**HACKTEX VIRTUAL TRAINING MATERIALS**
ADVANCED TEXTILES MANUFACTURING INDUSTRY
Learning Unit 1 Introduction to Smart Textiles
Lesson 3

# Challenges and opportunities for smart textiles

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**Innovative smart textiles & entrepreneurship** / 2021-1-RO01-KA220-HED-000027527

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# CHALLENGES AND OPPORTUNITIES FOR SMART TEXTILES

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# GENERAL OVERVIEW



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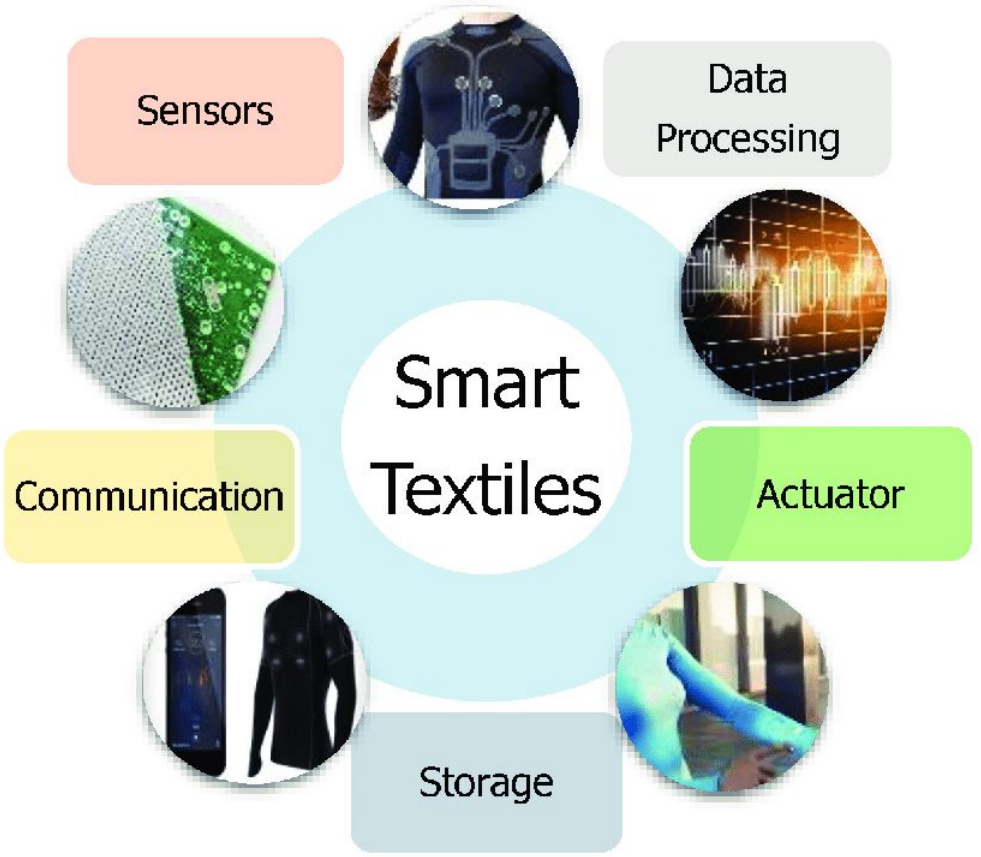
# Overview

Smart textiles are **able to sense and respond** to changes in their environment.

Smart textiles are thriving while tackling some tough challenges that yet to meet in order to achieve **reliable, performant and manufacturable smart textiles**.

Integration of **complex heterogeneous technologies**, comfort, washability and regulatory frameworks are among the key challenges.




10.5772/intechopen.92439



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# Overview

According to Smart Textiles Market report (2023), “the global smart textiles market size **reached US$ 3.8 Billion in 2022**.

