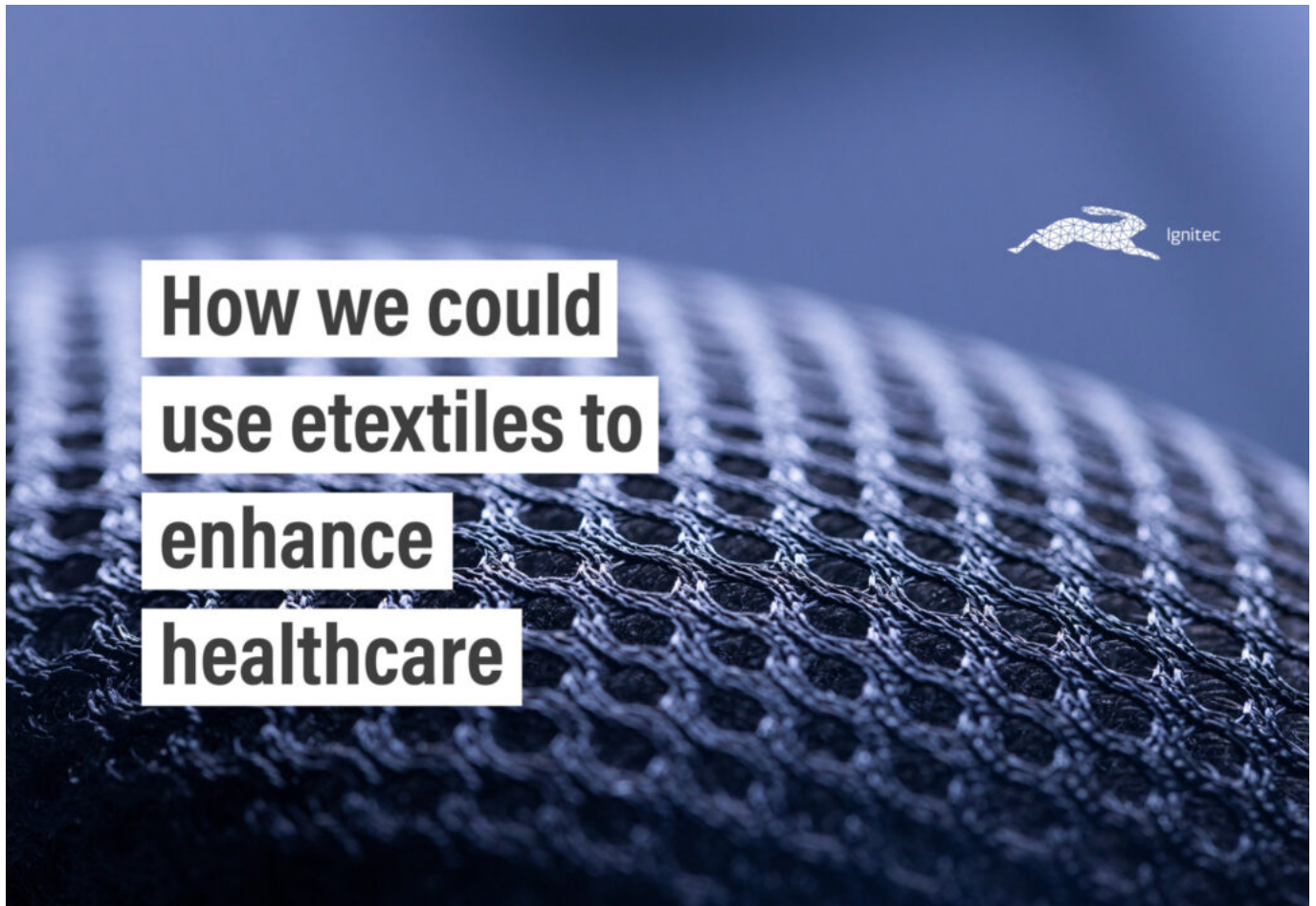


The benefits of using e-textiles to enhance healthcare



The benefits of using e-textiles to enhance healthcare

Reading time 9 mins

Key Points

- e-Textiles in healthcare are making considerable progress in helping with diagnostics, disease prevention, and treatment

- Conductive threads can function as sensors and data transfer systems
- Wearable Biosensors (WBS) are less invasive and painful, and provide real-time measurements of biochemical and biological markers
- E-textiles can be used in the treatment of precancerous skin conditions, neurological conditions, light drug delivery, and pain management
- Challenges include lengthy regulatory authorisation procedures, data protection, and managing e-waste

Looking to revolutionise healthcare experiences with technology? We're here to design health tech solutions that can redefine care provision. Make contact now to find out more.

