction>

What is Human-Computer Interaction?

“...it no longer makes sense to regard HCI as a specialty of computer science; HCI has grown to be broader, larger and much more diverse than computer science itself.”

– John M. Carroll, author and a founder of the field of human-computer interaction.

What is Human-Computer Interaction?



Brain-Computer Interfaces

Using brain-computer interfaces as an in-depth example of HCI.

Class Exercise

Break out into groups of around 4, and discuss a possible human-computer interaction that you could do with **technology and skin**.

E.g. you could think about wearable devices on your skin

Input and/or output on your skin

iSkin

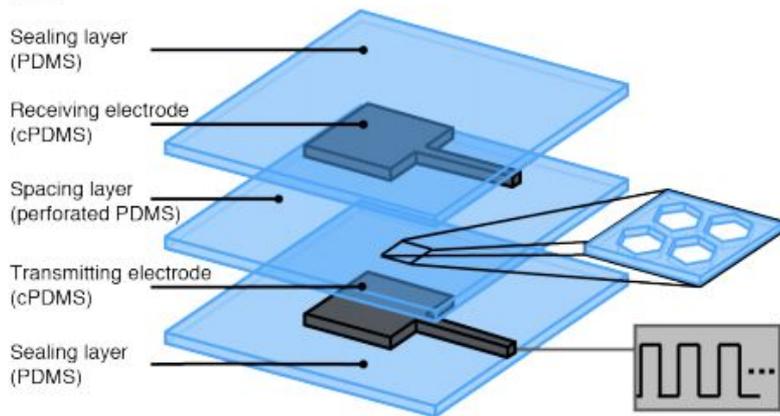
Weigel, M., Lu, T., Bailly, G., Oulasvirta, A., Majidi, C. and Steimle, J., 2015, April. Iskin: flexible, stretchable and visually customizable on-body touch sensors for mobile computing. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (pp. 2991-3000). ACM.





Figure 1. iSkin is a thin, flexible, stretchable and visually customizable touch sensor that can be worn directly on the skin. We present three novel classes of on-body devices based on iSkin: (a) *FingerStrap*, exemplified here with a strap on the index finger for fast, one-handed control of incoming calls; (b) *Extensions for wearable devices*, exemplified here with a rollout keyboard attached to a smart watch; and *SkinStickers*, exemplified here with (c) an input surface for a music player attached to the forearm, (d) a click wheel on the back of the hand and (e) a headset control behind the ear.