Looking forward, the market to reach US$ 15.9 Billion by 2028, exhibiting a growth rate Compound annual growth rate of 26.94% during 2022-2028”

https://www.marketsandmarkets.com/Market-Reports/smart-textiles-market-13764132.html

https://atlasuniversity.edu.in/m-des-in-fst/



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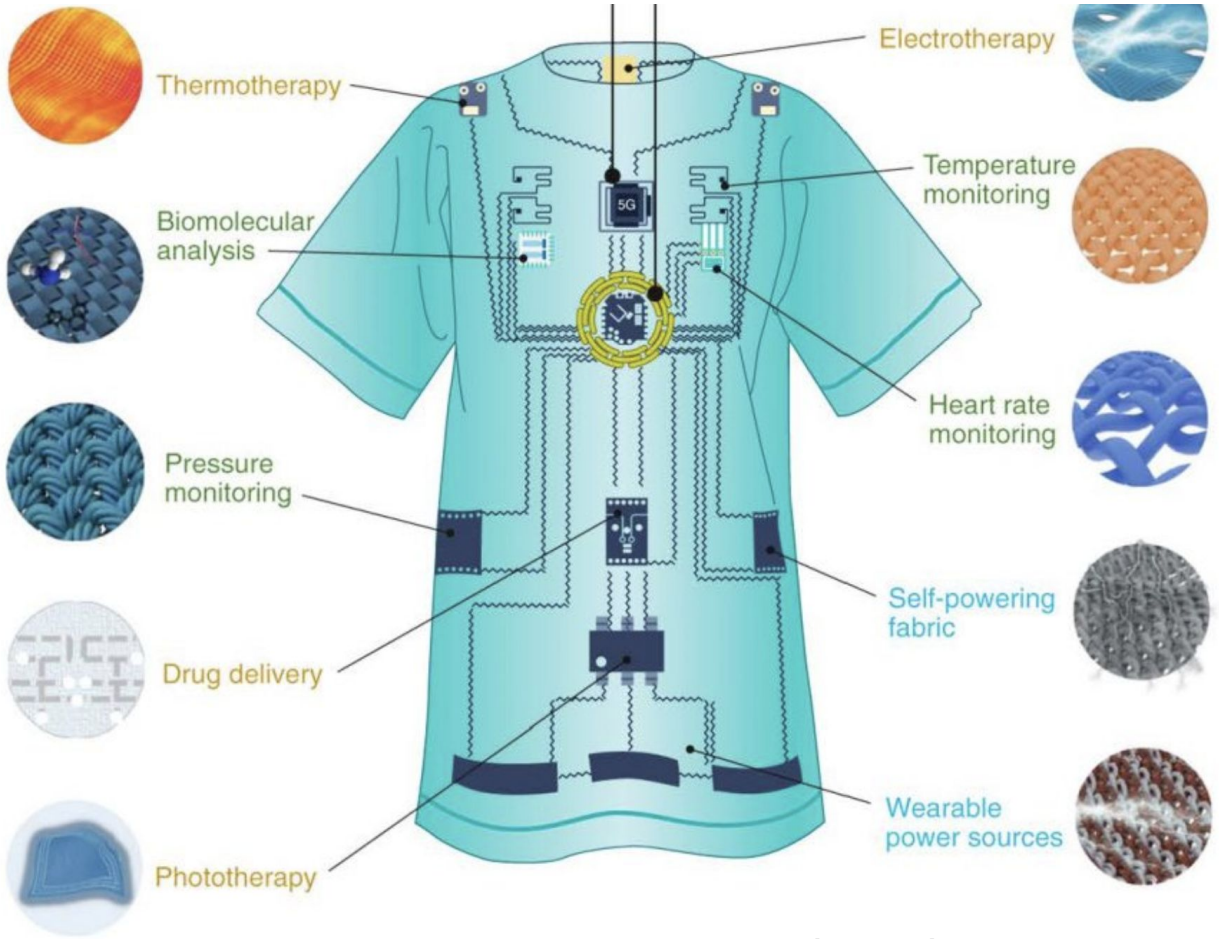
# Overview

The smart textile sector is projected to **drive the market even further** along with technological advancements and extensive research and development (R&D) activities at various stakeholder's level.




