



Fig. 1: Example wearable designs with electrochromic displays

WEAREC: Designing Toolkits for Exploring Wearable Electrochromic Displays

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Introduction

Electrochromic (EC) displays are graphical segment-based displays that transition between two predefined visual states when a small voltage is applied. They are flexible, transparent and can be fabricated in a free-form shape, which makes them fitting candidates for designing wearables. Compared to light-emitting technologies (e.g. LEDs), these displays promise subtle indications and expressive uses without drawing much attention (see Figure 1 for some examples).

Programmable Kit

The Programmable kit is composed of addressable hexagonal display modules that are attached to each other (Figure 2). The modules can be programmed to switch between blue and white (transparent) states by using a microprocessor and sensors. The designers can explore interactions by attaching the modules together on the body and assigning different animations by programming them.

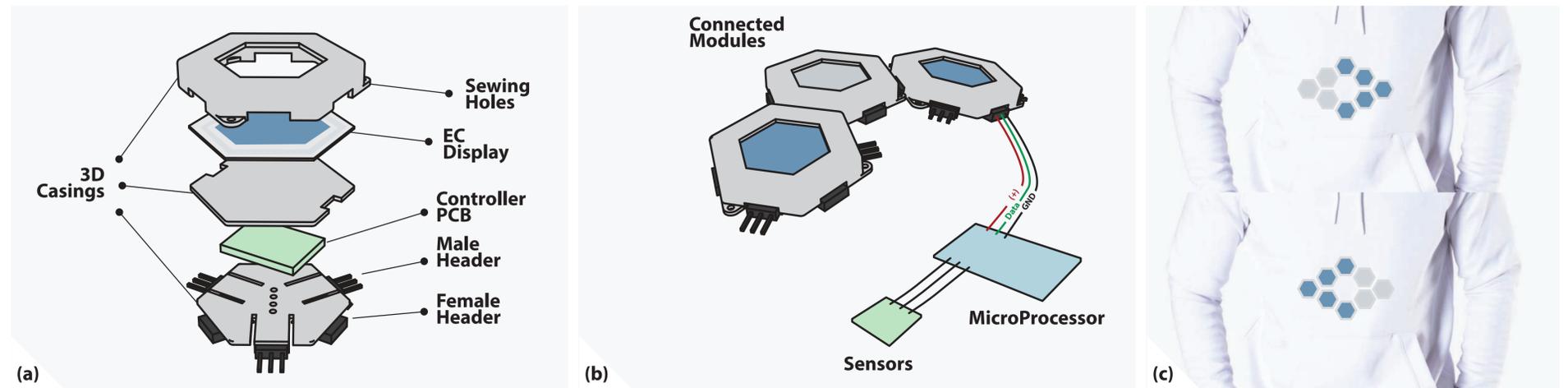


Fig. 2: Programmable Kit. (a) module details, (b) modules, a microprocessor and a sensor for programming, (c) two programmed state of the kit on chest.

Transparent Kit

The Transparent Kit is composed of connector/power modules that control naked EC modules (Figure 3). Through transparency and flexibility without being enclosed in a hard case, the naked EC modules allow designers to augment appearances coherent to the textiles and body forms. Designers connect the EC displays and switch their states manually by pressing the buttons. This allows quickly attaching the ECs to customize the form and interactivity of the toolkit. Additionally, the TransPrint method provides easy guidelines, opening up the design space for customized EC displays (Figure 3-b).

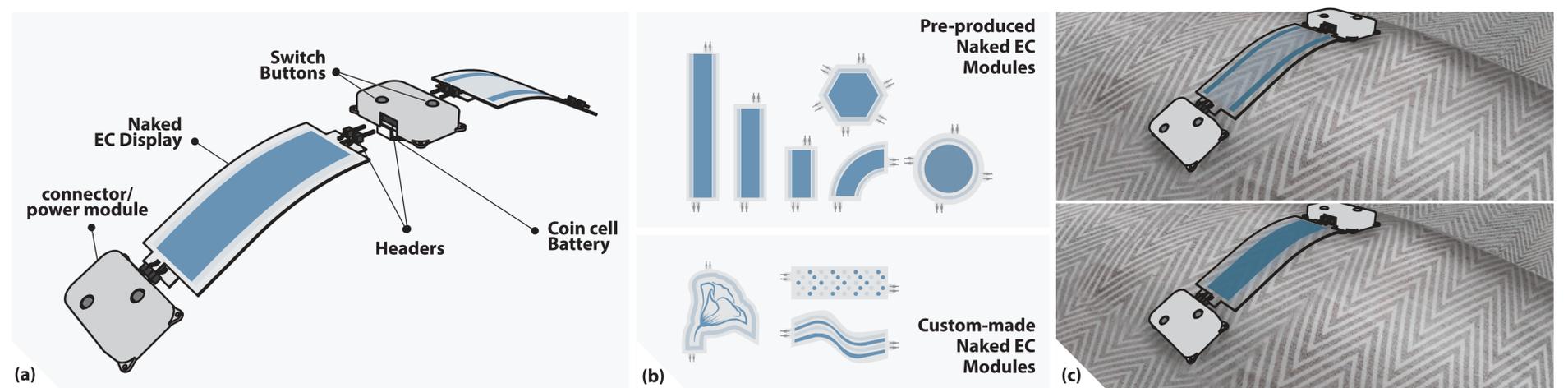


Fig. 3: Transparent Kit. (a) Modules and their details, (b) naked EC screen alternatives, (c) two state of the EC display on a fabric.

Comparison of the Kits

	Programmable Kit		Transparent Kit		
EC Flexibility	...doesn't support explorations with the flexibility of EC displays	NO	YES	...supports explorations with the flexibility of the naked EC displays	EC Flexibility
EC Transparency	...doesn't support explorations with the transparency of EC	NO	YES	...allows explorations on different surfaces by overlaying the naked EC displays	EC Transparency
Interaction	...allows explorations on different animations and sensor	YES	NO	...allows only exploring state changes of the EC displays via manually pressing the buttons on	Interaction
Tech. Knowledge	...requires users to have programming knowledge	REQUIRED	NOT REQUIRED	...does not require users to have any technical knowledge on programming or electronics assembly	Tech. Knowledge