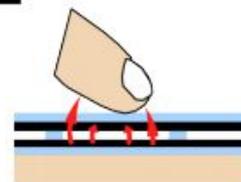
a Electrode Design



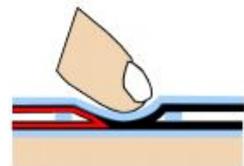
b No Touch



c Light Touch



d Firm Touch



Received Signal

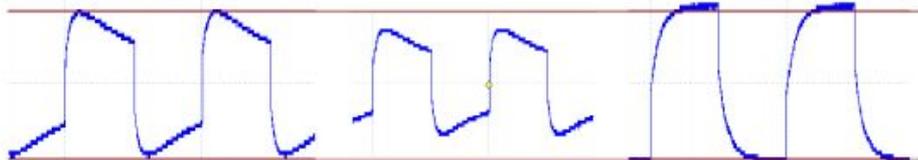
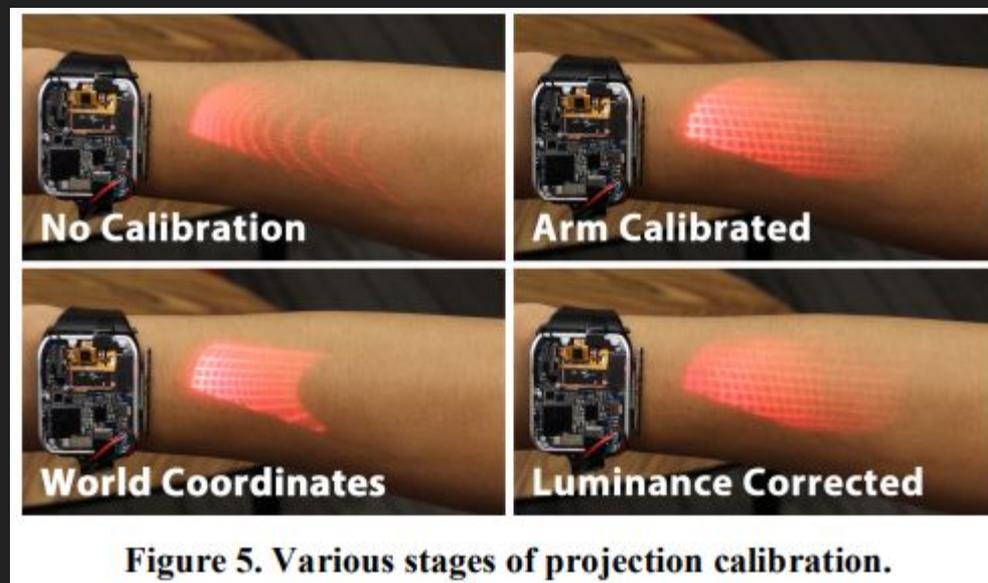
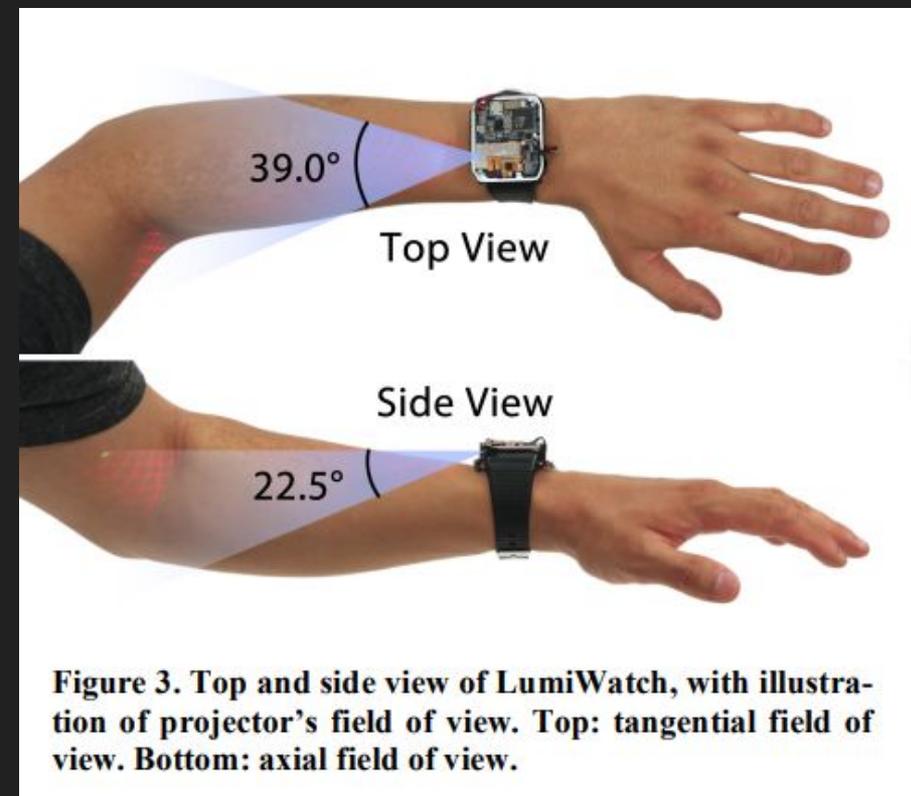


Figure 2. iSkin Touch Sensing: (a) Overview of layers in a touch-sensitive iSkin; (b) sensing without touch contact; (c) projected capacitive sensing of slight touch events; (d) resistive sensing of firm touch events.