*Source: Jun Chen Lab/UCLA.*



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# CHALLENGES FOR SMART TEXTILES



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# Challenges

The challenges facing for smart textiles  can be divided into three main groups, as follows;

- Challenges related to **user experience.**
- Challenges related to **technology.**
- Challenges related to **critical factors.**

Source. :https://hal.science/hal-02868900

Source: Textile Focus

Source: URI, USA.



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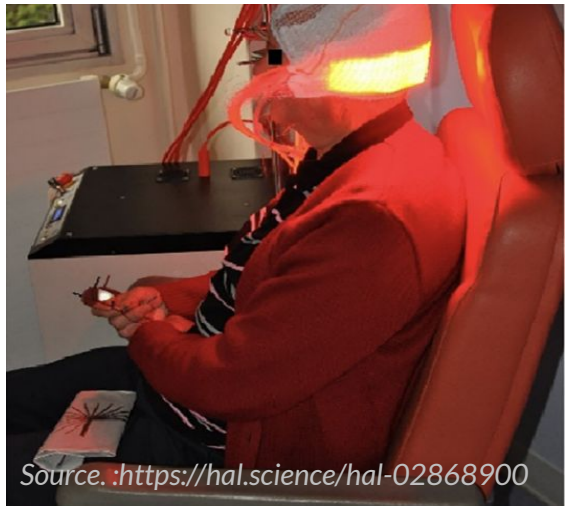
# Challenges related to user experience

The challenges facing for smart textiles related to **user experience** are as follows;

- **Comfort** issues and user friendliness.
- **Design** restrictions.
- System life-time and poor **usability.**
- **Unstable functionality** and Maintenance.
- Complex **installation-uninstallation**.
- Washability
- Complex **data collection and management** system.
- Incoherent **value propositions**.


Source. :https://hal.science/hal-02868900



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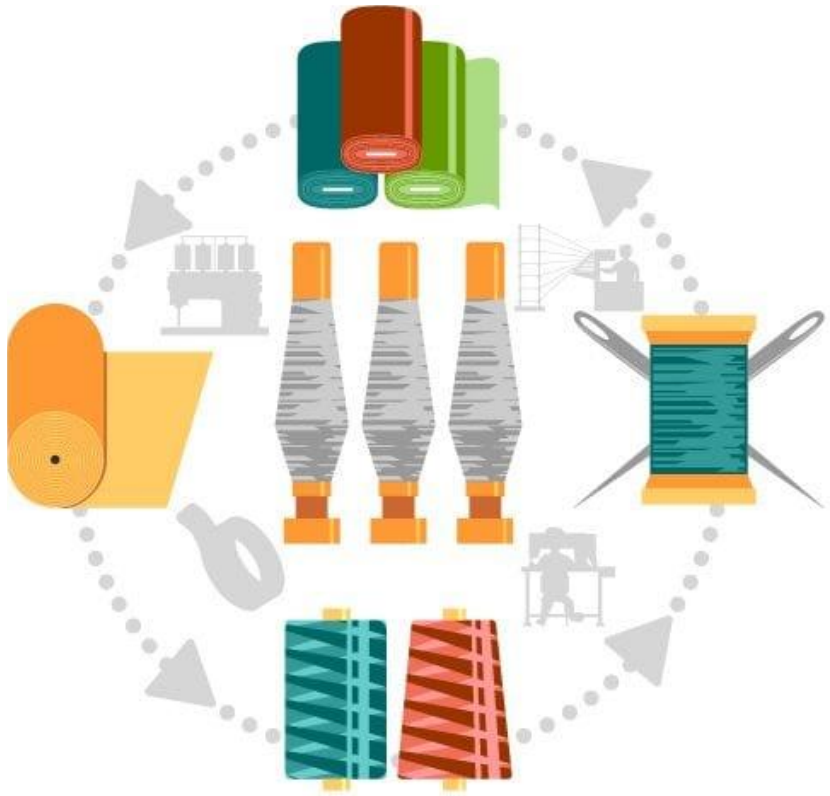
# Challenges related to technology