[Get in touch](#)



Ben Mazur

Managing Director

Last updated Jun 12, 2023

I hope you enjoy reading this post.

If you would like us to develop your next product for you, [click here](#)

[Share](#)

[Share](#)

[Tweet](#)

[Pin](#)

Textiles date back hundreds of thousands of years. Probably to when Neanderthals started using the hides of animals they hunted for warmth, bedding, and shelter ^[1]. While the first function of textiles was primarily performance-based (i.e. to protect us from the elements), today's generation of electronic textiles can save lives too. The best example is the medical field, where e-textiles to

enhance healthcare have made considerable progress.

Smart fabrics or e-textiles are textiles which can sense, react, or adapt to environmental conditions or stimuli such as thermal, chemical, or mechanical factors. Some can also respond to external conditions/stimuli in a predetermined way ^[2]. As we discussed in a previous post on [the future of wearable technology](#), it's debatable whether their application in some industries, such as fashion, will be more than a passing trend.

However, healthcare is key to the future longevity of smart textiles as there is a real and demonstrable need for early diagnostics, disease prevention, treatment, and home support ^[3]. This 'real need' can be attributed to:

- An increased attention to health globally
- Longer life expectancies
- Growing concern over the increased rates of obesity and chronic diseases such as diabetes, cancer, and heart conditions
- A commitment to sustainable development where populations are healthier, more independent, and can benefit from low-cost medical care

How are e-textiles made?

E-textiles are made of minuscule conductive threads that either exist naturally (e.g. gold) or have been specially treated to become conductive (i.e. electrical or optical fibres). They can function as sensors, data transfer systems, antennae, thermochromic displays, and heating elements ^[4].

How this works depends on five main components:

- Platform: the main fabric structure and its manufacturing process
- Interconnected architecture: fabric design, fusing of data paths, and how their electronic circuits are intermingled
- Hardware: microchips, sensors etc.
- Software: how information is processed and communicated
- Performance metrics: evaluates remaining parameters such as cost, physical dimensions, and manufacturing aspects

Using e-textiles to enhance healthcare is a logical application. Because they can act as a second skin and are designed for comfort and functionality, they help to monitor and communicate a patient's condition by detecting, storing, analysing, and transmitting physiological signals.

‘Wearable Biosensors’ assist with diagnosis and disease prevention

Wearable biosensors (WBS) are portable electronic devices that integrate sensors into or onto the human body in the form of tattoos, gloves, clothing, or implants ^[5]. The benefits of these medical devices over their traditional counterparts are that they are generally less invasive and provide real-time measurements of biochemical (e.g. sweat, saliva, tears) and biological (e.g. sleep, blood pressure, respiration) markers.

[Myant’s blood pressure monitoring shirt](#) is called SKIIN, and it allows for 24/7 monitoring and automatic data tracking. Considering that over 40% of all strokes and [heart attacks in the UK](#) are associated with high blood pressure, this application of e-textiles to enhance healthcare could literally be a lifesaver.

Textile-based sensor systems can also be used in the diagnostics and prevention of sleep disorders such as apnea-hypopnea syndrome (where the airflow is reduced or stops during sleep) ^[6]:

- Measures pulse waves during sleep
- Is comfortable and non-intrusive to wear
- Allows for more accurate readings as patients can come into a natural sleep state at home – as opposed to being hospitalised in an unfamiliar environment and attached to sensors and machines
- A wireless biomonitoring system provides real-time alerts
- A more personalised approach to healthcare

Improved medical treatments and home support

E-textiles can also be used for the treatment of precancerous skin conditions, [neurological conditions](#) such as epilepsy, [light drug delivery](#) (e.g. insulin for diabetics), and pain management for people with arthritis. The benefits of using e-textiles here are less hospitalisation time and therefore reduced costs, as well as personalised treatments that can often be used independently at home.

