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Improving patient's self-reliance

Demcon Johan Sports is a participant in the European TREAT project that aims to improve the self-reliance of patients with a chronic disorder. The company will investigate whether its real-time monitoring technology for sports teams, PACER, can also be used in the healthcare sector. PACER is equipped with an ECG sensor that will be connected to electrodes integrated into a vest that patients can also wear at home for cardiac monitoring during exertion. The company will investigate whether the data can be translated reliably into information for healthcare providers and into recommendations for the patient concerning his/her behavior and lifestyle.

Demcon Johan Sports has been involved in the development of sensor technology for use in top sports since 2014. This concerns systems for monitoring players during training and games. All movements are tracked using GPS sensors and heartbeats are measured using heartbeat sensors. The user-friendly Johan Sports software enables sports teams to analyze the collected data and to use the acquired insights to improve the physical performance of  players.

PACER technology with ECG sensor

Demcon Johan Sports recently introduced a new version of its real-time monitoring technology, PACER, for sports teams. In addition to the work performed by athletes, PACER also monitors the heartbeat's variability: the variation in the time interval between consecutive heartbeats. This parameter provides information about, for example, heartbeat recovery after exertion. PACER is furthermore equipped with a sensor for producing electrocardiograms (ECGs) that record the electrical activity of the heart muscle.

Health information

Demcon Johan Sports is currently investigating the potential application of its monitoring technology in the healthcare sector, says managing director Niels van der Linden. "Our systems have been used successfully for years in the top sports sector for collecting performance data and in the near future they will also be used to collect health information. This could also be very useful for the healthcare sector, for example during rehabilitation. This type of intensive monitoring is rarely applied there, however. We see opportunities here for using our latest system, PACER, which is also equipped with an ECG sensor. This is why we are participating in TREAT. We refer to this as 'healthy performance': we enable top athletes to perform better and ultimately we aim to use the information generated by our system to coach people to be active in healthy ways. This way we are looking for opportunities to apply our technology on a broad front for society at large."

European project

TREAT (Transforming Healthcare Through Semantic Interoperability & Patient Self-Efficacy) is a large European project within the ITEA program that focuses on software innovation and the digital transition.

People are becoming older, increasingly more often suffer from chronic ailments and are increasingly receiving remote care for this at home. The objective of TREAT is to increase the patient's self-reliance by giving them information and feedback about their health and behavior. Sensor, information and communication solutions are developed and investigated for their effectiveness for this purpose. TREAT will start up on January 1, 2024, will last three years and includes 25 partners in seven countries. The Dutch partners, among others, include Demcon Johan Sports, Maastricht University, Eindhoven University of Technology, Roessingh Research and Development (RRD) rehabilitation center and Elitac Wearables.

Robust hardware

In the TREAT project, Demcon Johan Sports will combine its PACER with ECG sensor technology with the electrodes that partner Elitac Wearables will integrate into a vest. That makes the patient-unfriendly process of sticking electrodes to the body unnecessary. In addition, it provides an alternative to smart watches that use light technology to conduct measurements, which does not always work well under all conditions. In cooperation with RRD, the two partners will be testing the system on patients being treated by a physiotherapist. The biggest technical challenge is conducting measurements during exertion. The system must be reliable under all conditions and that requires robust hardware, Van der Linden explains. "Together with Elitac we will ensure that our PACER combined with the electrodes integrated into their vest will continue to work well."



Advanced software

However, the emphasis is on developing advanced software for signal processing, data analysis and information. "We optimize the filtering of ECG signals to be able to detect heart activity, breathing and anomalies. We also intend to develop algorithms that with the help of artificial intelligence must transform measurement data into health information. Finally, we are designing a user-friendly presentation of this information for the patient and healthcare provider."

Looking for useful information

The ultimate goal of TREAT is to give the patient and healthcare provider useful information that enables them to assume control over the patient's health and treatment, Van der Linden explains. "We aim to merge the patient data originating from our wearable with data from other systems and to present it in understandable ways. Our key research question is whether this will provide reliable health information. If the outcome is positive, this will give the healthcare provider better insight into the condition of their patients and enables them to provide patients with focused advice. Furthermore, patients can receive automatic feedback on their behavior, as well as recommendations for a healthy lifestyle. Following the completion of the TREAT project we will know whether our monitoring technology indeed is applicable to the healthcare sector."

Also for top athletes

The monitoring technology developed and investigated by Demcon Johan Sports under the TREAT project could also be of interest to top athletes, says Van der Linden in conclusion. "Information about their condition and health is important. An example is breathing: proper breathing enables athletes to maintain their performance for longer periods of time. PACER can monitor the breathing of an athlete with the ECG monitor. However, ECG monitoring during exertion can also provide valuable information during the rehabilitation of an athlete following injury. For sports applications, we are going to conduct more in-depth research in cooperation with physicians and sports physiologists in order to extract more information from the ECG signal. This way we aim to contribute to further improving the performance of top athletes."

About Johan Sports and Demcon

Demcon Johan Sports was founded in Delft in the Netherlands in 2014, for the purpose of developing monitoring technology for sports teams. The company has worked together with Demcon for years to develop its sensors and since 2021 forms part of the Demcon group. Demcon (1,000+ employees) develops, produces and supplies technology and innovative products. The group has locations in Best, Delft, Enschede, Groningen, Leiden (The Netherlands), Munster (Germany), Tokyo (Japan) and Singapore. The company was created as a result of the passion of its founders for combining creativity and technical skills focused on solving complex issues of a technological and social nature. In addition, Demcon also focuses its efforts on promoting entrepreneurship and investing in talent and education.

