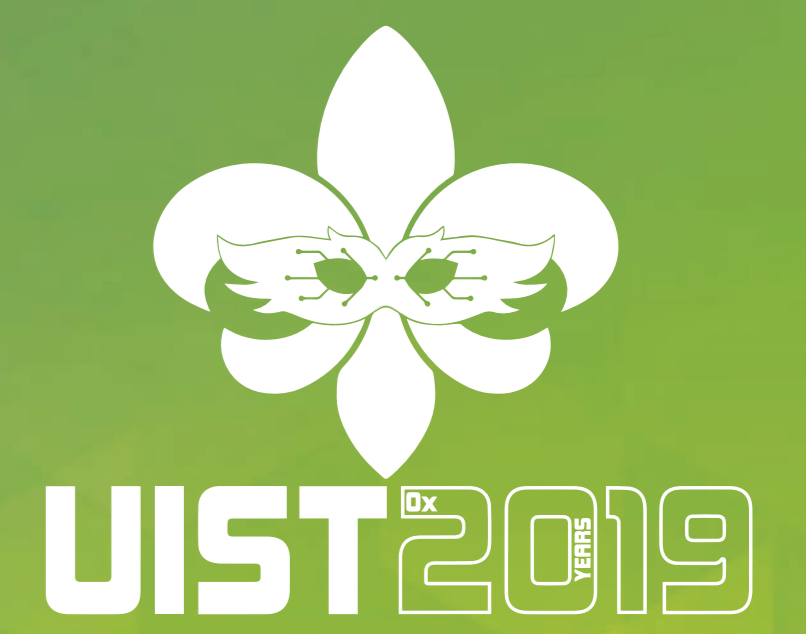# BodyHub
A Reconfigurable Wearable System for Clothing

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Motivation

While mobile technologies are moving closer to our body and novel wearable gadgets and smart textile interfaces emerge, current wearable solutions are often expensive individual solutions for specific applications and lack re-configuration possibilities.

Current solutions

- ▶ Lack of customization
- ▶ Often expensive individual soltions
- ▶ Limited to specific applications

Concept

We introduce BodyHub, a reconfigurable wearable system, which allows to combine various functional I/O modules to create individual wearables. To provide easily attachable and detachable modules, we propose a connector system, which is directly 3D-printed into garments and interconnects the modules with integrated conductors.

Functional Modules

▶ Input Modules
e.g.,
- ▶ Slide-joystick
- ▶ Gesture recognizer

▶ Output Modules
e.g.,
- ▶ OLED- & RGB-displays
- ▶ Vibro-tactile output

▶ Decorative Tiles
e.g.,
- ▶ Cover unused sockets
- ▶ Aesthetic purpose

Our concept in a nutshell:

- ▶ Modular wearable approach
- ▶ Integrated 3D-printed sockets system
- ▶ Easy & fast setup of various I/O modules
- ▶ Simple (re-)configuration via smartphone
- ▶ Enable a promising set of new applications

Processing

BodyHub uses a central processing unit that handles all data communication:

- ▶ All modules are interconnected with an integrated four-wire I²C bus
- ▶ A Bluetooth Low Engery microcontroller is used for smartphone connectivity

Companion App

To accomplish a simple specification of user-defined functions, we developed an app according to the **If This Then That principle (IFTTT):**

- ▶ Define and configure trigger events
- ▶ Select corresponding actions and behavior
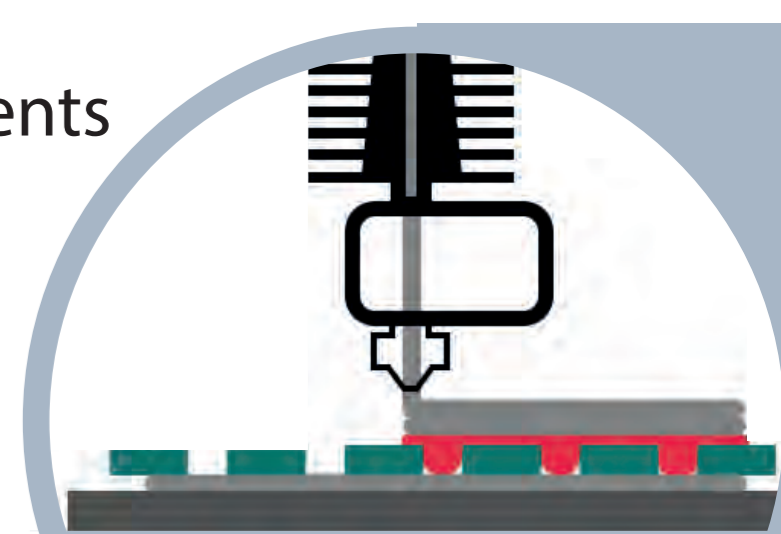
3D-printed on fabric

Socket System

- ▶ Foster sustainability
- ▶ Enable washability
- ▶ Easy (re-)configuration
- ▶ Robust integration

Application Examples

To illustrate the versatility, we developed a prototype that implements this concept and enables the user to realize a number of application examples including context-aware, tangible and remote interaction.

