iSoft

Specs
Materials: Carbon elastomer (LR 3162 from Wacker Ltd.), heat-stabilized film, ribbon crimp ends, textile, steel blocks
Tools: T-shirt heat press, toaster oven, palette knife

Describe what you made.
iSoft is a single-volume soft sensor that provides muti-modal sensing, including real-time continuous-contact and stretching sensing. With the help of a low-cost compression-molding process and a customization software toolkit, we enable users to design and fabricate their own sensors. The flexible and stretchable nature of our sensor allows users to deploy iSoft to everyday objects as well as textiles.

Describe the process of how this was made.
The iSoft fabrication process contains three main parts: customization, fabrication, and attachment.

Customization: Users can design and deploy their own personalized interface with the provided software toolkit. The toolkit then generates a guidance image for the fabrication process.

Fabrication: The iSoft is fabricated in three steps. First, users need to mix the two components that make up the carbon elastomer (LR 3162 A/B) and paste it on the heat-stabilized film using a palette knife. After putting another film on the other side, the user places this piece between two steel blocks with washers to control the thickness and remove any trapped air bubbles. After precompression, users can put the sensor piece into either a T-shirt heat press (140 seconds) or a toaster oven (60 minutes).

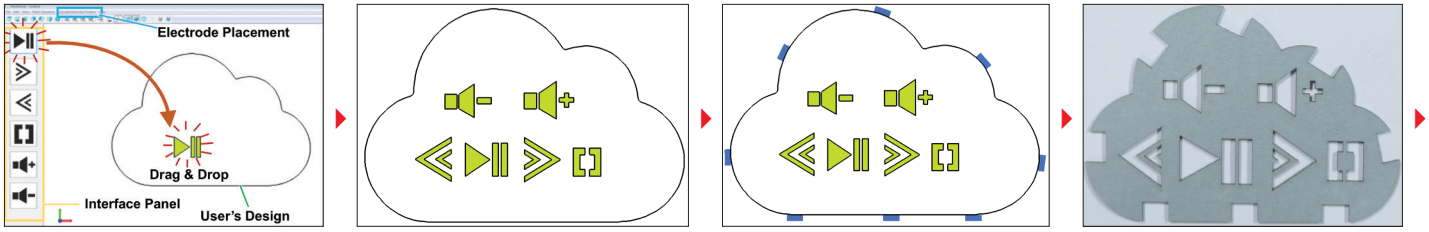
iSoft allows users to build their own soft interface by attaching it to various objects, such as a tumbler or a pillow.

Attachment: The last step for iSoft fabrication is to cut the fabricated sheet into the desired shape and attach electrodes (ribbon crimp ends) according to the guidance image generated by the customization toolkit.

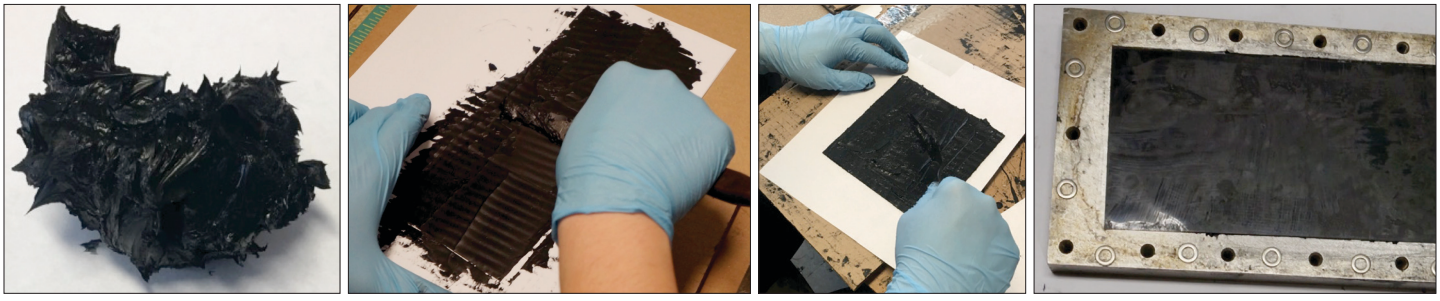
What for you is the most important/interesting thing about what you made?
iSoft allows users to build their own soft interface by attaching it to various objects, such as a tumbler, clothing, or a pillow. Users can easily cut the sensor into personalized shapes and use either a paint marker or fabric transfer paper to finalize the physical design of the customized interface. For example, users can turn a conventional neck pillow into a remote controller simply by attaching iSoft. Due to the nature of soft sensing, multimodal sensing including continuous-contact and stretching sensing can be provided.

What expertise (skills and competences) did it require?
iSoft is intended for the novice users who possess no expert knowledge of either sensing technologies or material processing. As developers of this whole framework, however, the

→ **Creating a fabrication guidance image using the customization software toolkit.**



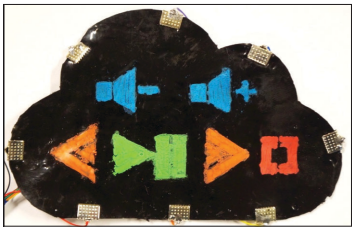
→ **Fabricating iSoft using a low-cost compression-molding process.**



→ **Material preparation**

project required skills in electrical hardware design, graphics programming, and sensor fabrication. First, we came up with our own sensing board to process the signals from the sensor. To provide a software toolkit, we employed a graphics algorithm to enable customization with any given shapes and interfaces. On the sensor-fabrication side, we tested various sensor-fabrication conditions including mixture ratio, curing duration, and temperature.

What is the one thing about making this that you would like to share with other makers? During the early stage of our fabrication process, we used a toaster oven for the curing process. To remove air bubbles, we had to put the sensor piece between two steel blocks and fully screw them together to provide enough pressure during compression molding. However, it caused a long curing duration (about 1 hour). We needed to reduce the overall fabrication time, so we ended up finding an alternate compression heating approach by employing a T-shirt heat press, which takes only 140 seconds to complete the fabrication while maintaining the quality of the sensor.



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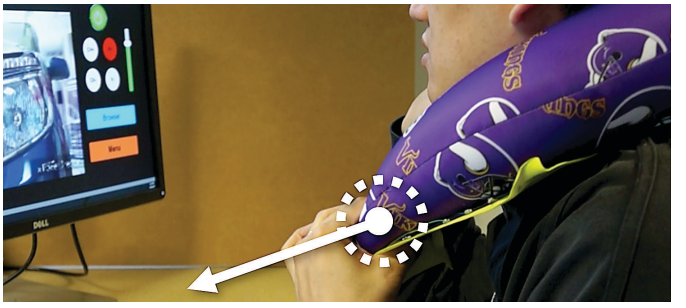
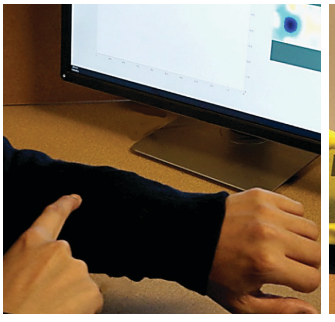
→ **A user can bring customized interactivity to a tumbler by wrapping it with iSoft.**



→ **By attaching iSoft, a neck pillow can be used as a remote controller with squeezing and stretching motions.**



→ **iSoft can be attached either on or underneath the textile.**

→ **Curing**

→ **Completed single-volume soft sensor**