

SMALLER AID:

A CINCHING ASSISTIVE WEARABLE

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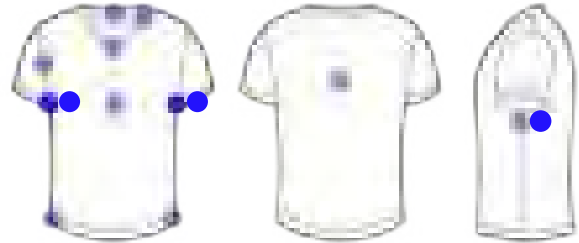
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Introduction

Problem: Often times the issues associated to the donning (putting on) and doffing (removal) of a basic T-shirt is prominently brought up within people with mobility impairment issues (MI).

Solution: The problem lies within the way T-shirts are sewn, not to mention the way MIs often sacrifice comfort and aesthetic integrity of their shirt in order to dress. We introduce SMALLer Aid. We show how embedding shape memory alloy (SMA) springs will result in the successful cinching of the underarm area of a T-shirt, which will increasingly improve the process of donning and doffing within people with mobility impairments all while retaining aesthetic integrity.

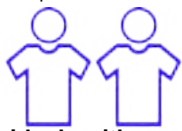
Common Restrictive Areas on a T-shirt



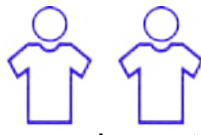
Every participant identified the **underarm area** as being the **most restrictive** area while donning and doffing a T-shirt

User Study

- We ran a user study to engage and co-design with people with mobility impairments to understand their needs while designing for/with them.
- Participants included:



2 individuals with a mobility impairment



2 personal support workers (PSW)

Results

Aesthetic Compromise

- All MI participants mentioned their desired aesthetic choices being hindered due to their impairment

Feeling Frustrated

- All participants described their donning and doffing T-shirt process as being frustrating.

Material Matters

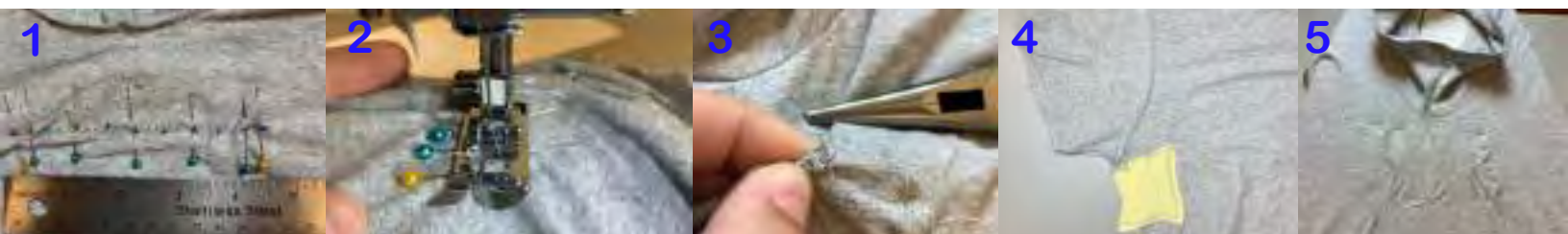
- During the study we engaged all participants in the design and materiality of their wearables.
- All participants described the Kevlar as “soft and comfortable”.
- All participants mentioned that their T-shirt material of choice as 100% cotton

Prototyping SMALLer Aid

- SMALLer Aid, a plausible solution to the challenges associated to donning and doffing a T-shirt.
- The shirt consists of:
 - 100% cotton T-shirt with an embedded piece of SMA wire
 - An interior patch made of 100% Kevlar heat-resistant fabric which protects the exposed wire from the user’s skin.
 - A detachable Arduino based circuit that serves as controller attached to a power supply.

Steps of creation

- We cut the SMA to 1.5 inches.
- Measure, mark, place, and pin in five areas of the SMA in a stretched position of 4 inches (1).
- Sew the spring at both extremities (2). Setting of sewing machine:
 - Type of stitch: **satin stitch** (tight zigzag)
 - Length of stitch: **smallest** (machine setting: 1)
 - Width of stitch: **medium** (machine setting: 3)
 - Tightness of stitch: **tight** (machine setting: 2)
- Cut holes on the outside of the shirt at the extremities of the spring.
- Next, clamp conductive beads to the outside extremities of the coil (3).
- Finally, sew a patch of Kevlar inside the shirt onto spring (4).



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