MYOW – Make Your Own Wearable
A Toolkit and Platform for the collaborative development of textile-based wearables

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The toolkit

The MYOW-system was developed for the integration of electronics into textiles. The system encompasses a hardware toolkit and a web-based software platform providing coding environment, design interfaces and detailed manuals (Figure 1).
The hardware toolkit is composed of a set of textile conductive trace elements and custom-made adapter modules that allow the system to interface with commercially available sensor and actuator PCBs frequently used by makers (Figure 2). The conductive trace elements, which replace cables or stitched conductive yarn typical for e-textiles, can be applied additively to all textiles by means of thermal transfer pressing to form any desired trace layout. The whole system functions as an I²C bus. Any electronic component with an I²C interface can theoretically be connected to it.

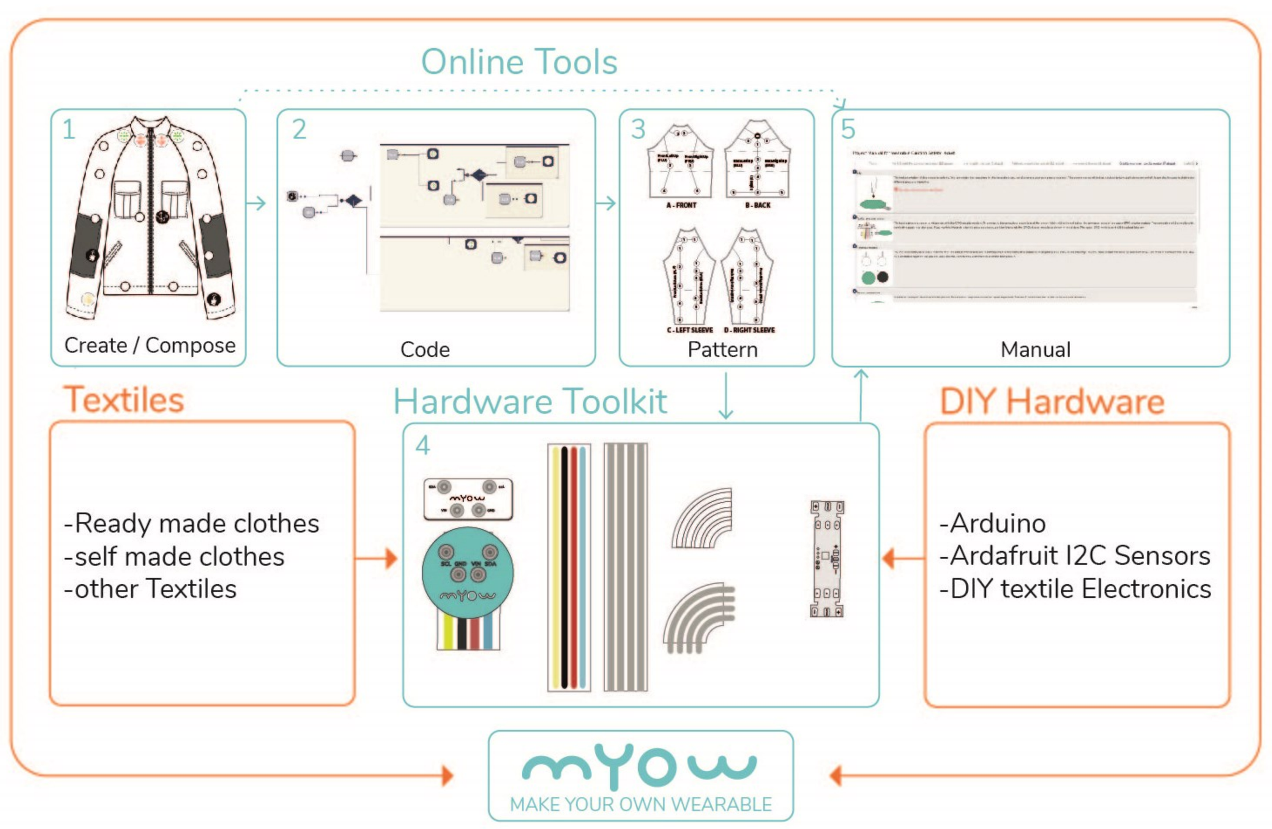

Figure 1: The MYOW System

Components

The conductive trace system, used in the MYOW-toolkit, has several properties, which are suitable for the adaptation on textile surfaces: The conductive traces are thin, soft, flexible and easy to apply. The system was developed to maintain typical textile properties, like flexibility and drape. The conductive traces are made of 4 parallel conductive textile strips, that are fused to a highly flexible heat activated transfer foil (Figure 3). This way, the 4 paths of the I²C bus are held in place, the conductive traces are applied to the textile surface in a single operation and the sensitive, silver coated conductive fabric is shielded from corrosion. By designing the track elements in straight track modules, as well as curve modules (90°, 45°), users can easily reach all positions on the wearable. All modules can be cut to the desired length and combined for the shaping of unique conductive tracks.