LumiWatch

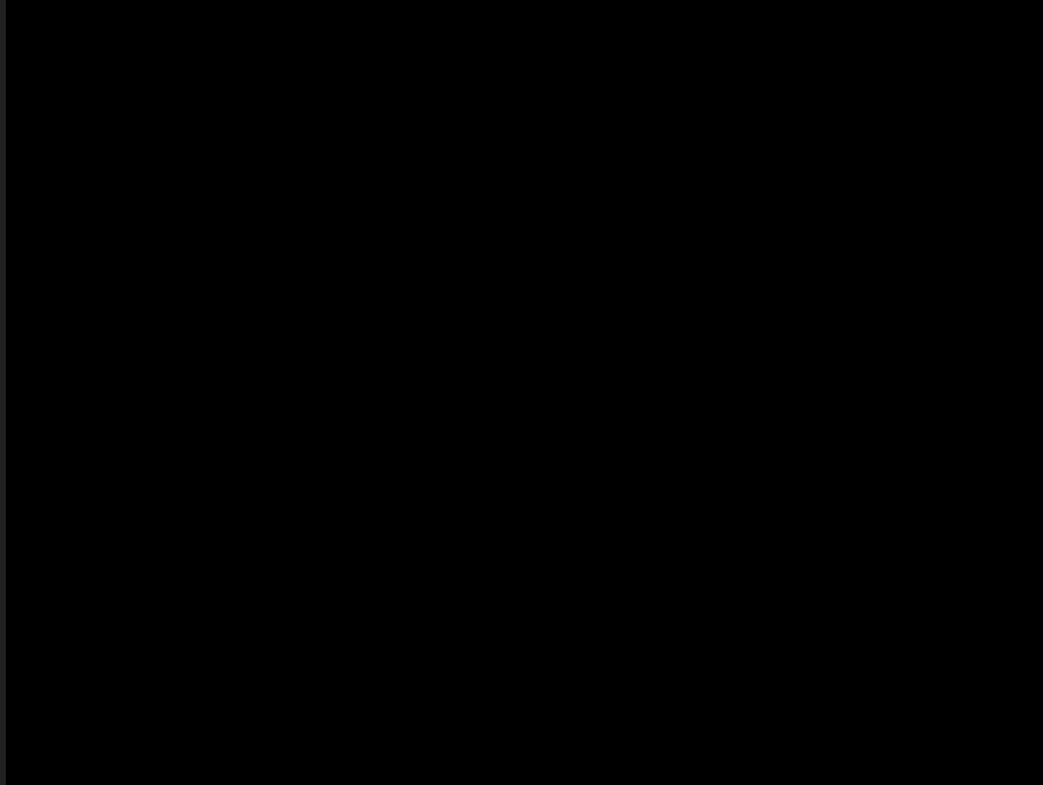
Xiao, R., Cao, T., Guo, N., Zhuo, J., Zhang, Y. and Harrison, C., 2018, April. LumiWatch: On-Arm Projected Graphics and Touch Input. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems* (p. 95). ACM.





DuoSkin

Kao, H.L.C., Holz, C., Roseway, A., Calvo, A. and Schmandt, C., 2016, September. DuoSkin: Rapidly prototyping on-skin user interfaces using skin-friendly materials. In *Proceedings of the 2016 ACM International Symposium on Wearable Computers* (pp. 16-23). ACM.



DuoSkin



Figure 1: DuoSkin is a rapid prototyping and fabrication process using the skin-friendly material gold leaf to create wearable on-skin user interfaces, such as (a) sensing touch input, (b) displaying the user's mood using a thermochromic tattoo, and (c) communicating and sharing data with other devices through NFC—all while maintaining body decoration aesthetics.

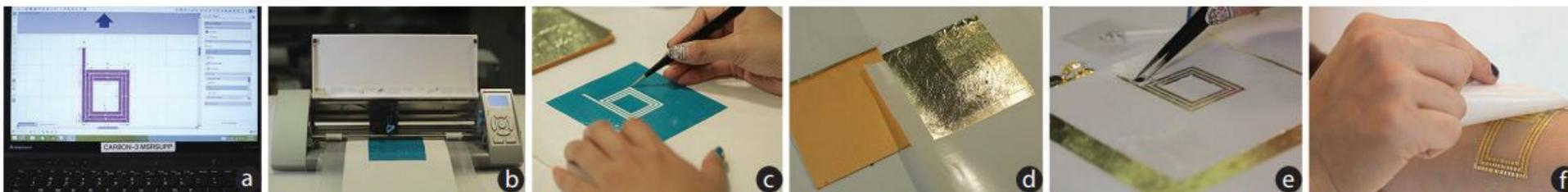


Figure 2: DuoSkin's three-step workflow. Step 1: (a) Sketching skin circuitry with graphic design software. Step 2: (b) Fabrication which includes (c) creating stencils of the circuitry, (d) applying gold leaf as the conductive material, and (e) mounting electronics. Step 3: (f) After completing the circuitry, we apply the DuoSkin device to the user's skin through water-transfer.

