

## Designing a solar powered jacket: Interdisciplinary research and design through the functional, expressive, and aesthetic (FEA) consumer needs model

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### Introduction

Wearable technology and product sustainability in the apparel industry is an increased focus of consumers. Because few apparel products beyond accessories exist in the marketplace today, research is needed on the functionality of solar panels and their integration into apparel.

A major problem of wearable electronics currently on the market is the reliance on conventional power supplies (i.e. batteries) that are typically heavy, made from toxic sources, and have a short lifetime. To save resources, solar energy can be harnessed.

Flexible solar panels offer a sustainable, lightweight source of energy, but consumer attitudes towards solar powered clothing are greatly affected by the product's **functional, expressive, and aesthetic** (FEA) qualities (Hwang, Chung, & Sanders, 2016; Lamb & Kallal, 1992).



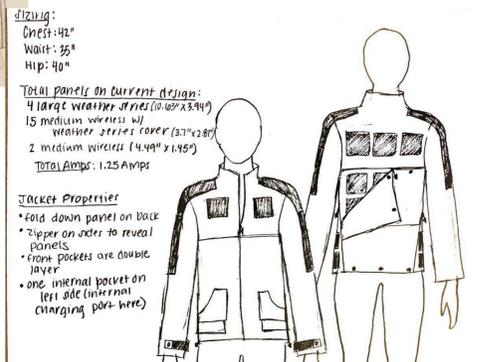
Flexible solar panels

### Purpose of Study

The purpose of this research is to **integrate solar panels into apparel in an expressive and aesthetic manner for the consumer market.**

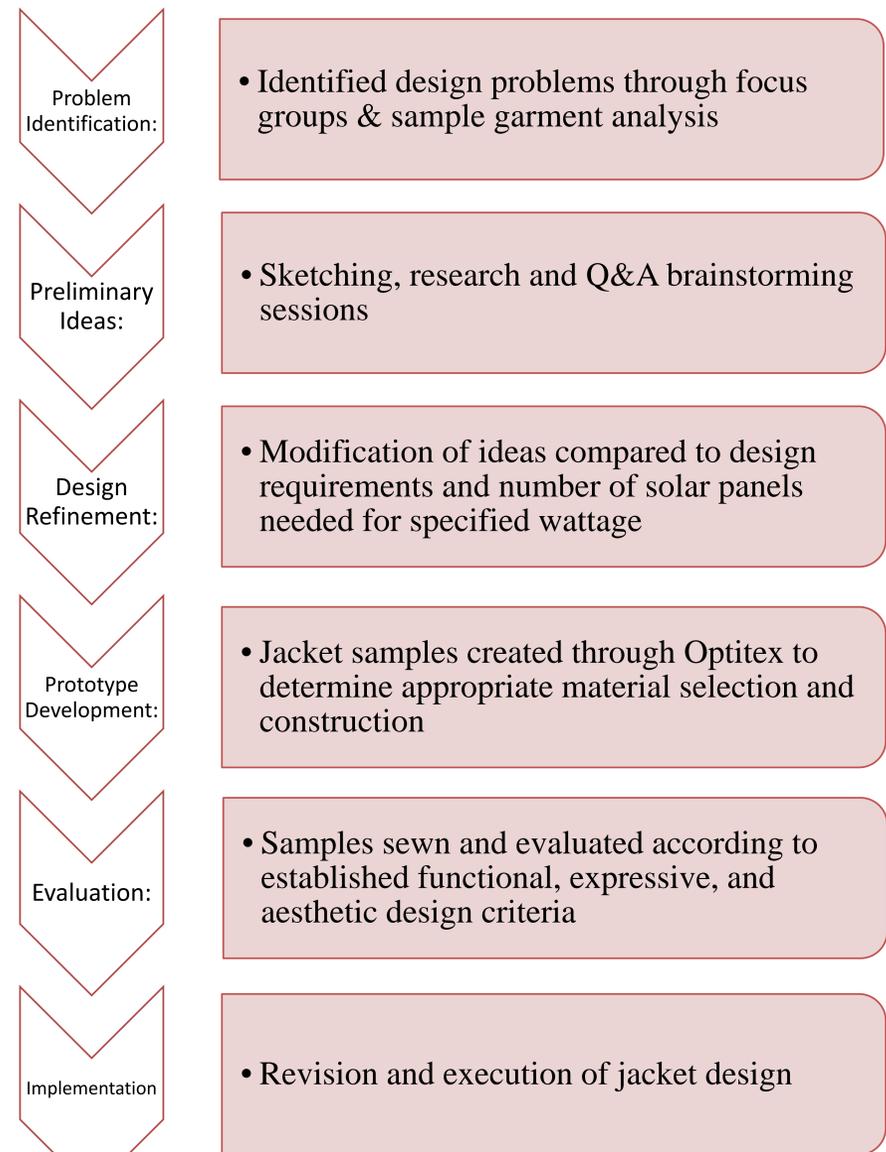


Initial Sketches



### Methods and Procedures

The apparel design framework and FEA model by Lamb and Kallal (1992) guided the process of designing a solar powered jacket:



### Results

Identified target consumer	The most important design criteria were identified as:	Balancing the two was challenging
<ul style="list-style-type: none"> <li>Male and female recreational hikers</li> <li>Gender neutral jacket for outdoor activities</li> </ul>	<ul style="list-style-type: none"> <li><b>Functional</b> <ul style="list-style-type: none"> <li>minimum energy output</li> </ul> </li> <li><b>Expressive</b> <ul style="list-style-type: none"> <li>visual adaptability</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Wearer safety and garment function vs appropriate of electrical components</li> <li>Findings may be useful for future wearable solar products.</li> </ul>



Cutting First Sample



Second Fitting



3D Avatar - Optitex

### References

Hwang, C., Chung, T.-L., & Sanders, E. A. (2016). Attitudes and Purchase Intentions for Smart Clothing. *Clothing and Textiles Research Journal*, 34(3), 207-222. doi:10.1177/0887302X16646447

Lamb, J. M., & Kallal, M. J. (1992). A Conceptual Framework for Apparel Design. *Clothing and Textiles Research Journal*, 10(2), 42-47.