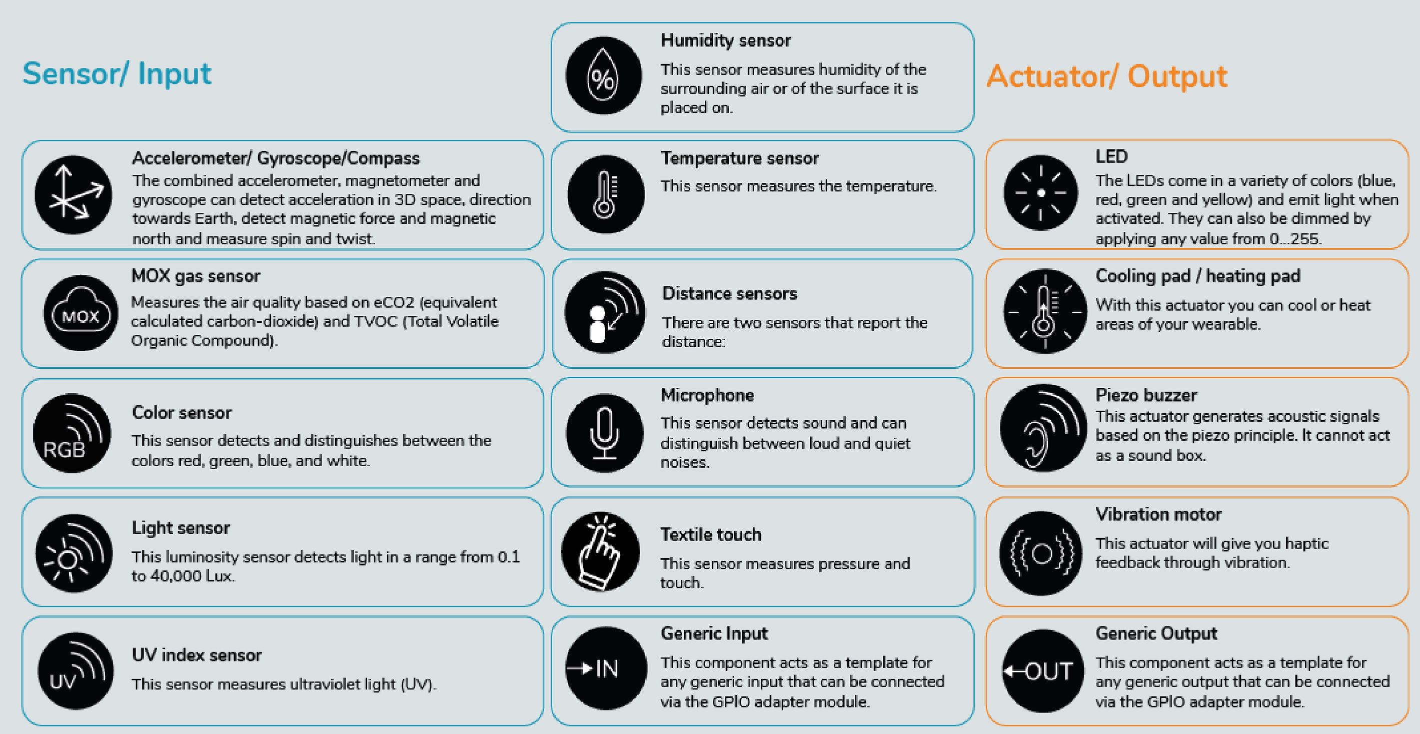

Figure 2: List of sensors and actuators

Figure 3: Hardware components of the toolkit

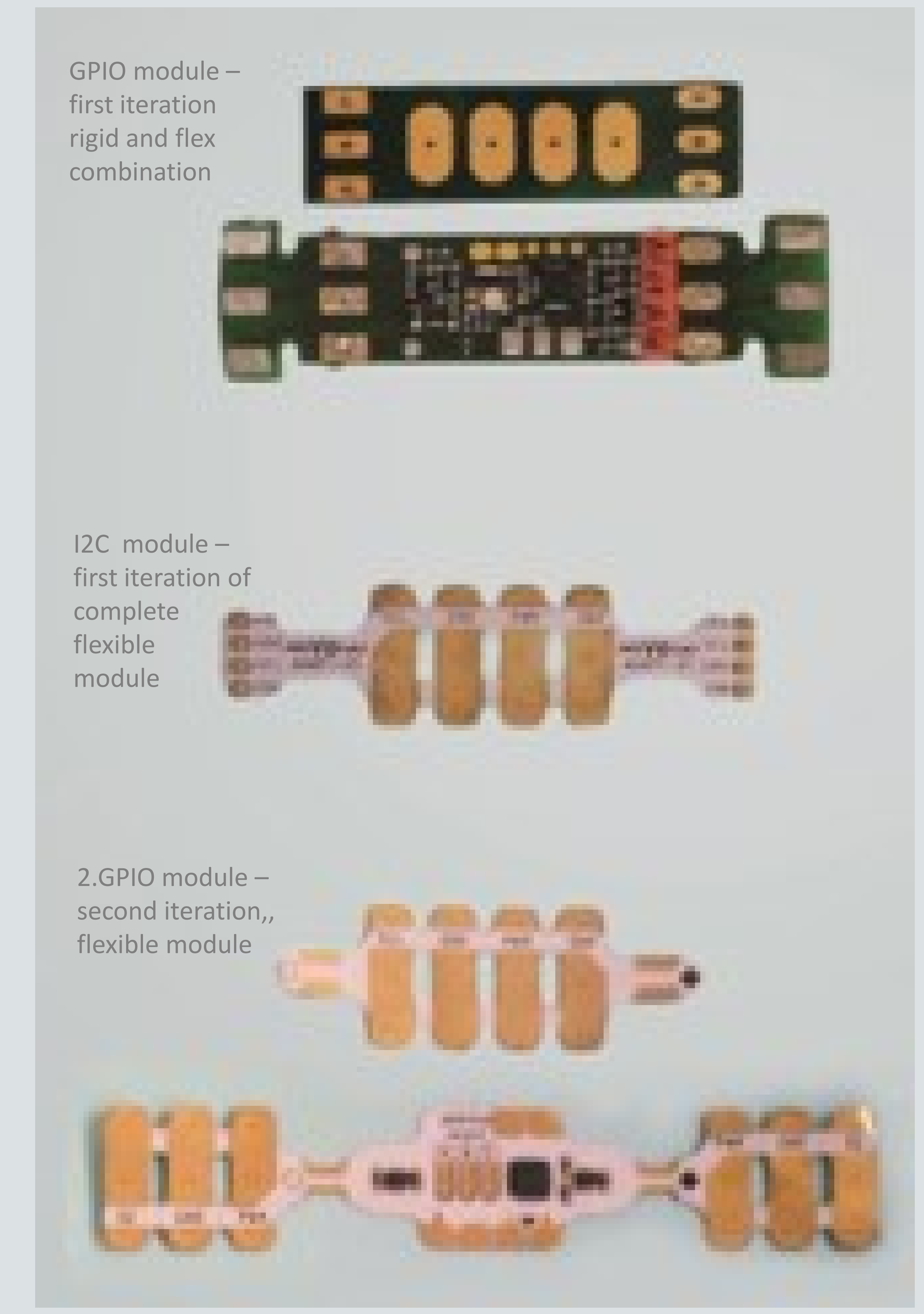

Figure 4: Evolution of Adapter modules

Possibilities and limitations in the design process

Sensors, Actuators and Compute are added to the electronic textile with adapter modules made from polyimide (Figure 4). Those flexible PCBs are fixed between the textile and conductive traces directly in the heat transfer bonding process. Several pinout-variants directly connect most breakout boards commonly used in the electronics maker culture to the I²C bus. For analouge components or components without an I²C interface the toolkit comes with a configurable adapter module, that makes those components addressable via the bus.

The components can be used for the integration in many different designs. The thermally applied conductive traces were tested on several different knitted and woven textile surfaces, constructed with different thickness, flexibility and drape (Figure 6). However super stretchy materials will sacrifice some amount of their stretch when equipped with the conductive traces. Regarding the thermal application process, executed on a horizontal 2D textile surface, the design process of the wearable is segmented in a great number of smaller steps and interlocks production processes of two different domains. New design approaches can thus not only arise from the original design idea but also from the uniqueness of the process.