DuoSkin

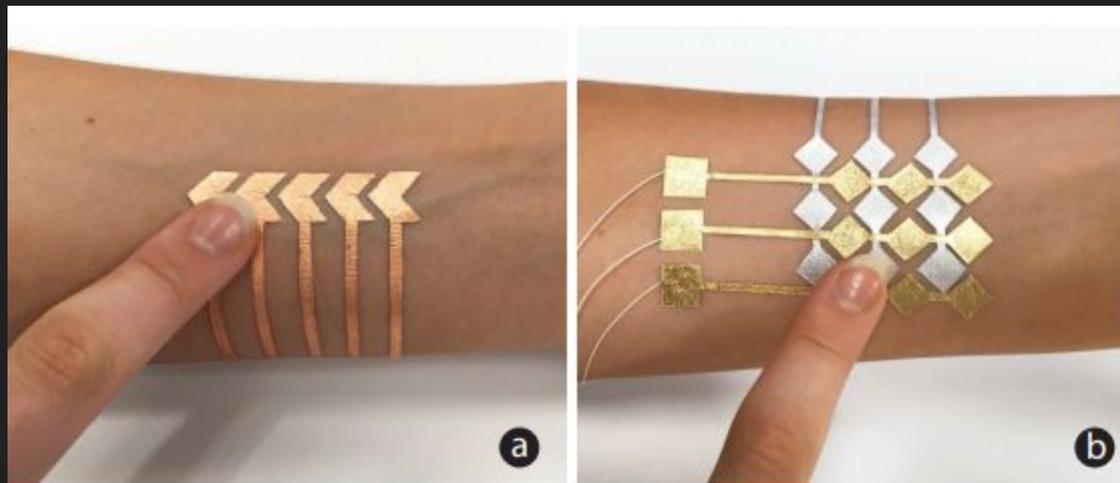


Figure 5: Input on (a) a continuous slider and (b) 2D touchpad.

Propriceptive Interaction

Lopes, P., Ion, A., Mueller, W., Hoffmann, D., Jonell, P. and Baudisch, P., 2015, April. Proprioceptive interaction. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (pp. 939-948). ACM.



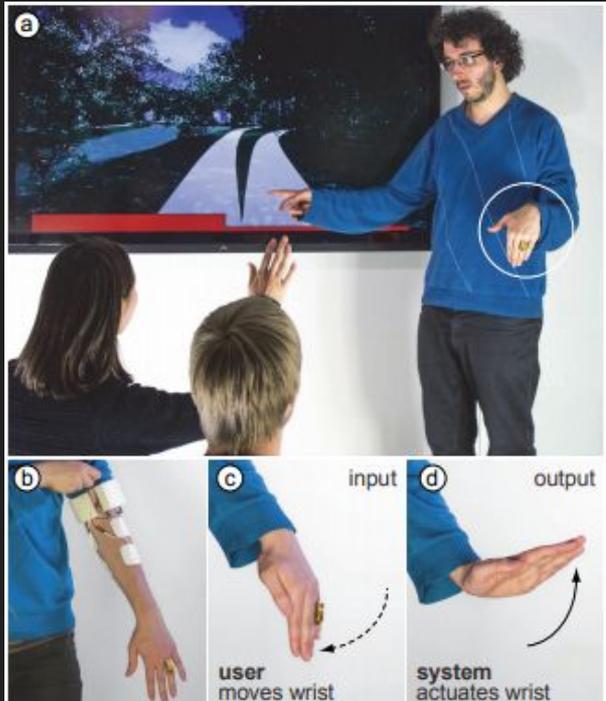


Figure 1: (a) Proprioceptive interaction allows users to interact eyes-free based on their sense of proprioception alone, allowing this user to rewind a video, while maintaining eye contact with his audience.

(b) The user is wearing our proof-of-concept bracelet called Pose-IO. (c) It reads input by sensing the same wrist's flexion using an accelerometer and (d) it sends output to the user by actuating the user's wrist using electrical muscle stimulation.

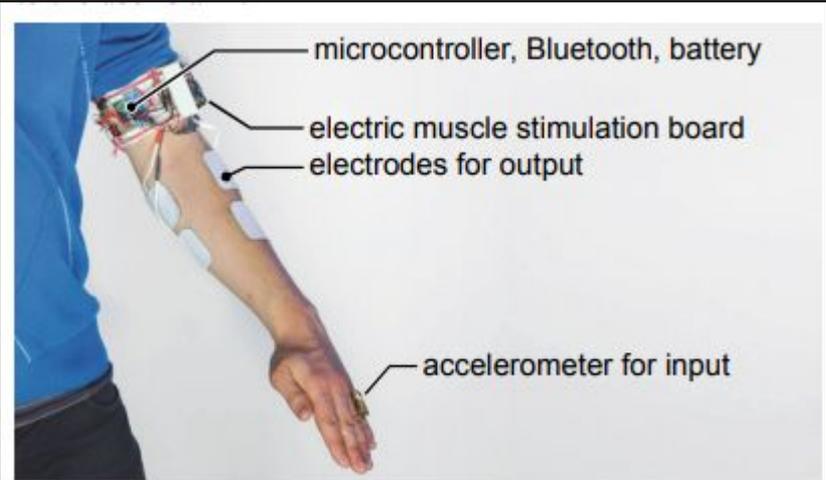


Figure 4: The main components of Pose-IO.

Finally to give you one last example of a completely different interface: *tangible computing*

