The Needs for Interdisciplinary Collaborations for Preparing Future Fashion Technocrats

Deepika Raj and Jung Ha-Brookshire, University of Missouri, USA

Keywords: Wearable Technology, Innovation, Human Computer Interface

With embedded technology knocking on the door of the fashion industry, the time to embrace new kinds of clothing is getting closer. The origin of wearable technology (WT) can be traced from the combination of computer science, psychology, and product design. The disciplines that are critical for the WT industry are ubiquitous computing, persuasive and affective technology, and human computer interaction (HCI) (Baurley, 2004; Morris & Aguilera, 2012). When the computer was first invented, only computer engineers were able to use the system. However, slowly with the advancement of computers, computers are now accessible to most people. Personal computers made it possible to combine cognitive science and human factors engineering (Card, Moran, & Newell, 1983). Easy accessibility and usability were the results of HCI, which is one of the core concepts of WT (Morris & Aguilera, 2012). Another core concept of WT is derived from ubiquitous computing. Some technologies are so useful that they become part of human being; such technologies are called ubiquitous (Weiser & Brown 1998).

As many new startups and well-established companies are coming up with WT products, there is a need for employees trained from interdisciplinary fields to satisfy the unique work demands of such firms. New technologies, such as WT and 3D printing, can play a huge role in the fashion industry. Therefore, to prepare students for these work requirements, curricula in fashion-related schools and universities will have to be updated. However, there is a huge gap in the literature to understand the interactions between apparel designers and technology engineers. To address this issue, the objectives of this research were to explore: (a) unique skill sets required by WT professionals, (b) habits cultivated to help them in providing solutions, and (c) the potential gaps in skill sets between product designers and engineers.

This qualitative research was conducted during the spring of 2015 in the United States. A total of thirty-six participants were requested for interview after the research proposal gained approval from the Institutional Review Board. Ten participants responded for the interview: one CEO, three creative designers, three product engineers, and three material specialists. The interviews were either held one-on-one in Columbia, MO, or through Skype/FaceTime/phone and took 30 minutes. Theme saturation was achieved in the tenth interview. Audio records were transcribed, and the transcribed text data were analyzed to find the repetitive themes.

Participants described that WT professionals must possess skill sets in apparel design, product development, computer science, fiber science, electrical engineering, mechanical engineering, and biotechnology. As most participants were not prepared for such diverse job requirements in the beginning, they had to go beyond and learn the new concepts on their own through online courses or self-study. A material specialist at a firm said, "I had to do lots of material research to

find out the correct material for WT." A 3D design researcher "had to read lots of blogs published by companies or designers to keep myself informed."

In terms of the habits that interviewees cultivated to update their knowledge, three major themes emerged. First, "being open minded and looking for patterns and connections from nature is important" [a product engineer with experience in designing]. For example, a creative designer shared that she could "scale down and see the connections. When looking at the cables on a bridge or baskets, see how they are interconnected." Second, "looking for how other industries are evolving other than WT industry" is useful as it would help them think "outside of the box" [CEO of a WT company]. Third, "looking into lifestyles of teenagers, their needs and wants" was shared as another key habit to form according to a creative freelance designer. With regards to the gaps in skill sets between WT designers and engineers, first, WT designers emphasized "engineers must be aware that the human body is a factor and they cannot just make things square" [a product development engineer at a sensor manufacturing company]. In fact, a freelance creative designer thought WT products "should look pleasing, even if they are not comfortable to wear." To her, "as long as a design looks good, it will still work." On the other hand, engineers shared that "even if fashion struggle a little bit, with rules of engineering, designers really have to see value added technology to fashion." In addition, another engineer said that WT designers should know "radius of a curve" or "pitch of the buttons," both of which are typical engineering terms, before talking to engineers.

The study findings show what skill sets and habits are required and how to improve collaborations between engineers and product designers. Perhaps, fashion curricula could be changed to meet these new demands of the WT industry. Fashion design students may now have more opportunities in the WT industry than before. Knowledge of other disciplines, such as engineering and computer sciences, would be important for a future career. The study findings highlight the need for bridging the gaps between the ways engineers and designers work or solve problems. Future research is recommended to find out specific curricula contents and learning activities that will help close these gaps.

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