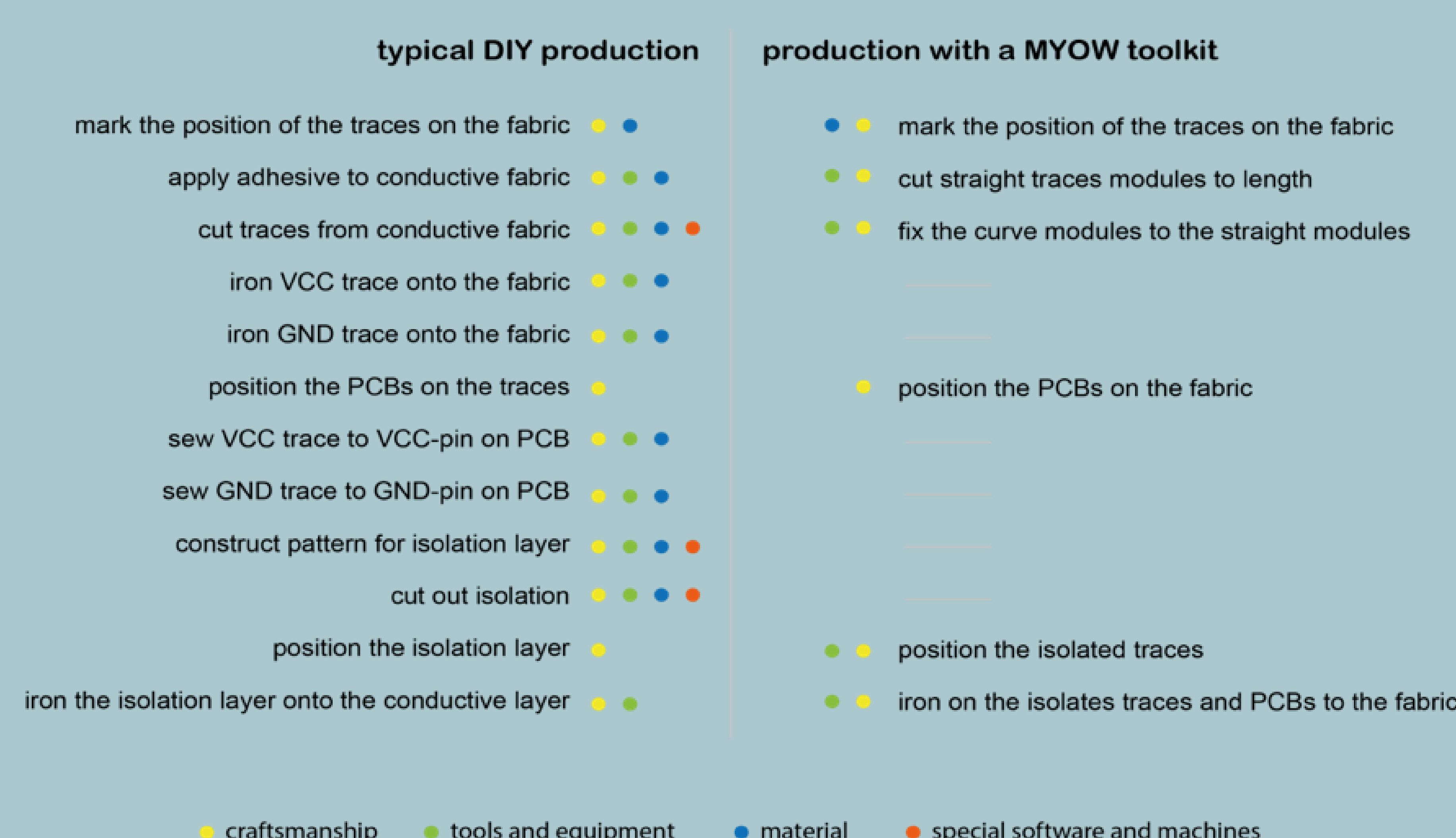

Figure 5: Production process of common smart textiles vs. production process utilizing the MYOW Toolkit

Users

The MYOW-toolkit targets users that have either electronics or textile processing knowledge but might not have any know-how in electronic textiles, to offer them the opportunity to create their own textile-based wearables. The toolkit enables the experts in their respective fields to apply their domain knowledge to the electronic textile space. Textile experts will be innately familiar with the layering of material and bonding process while for electronic experts the production process mirrors circuit development in common visual circuit design tools.

By directly interfacing with the breakout boards used in the electronics maker culture we gain access to the distributed knowledge available there in form of tutorials and communities and naturally extend the functionality of the toolkit with new developments in that space.
MYOW eliminates the need for specialized tools - and the preplanning and knowledge-requirements that come with them and streamlines the manufacturing process into only a few steps (Figure 5). Through this, true electronic textile prototyping becomes possible.


Figure 6: Illuminated jacket created with the MYOW toolkit