Mobility
- ▶ Change notification settings
- ▶ Get vibro-tactile feedback

Presentation
- ▶ Control presentation slides

Gaming
- ▶ Build custom controllers

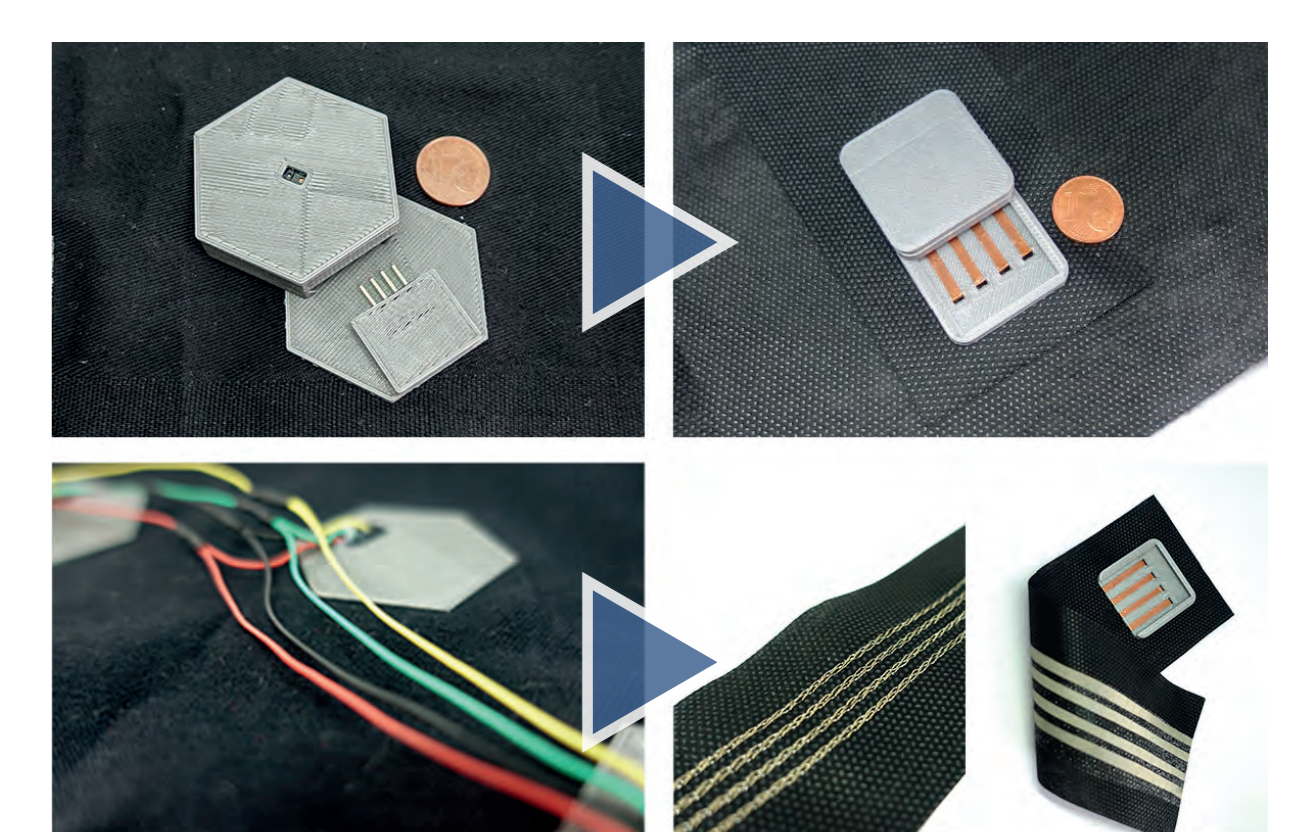**Shopping**
- ▶ Recognize allergens
- ▶ Handle shopping lists

Future Work

Miniaturization
- ▶ Use of conductive yarns and smart materials

Evaluate further applications
- ▶ Extend the IFTTT principle
- ▶ Conduct field studies

TECHNISCHE UNIVERSITÄT DRESDEN · INTERACTIVE MEDIA LAB DRESDEN · CeTI Centre for Tactile Internet with Human-in-the-Loop · CPEC CENTER FOR PERSPICUOUS COMPUTING

The first two authors contributed equally to this work.