The challenges facing for smart textiles related to **technology** are as follows;

- **Integration** and miniaturization techniques .
- Mechanical environment.
- Washability and fragile interconnection.
- Power **supplies and wiring.**
- User friendly product development.
- Designer friendly **technologies and tools.**
- End user engagement and **usability testing**.
- Pre-series **market testing.**



https://leverageedu.com/blog/textile-design-courses/



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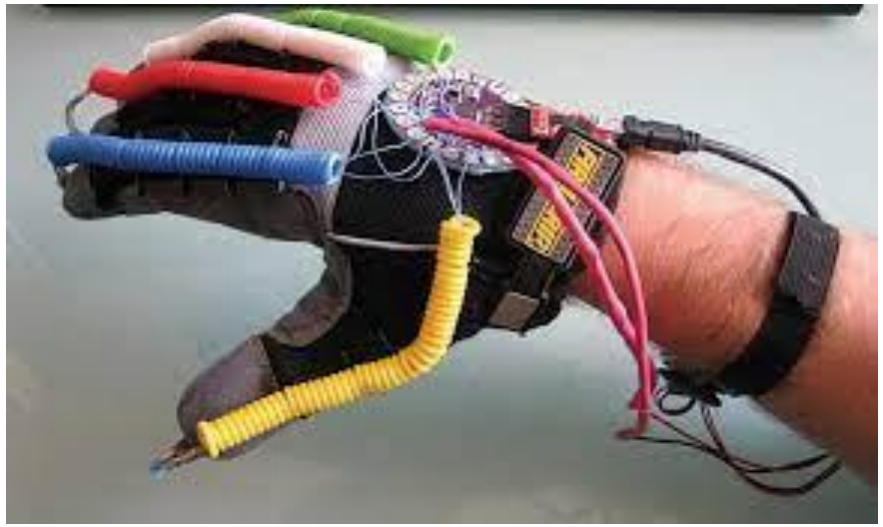
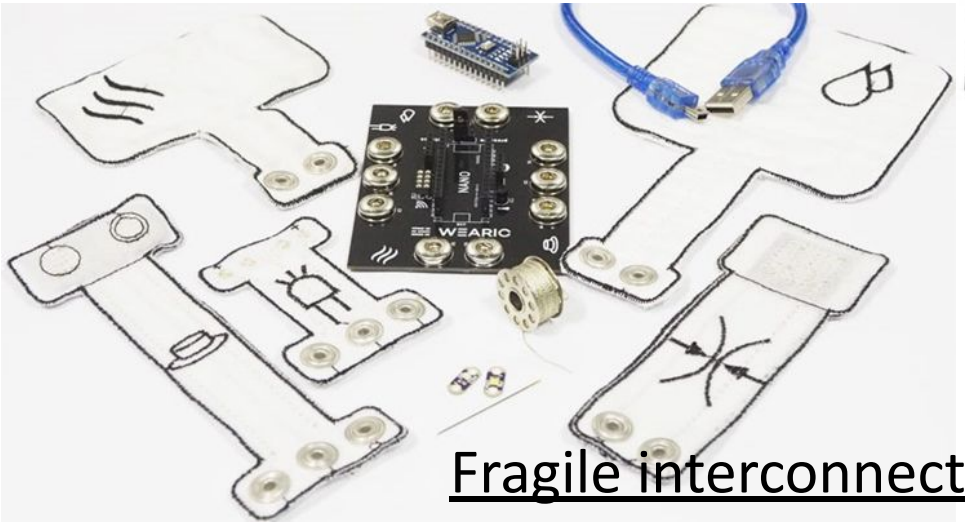
# Challenges related to technology



Excessive wiring


Poor comfort




Fragile interconnectivity



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# Challenges related to critical factors

The challenges facing for smart textiles related to **critical factors are** as follows;


- **Standards and testing** methods.
- **Regulatory** framework.
- Market requirement and **business model**.
- **Sustainable** service model, compliance and life cycle.
- Trends, education and **awareness.**
- **Effective cooperation** between ecosystem actors.
- Automated **manufacturing process**.



