One Shirt to Rule Them All: Pursuing the Vision of a Garment-Based Wearable Technology Platform

Lucy Dunne
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Prior to 2014

- Jacket/Sweatshirt: 16.4%
- Accessories - Gloves: 11.3%
- Accessories - Watches: 8.7%
- Shirt: 8.5%
- Accessories - Hats: 6.5%
- Accessories - Eyewear: 5.2%
- Vest: 5.1%
- Bags/Backpacks/Purses: 5%
- Footwear: 4.7%
- Accessories - Misc: 4.5%
- Dress/Skirt: 4.2%
- Accessories - Jewelry: 3.4%
- Pants: 2.9%
- Undergarments/Swimsuit: 2.7%
- Accessories - Badge/Patch/Clip: 2.2%
- Clothing: 2.2%
- Accessories - Chest Strap: 2%
- Accessories - Scarves: 1.7%
- Bodysuit: 1%
- Accessories - Earpiece/Headphone: 0.8%
- Accessories - Belt/Strap: 0.6%
- Accessories - Armband: 0.4%

2014-2015

- Accessories - Watches: 35%
- Accessories - Jewelry: 29.1%
- Shirt: 10.7%
- Accessories - Misc: 7.8%
- Accessories - Badge/Patch/Clip: 4.9%
- Accessories - Earpieces/Headphones: 3.9%
- Accessories - Eyewear: 2.9%
- Accessories - Hats: 2.9%
- Accessories - Gloves: 1%
- Vest: 1%
- Footwear: 1%
- Jackets/Sweatshirts: 0%
- Accessories - Scarves: 0%
- Accessories - Belt/Strap: 0%
- Accessories - Chest Strap: 0%
- Accessories - Armband: 0%
- Bags/Backpacks/Purses: 0%
- Pants: 0%
- Clothing: 0%
- Bodysuit: 0%
- Dress/Skirt: 0%
- Undergarments/Swimsuits: 0%

Berglund et al., ISWC 2016
Expectations

Time

Technology Trigger

Peak of Inflated Expectations

Trough of Disillusionment

Slope of Enlightenment

Plateau of Productivity

(A pile of discarded wristbands)

Derived from Gartner, Inc
US Apparel Consumption per Capita

Source: AAFA ApparelStats, US Census
Worn > 1x per month

Worn < 1x per month

Perception

Reality
Garment Platform

Functionality
- Market Application Survey
- Student Concept Survey
  - Identification and Distribution of Enabling Technologies
  - CBA, Platform Versatility Analysis

Fabrication
- Stitched SMD Circuit Fabrication
- Garment Manufacturing Processes

Mass-Produced Platform
Functionality

What *does* smart clothing/wearable technology do?

What *could* smart clothing/wearable technology do?

What *should* smart clothing/wearable technology do?
Student vs. Student

Mean NUWTW | Mean N | Mean U | Mean W | Mean TW

- APD | PRD | DES1 | DES 2
Top Functions

- Temperature Control: 51%
- Activity/Health Monitor: 10%
- Charging Device: 10%
- Automatic Clothing Functions: 7%
- Niche Functional Needs: 7%
- Remedial Aid: 7%
- Camera/Video: 3%
- Weather Protection: 2%
- Notifications: 2%
- Lights: 2%
- Invisibility: 2%
- Enhancing Human Capabilities: 10%
- Hover/Fly: 10%
- Massage: 1%
Controversial Functions

- Temperature Control 19%
- Audio 12%
- Niche Functional Needs 12%
- Activity/Health Monitor 10%
- Light 8%
- Automatic Clothing Functions 6%
- Bodily Functions Control 5%
- Sport/Entertainment 3%
- Camera/Video 3%
- Phone Replacement 3%
- Remote Control 3%
- Safety 3%
- Power Generator 3%
- Element Control 2%
- Digital Display 2%
- Massage 2%
- Enhancing Human Capabilities 2%
- Invisibility 2%
Fabrication

Leveraging CMT (cut-make-trim) manufacturing

Adapting CMT technologies

Developing (domestic) production workflows
Comparison among 1mm, 3mm, and 5mm LEDs

Islam Molla et al., ISWC 2017
Comparison between perpendicular and parallel orientation

Islam Molla et al., ISWC 2017
Method comparison

Islam Molla et al., ISWC 2017
Fashion through science

Style Engineers is a program designed for young girls who love fashion as much as we do! We think the real magic of fashion is how science, technology, engineering, and mathematics are part of the process of fashion design. On this site, you will find a series of activities designed to explore the science and technology of fashion.

Learn more

This material is based upon work supported by the National Science Foundation under Grants No. 1139469 and 1139501.
Thanks!

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