A revolutionary gait analysis system for smart injury and performance management.

Gait analysis technology aims to prevent expensive sporting injuries

Interventions such as gait analysis can prevent injuries and improve rehabilitation time. An innovative pair of AI-based smart socks hopes to revolutionise the sporting world.
Professional athletes are considered to be the most expensive human real estate in the world. Injuries are currently the 4th largest cost to sporting institutions; in the top four European football leagues, clubs spent EUR 1.7 billion on paying salaries for injured players in 2015 alone. Research shows the number of injuries is on the up, meaning a way to prevent them is becoming increasingly necessary.

Scientific research has shown almost half of injuries could be prevented through adequate interventions such as gait analysis, presenting a promising avenue for research.

“Gait analysis is the systematic study of a person’s movement form, and is one of the best biomechanical solutions to help people reduce injury occurrence, recover from injuries and maximise their physical potential,” says Oisín Lennon, founder of Danusport and SIPAR project coordinator.

The SIPAR project has been working on Danu, a gait analysis system based on wearable technology that provides coaches and athletes with invaluable data that can be used to prevent injuries, reduce rehabilitation when they do occur, and maximise athletic ability.

The patent-protected sensor technology is integrated into smart socks that combine
with a powerful data analytics software. The system tracks human movement to the highest accuracy available today. The socks are based on a state-of-the-art machine learning algorithm, which continuously improves while working, creating a database for predictive analysis.

“We were surprised at the multitude of varying use cases each coach, clinician and athlete finds for the product. Each customer seems to see a different potential application in a different sports arena, such as MMA and golf. They also see the potential to measure new beneficial metrics we had not considered until now, such as individual limb load,” explains Lennon.

**Smart socks**

The system is comprised of a pair of sensor-integrated socks, a mobile app for live analysis and a professional analytics platform. A bed of discreet capacitive sensors is seamlessly integrated into the sole of the foot to measure the interaction between the foot and the ground to the highest accuracy possible. The socks include accelerometers, magnetometers and a gyroscope, to give a full positional overview of the foot.

The product is worn on the user’s legs, like an undergarment that can be worn on its own or underneath the user’s sports socks. The data can be retrieved live or post-exercise. The smart socks connect with an app via Bluetooth; this app can be connected directly to the user’s smartphone or smartwatch. The main use is to connect directly to the coach or clinician who will be monitoring and coaching the user.

“As the use cases and data sets grow, the company will build in machine learning for live, predictive injury analysis that empowers coaches with the ability to intervene before injuries occur,” Lennon adds.

Based on the project’s progress, the team believes that our methods and technology will lead to a significant improvement in the management of athlete performance and injuries in sport.

The company is patenting novel algorithms, analytics, technology and manufacturing methods created during the project.

**Keywords**

SIPAR, gait, analysis, sports, injuries, prevent, algorithm
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