

Flexability: An E-textile Toolkit for Persons with Limited Mobility

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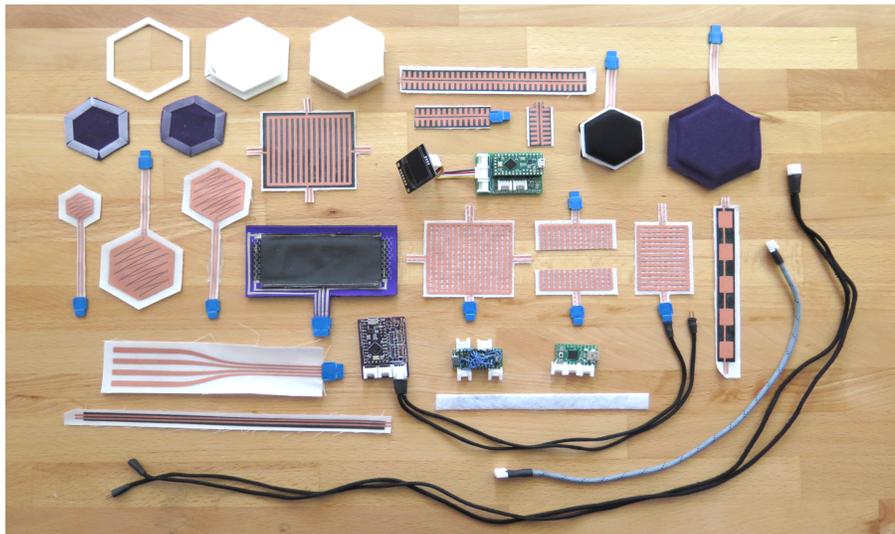
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CCS CONCEPTS • Human Centered Computing • Accessibility • Accessibility design and evaluation methods

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Commercial assistive technologies are often narrow in functionality and design and fail to best address individual needs of people with limited mobility. Stock solutions can be expensive and are usually not designed for repair or easy customization.



Our FlexAbility project addresses these limitations and improves outcomes for individuals using a modular, e-textile interface kit facilitating the creation of bespoke devices for persons with limited mobility. It is created from ethically and sustainability vetted physical components and parts.

Software and designs are open-source and modifiable using open-source tools—an essential feature for a disabled user to benefit over an extended period from modifications, repair and upgrades. Information on curated components, module

designs, and examples illustrating design-for-repair features and methods are available at www.flex-ability.org. The kit is flexible enough to support making wearable devices, devices that attach to wheelchairs, specialized beds and less portable extensions to workstations.

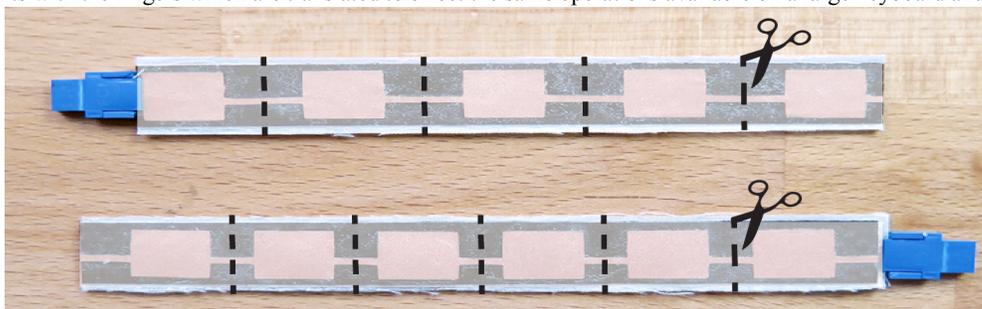


The kit evolved as we worked with consultants at two community centers: the Pfennigparade Munich (Germany) and Ability Now in San Francisco (USA) and integrated the advice and support of the global community of e-textile experts. Our iterative process produced a series of prototypes of bespoke tactile computer interfaces for our consultants and refinements to the e-textile kit from which they were built. We studied our consultants' living environments, their tools, and the problems they experience daily identifying opportunities for improving quality of life through e-textile interfaces.



We also mapped the network of actors in the institutions and broader community on which the success of these projects depends. An important source, for example, is the team who buys, maintains and observes the use of commercial assistive devices in the communities supporting our consultants. This mapping recognizes differences in values, interests and

orientations. This work helped us generalize our kit to be more useful to a broader range of accessibility challenges. The salience of this aspiration was revealed by our two consultants who have contrasting mobility limitations. One uses large, full body movements to operate devices that are usually for hands (e.g. mouse or buttons), the other uses very small movements with the fingers which are translated to effect the same operations available on a large keyboard and trackpad.



Evaluating the designs from the kit required observational approaches that focus on specificities of the individual's use of them. Evaluating the kit itself will require a longitudinal study as it becomes more widely adopted and enough case studies become available. We have begun this process by presenting the toolkit as an internet resource (<http://flex-ability.org>) and in person in workshops and conferences.

We will share and discuss details of two particular challenges negotiated to foreground the interests of our central consultants: the complex legal requirements to respect their privacy and the relative inaccessibility of many of the tools and techniques typical of e-textile prototyping and engineering. This frustrated common and valuable community expectations of active participation (as implied by the DIY moniker) and unfettered publication of the processes and results.