

The Use of Smart Textiles in the Context of Digital Transformation in Healthcare with the Principles of Circular Economy

Michal Svehl, Jiri Tupa

Department of Technologies and Materials
University of West Bohemia in Pilsen
University 8, Czech Republic
svehlam@fel.zcu.cz, tupa@fel.zcu.cz

Abstract

This paper deals with the issue of smart textiles in the context of the principles of the circular economy a digital transformation. Applications of smart textiles can be found in a wide range of industries. One promising sector is undoubtedly healthcare, where they can be used to measure and monitor vital signs in the home or hospital care. Therefore, the development of the technology is of interest for many research works. The requirement in their development is to ensure longevity, durability, repairability, disposal while maintaining the principles of circular economy and sustainability. The paper explores the interconnection of three keywords, circular economy, smart textiles. The output of this paper is a review of the available literature. Linking domains are explored through an analysis of the available literature on linking and combining the two domains together. This results in a review of the available literature that meets the selected criteria. The criteria are further specified in the paper. Furthermore, the paper assesses the intersection of the domains and the possible impacts when considering and combining all three domains together into one complex domain.

Keywords

Digital Transformation, Smart Textiles, Circular Economy, Reusability, Healthcare

1. Introduction and motivation

Digital transformation in healthcare is currently the subject of much research, but also of European strategies and policies. The process of digital transformation encompasses a wide range of areas, technologies and processes that are related to the delivery of care. The aim is to ensure the efficiency, accessibility and safety of the entire healthcare system. In this paper, we look in more detail at technologies that enable the acquisition of patient data using sensors that are part of so-called smart garments. And it is important to recognize the importance of this data in the whole process of digitalization.

The new field of smart textiles is getting more and more attention, given the technological advances that have been quite visible in recent years. The smart textiles market is estimated to be valued at 2.3 billion in 2021. It is estimated that around 2026 this market will reach a value of 6.6 billion due to the large growth that has occurred in recent years. [1] By smart textiles, we can think of value-added textiles, which can be added functionality, in the form of electronic components that can add another level of healthcare delivery, for example in the healthcare sector. In the case of smart textiles, the focus should be on how they are produced and the materials used to ensure reusability and avoid unnecessary waste. This opens up a lot of scope for manufacturing with high quality and durable materials. [2] The circular economy is currently a highly debated topic. This is the name for a closed-loop economic system. The idea behind this concept is that raw materials, components and products lose as little value as possible and can circulate. [3]

References

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Biographies

Michal Svehla is a vicepresident of University of West Bohemia IEOM chapter. He is also a student of doctoral study program at faculty of Electrical Engineering University of West Bohemia in Pilsen. Before doctoral study he earned Bachelor and Master degree in the same University as mentioned above. His research interests include e-Health/healthcare, processes, optimization.

Jiri Tupa received his MSc (2002) and PhD (2006) in Electrical Engineering from Faculty of Electrical Engineering, University of West Bohemia in Pilsen in Czech Republic. He is a Vice-dean of faculty and Senior Lecturer at Department of Technologies and Measurement. Dr. Tupa is member of executive management at Regional Innovation Centre for Electrical Engineering of the Faculty of Electrical Engineering at the University of West Bohemia in Pilsen. He is also PhD supervisor, reviewer of journal and conference publications and co-organizer of conferences. His research interests include Business Process Management, Quality Management, Risk and Performance Management in Electrical Engineering Industry, Industrial Engineering, Electronics Manufacturing and Diagnostics, Financial and Project Management, Copyrights and patents law, information law and transfer of IPR. Jiri Tupa is responsible for several international research and development projects with industrial and University partners. Jiri Tupa has been appointed as IEOM Fellow in 2020.