GOODBYE BACK PAIN: THE T-SHIRT OF THE FUTURE THAT LISTENS TO YOUR BODY

CONTACT DETAILS:

Research Results Transfer Office-OTRI
University of Alicante
Tel.: +34 96 590 99 59
Email: areaempresas@ua.es
http://innoua.ua.es

ABSTRACT

Researchers from the Department of Physical Education and Sports at the University of Alicante have developed a new smart textile garment that allows real-time and objective monitoring of the lumbar spine.

The main innovation lies in the 3D electrodes embroidered on the textile itself with a special configuration which, combined with state-of-the-art sensors and appropriate training with advanced Artificial Intelligence models, measure different bioelectrical signals and movements, eliminating subjectivity in the diagnosis of pain. The main advantages include correct diagnosis and functional assessment, high precision, comfort and ease of use, as well as customisation to the user's needs, among others.

This technology has applications in hospitals, rehabilitation clinics, mutual insurance companies, gyms and research. We are looking for companies interested in acquiring this technology for its commercial exploitation through patent licensing agreements.

ADVANTAGES AND INNOVATIVE ASPECTS

ADVANTAGES OF THE TECHNOLOGY

This novel smart textile garment offers the following **advantages**:

• It allows **lumbar pain to be detected objectively** based on a scale, eliminating the subjective component associated with the perception of pain through the application of artificial intelligence.

• It allows an **assessment and functional classification** of the lesions or the state of the lumbar spine.

• It can **accurately measure** all the necessary biomedical and biomechanical parameters, including detecting the curvature of the back thanks to IMV sensors.

• The garment is **comfortable** and **easy to wear**.

• The information provided is **very reliable** thanks to the textile electrodes integrated in the garment itself, which can pick up various bioelectrical signals from the wearer.

• The EDA measurement on the palm of the hand provides **better conductivity** compared to other areas of the body, as the conductivity of the skin is added to the conductivity of the sweat from the hand, which has a large number of sweat glands.

• The textile electrodes have an innovative three-dimensional configuration which results in a **better quality** of the acquired signals compared to flat or two-dimensional electrodes, **minimising noise and inaccuracies** in the signals.

• The three-dimensional configuration of the electrode achieved with the foam insert ensures intimate and continuous contact with the user's skin, resulting in **optimal quality** of the signals acquired by the electrode.

• The different embroidery layers of the three-dimensional electrode ensure a **homogeneous distribution** of conductivity.

• External **electromagnetic interference** can be **reduced** and even **eliminated**.

• **The amplitude of the signal is increased by up to 6 times**, which makes it easier to identify the characteristic waves of the various bioelectric signals.

• **Signal ripple is reduced**, reaching a point where it does not interfere with the identification of small amplitude waves such as the P wave of the electrocardiogram.

• Continuous monitoring allows for **long-term follow-up**.

• The **personalisation of the system** stands out, as the Artificial Intelligence model is trained with the user's own data.

• Early detection **enables prevention**.

• **Adaptation to treatment** is improved.

INNOVATIVE ASPECTS OF THE TECHNOLOGY

The main innovation lies in the **three-dimensional electrodes integrated into the textile garment itself**, which allow different bioelectrical signals or medical data to be captured from the user. The combination of these signals with the posture and movement data additionally collected by the garment allows both an **objective assessment** and the **monitoring of the subsequent treatment**, which can be modified according to the results that are subsequently recorded. The textile electrode has a **specific embroidery configuration** that ensures a homogeneous distribution of conductivity, **ensuring excellent quality in the bioelectric signal**.

In addition, the invention uses **Artificial Intelligence and Big Data tools**, which allows further study and knowledge of the mechanisms and causes involved in low back pain. By analysing this information, it is possible to establish **strategies for its prevention**, as well as possible **treatments**.

The combination of the different physiological signals together with the monitoring of the user's movement and posture, in addition to the use of Artificial Intelligence, makes the system capable of carrying out the **functional assessment and monitoring of the lumbar spine in an objective manner**.

MARKET APPLICATIONS

The present invention refers to an intelligent textile garment or complement with the capacity to monitor movements, postures and physiological signals for its application in the **prevention, detection and treatment of lumbar or back injuries**, classifying the patient's sensations objectively on the basis of a scale (it makes it possible to know whether or not he or she is suffering pain, as well as the degree of pain).

It is, therefore, an innovative tool with the capacity for the **continuous monitoring of patients with illnesses causing back pain** which can be very interesting for the following sectors:

- Hospitals.
- Clinics.
- Rehabilitation.
- Mutual insurance companies.
- Gyms with specialised technical staff.
- Research.

COLLABORATION SOUGHT

Companies interested in acquiring this technology for **commercial exploitation** through patent **licensing agreements** are sought.

Company profile sought:

- Textile companies.
- Electronics companies.
- Companies that develop and market health and/or sports software.