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# OPPORTUNITIES FOR SMART TEXTILES



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# Opportunities in terms of application area

Significant progress has been made in developing smart textiles recently and this area has received **widespread support from both the research and commercial actors.** Highest expectations of smart textiles opportunities are expected on the **following applications**;

- **Healthcare and fitness.**
- Infotainment and **wearable electronics.**
- **Fashion.**
- Wellness and **sports.**
- **Automotive,** transport, agro, and telecommuncications.
- Construction, **security/defense and** geo-textiles.
- **Energy** and architecture.
- **Home and interior textiles.**



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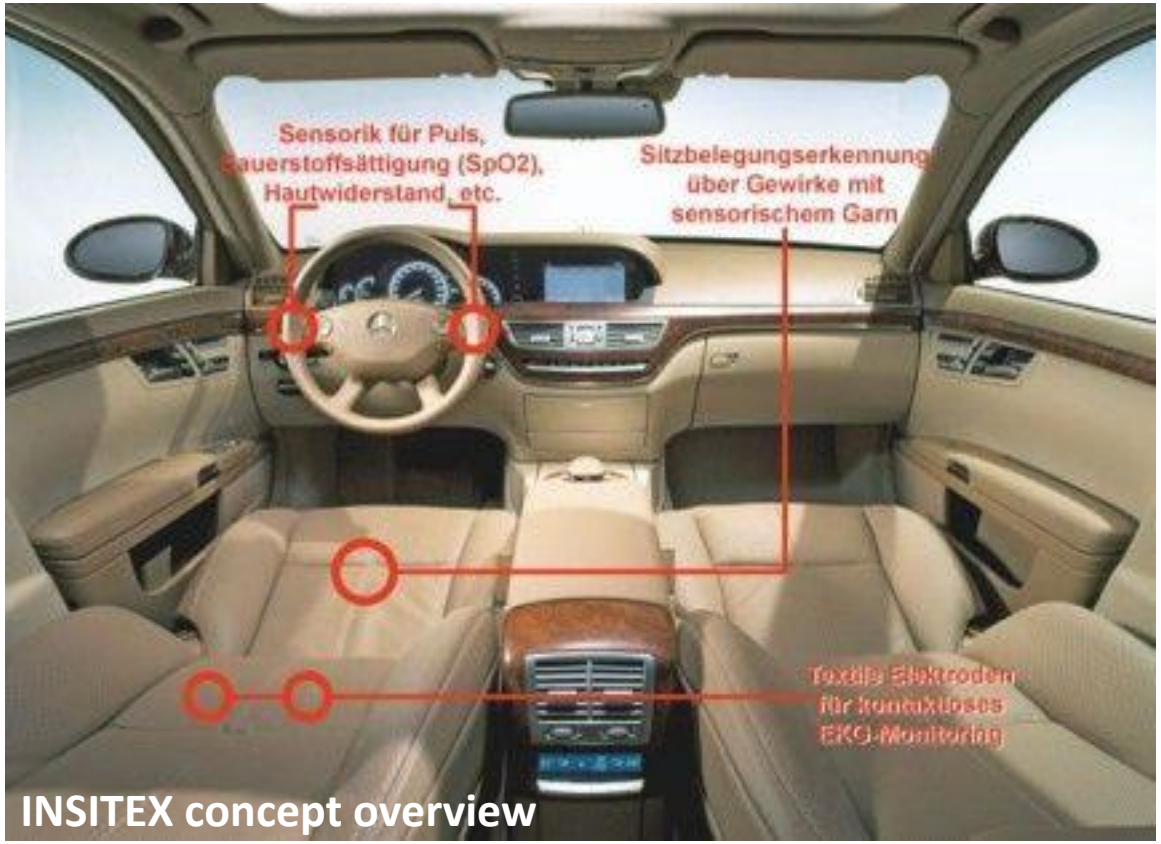
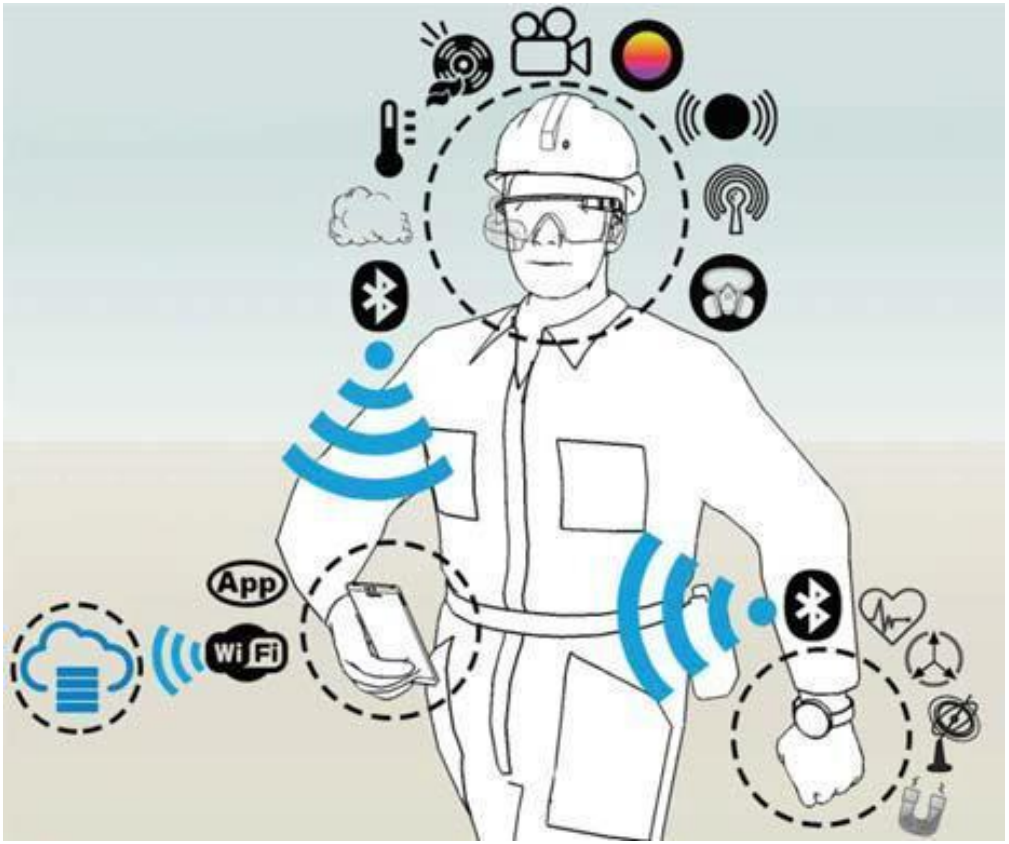
# Opportunities in terms of application area: Example



INSITEX concept overview




DOI: 10.17794/rgn.2019.1.4



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# Summary

- Smart textiles are in discussion for about **20 years and yet few commercial products** are on the market due to key challeges related to user experience, technologies and critical factors.
- Challenges need to be addressed to ensure that smart textiles will successfully t**ransition from research laboratories to industrial applications.**
- **Fast, easy and reliable Integration techniques are the key** to low-cost smart textiles which will help build a more sutainable business model.
- The key factors **driving the growth of the market includes** the emerging trend of miniaturization of electronics, increasing integration of smart textiles with wearable devices, monitor muscle vibrations, regulate body temperatures and provide protection from various hazards **in defense, sports and healthcare**.



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