CAREER: System-on-Cloth: A Cloud Manufacturing Framework for Embroidery Wearable Electronics

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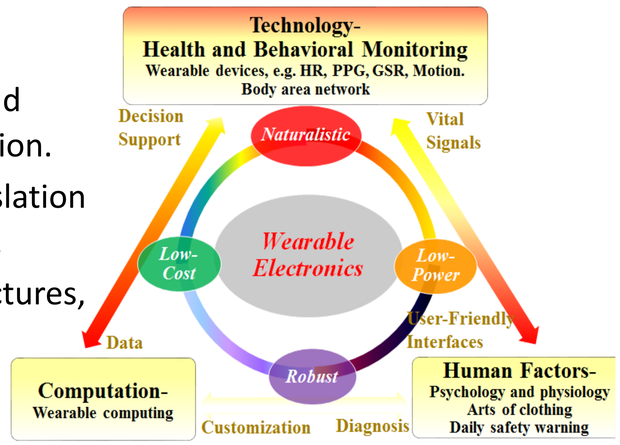
Goal - The research goal of this CAREER project is to establish a cloud manufacturing framework for embroidered wearable electronics as an accessible platform technology towards System-on-Cloth.

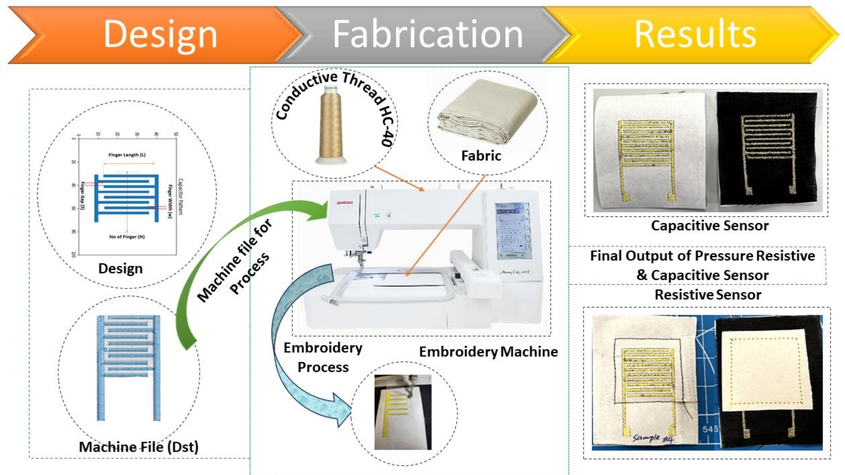
Challenges

- Electronics: Physical variations due to distributed resistance and flexible and stretchable substrate and contact in wearable condition.
- Electronic Design Automation: Automatic manufacturing translation with full functionality and high reliability of wearable electronics.
- Cloud Manufacturing: Tractability to customers, manufactures, design experts, and developers.

Scientific Impact



Embroidered Electronics Gallery



Solutions

- Understand physical variations of conductive threads and flexible electronics by physical modeling and experimental testing for embroidered electronics.
- Create EDA software that will realize design-to-manufacturing translation from schematics by integrating new Electrical Rule Checking (ERC) and Design Rule Checking (DRC) criteria, optimal stitch generation, and an open library of wearable electronics.
- Explore a cloud manufacturing framework with open architecture, open source code, and friendly user-interfaces that will be easily used by customers, manufacturers, software developers, as well as electronic design experts.

Broader Impact – Society

Success of this project will connect the advancements in cybermanufacturing systems and the needs of wearable electronics, which will not only enhance the healthcare community, but also benefit the manufacturing and consumer electronics industries.

Education and Outreach

The education objectives of this project are to broaden participants from K-12, undergraduate, and graduate students, provide rich multidisciplinary classroom and non-classroom experiences for all levels of students, and inspire students' interests in a STEM career.

More...

The ultimate goal is that everyone can design their own desired wearable devices on cloth through cybermanufacturing systems. The proposed CMfg framework with cloud-based Electronic Design Automation (EDA) features ***high tractability, reliability, and compatibility*** for diverse individuals and entrepreneurs.

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