

Latest advancements in cloth based wearable sensors

There are advantages to wearing smart clothes for any user, regardless of their age, gender, or degree of fitness. In general, smart clothing will give people enlightening information to efficiently manage their wellness and health. More specifically, automated biosignals and workout efforts across a variety of exercises like cycling, running and weightlifting, and will be tracked by smart gear. The recent advancements is made by DYNAFEED smart clothing. DynaFeed is an revolutionary smart garment that uses advanced biosensor technology and ultra-thin conductive polymer coating to directly measure the voltage potential of a heart beat. DynaFeed empowers athletes through the body map compression design, optimizing contact for the most accurate heart rate in motion tracking without any barriers or discomfort. DynaFeed's contemporary design provides high durability that enhances wash cycles and resistance to chemical oxidizers by more than 500%. The cutting edge technology permits direct and accurate measurements of vital biometrics data up to 99.7% accuracy by typical ECG methodology. DynaFeed users are also able to pinpoint areas of concern and monitor specific data such as fat burn or cardio zone. With DynaFeed, data can now be available anytime, anywhere, in a simple yet cost effective manner. This DynaFeed made main advancements in the following sectors, they mentioned.

Advanced Fibres:

New capabilities are being added to textiles thanks to advances in material science. Textiles can be enhanced with metallics, optical fibres, and conductive polymers to provide data transmission, electrical conductivity, and sensory capabilities. These components and textile fibres including polyester, nylon, cotton are being used by the apparel and tech industries to create advanced fibre. The additional functions of fabrics can diminish after washing and use, hence they are coated with nanoparticles. Nanoparticles' vast surface area and high energy enable them to be more durable and maintain the tactile qualities of materials. Additionally, the incorporation of anti-bacterial, water-repellent, and ultraviolet (UV)-protective characteristics to clothing is made possible by nanoparticles.

3D printing:

3D printing is mostly associated with prototyping across several industries. It is a developing trend across the apparel industry and is increasingly making headway in smart clothing. In 2019, researchers from Tsinghua University in China used a 3D printer to make patterns and draw pictures and letters on silk, giving it the ability to transform movement into energy.

Power Supply:

Using a combination of potent batteries and suitable energy harvesting technologies, the Smart2Go initiative, which is a component of the EU's Horizon 2020 research and innovation programme and is led by Fraunhofer FEP, is creating an autonomous energy supply platform for wearables, including smart clothing. The project, which will be finished in 2022, could assist smart clothing in becoming more widely used by overcoming power supply issues. Lithium-ion batteries, which require frequent charging, are now used in the majority of smart clothes. As a result, some organisations are considering using alternate energy sources. Researchers from the University of Coimbra in Portugal, the Max Planck Institute of Polymer Research in Germany, and the University of Bath in the UK collaborated to create nylon fibres that generated electricity from body movements in 2021. The development of alternate power sources for electronics, including clothes, is actively pursued by the European Union (EU). An EU-funded project called Thermo Tex investigated thermoelectric textiles, which harness body heat to power electronics.

Artificial Intelligence:

Google began integrating some of its Assistant chat platform into Levi's Commuter Trucker jackets in 2019. By using pre-programmed motions on the jacket's cuff, users can ask for directions and receive pre-recorded responses to questions like the time, weather, and news. Over the next three to four years, GlobalData anticipates that AI will play a crucial role in smart clothing, particularly in the areas of product creation, service development, and data analysis. Leading companies in AI like Google, IBM, and Amazon will benefit from this progress. Virtual fitness coaching systems are the only applications of AI in smart clothes at the moment. Startups like Sensoria provide an AI-based in-app coach that instructs users of its smart t-shirts on how to run more efficiently by applying performance analytics on data provided by the garment.

Sensor Quality:

The brains of smart clothes are sensors. Users may keep an eye on their fitness and health thanks to the data they produce. However, frequent washing of clothing degrades the built-in sensors. Researchers are developing sensors that can go through several washings without losing their functionality. Massachusetts Institute of Technology (MIT) researchers unveiled washable, woven biosensors for telemedicine and remote patient monitoring in 2020. Although this is a sign of progression, garment sensors are still in their infancy. Rugged sensors that produce crucial user data for efficient activity and health monitoring are being sought after by manufacturers of smart clothing to increase the toughness and attraction of the garments.

Some recent Innovations:

Self-cleaning clothes:

According to scientists, dirt can be broken down by microscopic metal structures attached to cotton fibres when they are exposed to sunshine. Copper and silver nanoparticles in 3D were grown by researchers on cotton thread, which was later weaved into fabric. The nanostructures absorbed the light's energy when it was shone upon, causing the metal atoms' electronics to become energised. This caused dirt on the fabric's surface to disintegrate and clean itself in about six minutes.

Clothes that can communicate:

While our clothing choices frequently give a glimpse into our personalities, wearing smart clothing can actually help you express yourself and create a statement. Messages and tweets can be shown on clothing and accessories thanks to a business called CuteCircuit. Its haute couture pieces have been worn by Kelly Osbourne, and Katy Perry. The business also produces t-shirts for people like us and recently debuted its Mirror Handbag. According to the description, the accessory is expertly machined from aerospace aluminium, then anodized black and lined with opulent suede-touch fabric. But most crucially, the handbag's sides are composed of laser-etched acrylic mirror, allowing the white LED light to shine through and produce stunning animations as well as show tweets and messages.

Colour-changing clothes :

With varied degrees of success, designers have tried incorporating LEDs and e-Ink screens into clothing and accessories. For instance, the concept trainers from ShiftWear, which had an integrated e-Ink screen and an associated app, garnered a lot of interest. But they never started moving. The University of Central Florida's College of Optics & Photonics has now unveiled the first color-changing fabric that can be changed by the wearer themselves using a smartphone. A thin metal micro-wire is woven into each thread of the Chromorphous fabric. The micro-wires conduct electricity, slightly increasing the temperature of the thread. The thread's colour changes in response to this change in temperature due to special pigments incorporated within it. Users can use an app to adjust both the timing of the colour shift and the design that will appear on the fabric. Therefore, even if we may own fewer garments in the future, there will likely be more colour choices than before. Although it might be some time until we have access to the technology, the institution claims that it is scaleable at mass production levels and could be used for clothing, accessories, and even home furniture.