The [FLUXMEDICARE®](#) device uses photodynamic therapy embedded in textiles (Textile-PDT) to treat Actinic Keratoses- precancerous skin lesions. The traditional photodynamic treatment uses light-emitting diodes, which are very rigid, uncomfortable, and painful. However, this device uses a patented knitting process to insert optical fibres directly into the fabric structure. The advantages:

- There are no burning or heat sensations during treatment, so it's less painful for the patient
- The soft fabric adapts flexibly, so the patient has more freedom of movement
- Results are equivalent to conventional PDT methods
- Protective equipment, cooling, or anaesthesia aren't necessary
- Homogenous and targeted treatment of affected areas are possible

The [QNANOTEC Glove](#) is an all-in-one IoT glove system to treat osteoarthritis:

- Provides dry heat to joints, alleviates pain, and releases a medicated ointment to penetrate finger joints
- Vibration function helps to release joint stiffness and increase mobility
- Uses shape memory alloys (SMA) to provide a straightening function
- Uses micropulses to provide a subtle stretching effect
- IoT functionality allows the physician to monitor the treatment and give tailored prescriptions in real-time while the patient is at home
- Easy smartphone or tablet connection via Bluetooth
- Self powered rechargeable batteries

What are the difficulties in using e-textiles to enhance healthcare?

Even though the above examples highlight the unique benefits of e-textiles to enhance healthcare, it has its challenges.

The first is that the regulatory authorisations needed to approve them in a medical context are lengthy and expensive. In addition, smart textiles that rely on data capturing to fulfil their function present privacy and ethical issues regarding how personal information is stored, shared and sometimes sold.



**Advances in
nanotechnology
mean even more
functionality**

What's trending for smart textiles in medicine and healthcare?

Because there's a real need for e-textiles in healthcare, the trends we're keeping an eye on have exciting potential. Advances in nanotechnology mean that even more functionality can be built into textiles. Shape memory materials provide more options for prostheses and replacements for body parts such as ligaments and tendons. Self-cleaning and anti-bacterial materials improve hygiene and sterilisation of medical environments.

One trend that will surely have a bright future, especially in light of sustainable design and renewable energy, will be the continued development of [energy harvesting textile materials](#). Sensors on the body require energy, and the human body produces heat naturally. Medical garments that can create the energy that sensors need independently don't need a battery and are more sustainable in terms of cost and environmental responsibility.

Is there a trend in smart textiles that you're excited about? Share your thoughts in the comments section below, and we'll help you keep an eye out!

1. Das, M. (2022, February 14). Origin and History of Clothing. Textile School. Retrieved 15 October 2022, from <https://www.textileschool.com/4639/origin-of-clothing/>
2. www.technicaltextile.net. (n.d.). Speakable Content. Retrieved 15 October 2022, from

<https://www.technicaltextile.net/articles/smart-textile-2592>

3. Tèxtils, A. (2019, February 15). Trends in textiles in healthcare and medicine. YouTube. Retrieved 15 October 2022, from <https://www.youtube.com/watch?v=UGvVemJj56w&feature=youtu.be>
4. E-textiles – alleviating the healthcare scene. (2013, May 21). Fibre2Fashion. Retrieved 15 October 2022, from <https://www.fibre2fashion.com/industry-article/6908/etextiles>
5. Sharma. A, Badea, M. et al. (2011, February 1). Wearable Biosensors: An Alternative and Practical Approach in Healthcare and Disease Monitoring. [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7867046/#:~:text=Wearable%20biosensors%20\(WBSs\)%20are%20portable,Using%20mobile%20or%20portable%20devices.](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7867046/#:~:text=Wearable%20biosensors%20(WBSs)%20are%20portable,Using%20mobile%20or%20portable%20devices.)
6. Meng, Zhao. (2020, April 1). A Wireless Textile-Based Sensor System for Self-Powered Personalized Health Care. Science Direct. [https://www.cell.com/matter/pdf/S2590-2385\(19\)30416-3.pdf](https://www.cell.com/matter/pdf/S2590-2385(19)30416-3.pdf)

We love to talk about new ideas

Do you have an idea? Book a consultation with an expert - it's free, it's confidential and there are no obligations.

[+44\(0\)117 329 3420](tel:+44(0)117 329 3420)
info@ignitec.com

Ignitec Technology Centre
1 The Powerhouse
Great Park Road
Bradley Stoke
Bristol
BS32 4RU

[Share](#)
[Share](#)
[Tweet](#)
[Pin](#)

Up next



Dive into the lucrative market of smart home IoT & maximise your profit potential!

Last updated Apr 25, 2024 | [INSIGHTS](#), [IoT](#), [PRODUCT DESIGN](#), [SMART HOME](#)

Developing smart home IoT products to meet increasing consumer demand is an opportunity for success!

[read more](#)