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World of wearables

Breaking through to patients and consumers

Datwyler SoftPulse™

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DATWYLER

Revolutionary monitoring at home

Monitoring devices have traditionally involved wires, patients hooked up to computers and periods of lying or sitting in a hospital room. Of course, there have been some rudimentary portable ones before now, but the next big step is finally upon us. Thilo Schmierer, business development manager for **Datwyler**, discusses the company's latest medical offering, SoftPulse, and how its revolutionary materials could bring monitoring home.

Its roots can be traced back as far as the 1960s, but the innovators of yesteryear would hardly believe how far wearables has come since. Back then, the idea of wearable technology was just that, an idea, based on science fiction and a hefty amount of imagination. Today, though, you would be hard pressed to share a room with a handful of people and not one of them be adorned by some sort of 'wearable'.

By the end of the past decade, the industry was worth an estimated \$28bn, with projections that it would continue to grow at an annual rate of more than 15% over the coming years, according to research conducted by market intelligence provider Market Study Report. The report said a combination of the growing awareness of the benefits of technologically advanced wearables and the popularity of the internet of things, along with advances in next-gen technologies, such as smart interface screens, would sustain the rising demand.

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Right now, many are familiar with wearables, whether it's a smartwatch or fitness tracker. The more tech-savvy may have even been acquainted with a smart ring. However, as Dr Thilo Schmierer of Datwyler explains, a wearable is not just a lifestyle accessory. Today, they are used in a variety of spheres, including healthcare, work safety



SoftPulse soft dry electrodes in brush design.

and the military. Schmierer is the business development manager for Datwyler's medical division, which is making a move into this burgeoning area.

By 2025, the global wearable medical devices market will be huge –

a staggering \$87.5bn according to Market Study Report's estimates. Admittedly, some of that value will be associated with off-the-shelf wearables, as the figure includes the likes of fitness trackers. But physicians and healthcare providers are increasingly turning their attention to the offerings of wearables and how they can advance diagnostics, the treatments that

follow on from diagnosis, and quality of life for the patients undergoing them.

Comfortable and cost-effective monitoring

In 2018, Datwyler, which provides high-quality, system-critical elastomer components, took its first step into the wearables market with the introduction of its SoftPulse electrodes. The use of electrodes in healthcare is nothing new. Combined with other technologies, they offer clinical teams treating patients an abundance of data and insight. “You can obtain signals from the brain, from collective actions of a person's neurons, or from a heart or muscle; an EEG, ECG, or EMG respectively, depending on where you are measuring,” says Schmierer. It is even possible to detect eye movements.

That data is then analysed and used to inform the care patients receive. However, the consequence can often be that patients have to remain in hospital with all “this messy equipment”

Company insight

attached to them, at the cost of time and money. Schmierer notes that it is always preferable to do such procedures at home, where a patient can be most comfortable.

SoftPulse is offering patients and their medical teams the ability to do just that. However, that's not all; it is doing so in a way that is more comfortable and cost-effective than ever before. The 'soft' in its name reflects that comfort and refers to the specially designed materials that are used to form the electrodes. "These are our core competencies," remarks Schmierer. "We developed an electrically conductive elastomer and coated it with silver/silver chloride, which helps reduce the impedance between the electrode and the skin."

Known as a dry electrode, SoftPulse offers those using it enhanced comfort because of the materials' softness. There are also ease of use advantages as the need for skin preparation is greatly reduced and, in most instances, even eradicated. There is not even a need to remove hair, which is typically a significant barrier to the use of monitoring devices outside of the clinical setting. "Dry electrodes are opening up new directions in EEG and other

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biotechnology applications," says imec, which has partnered with Datwyler on this development by contributing algorithms and extensive testing. Imec is an R&D and innovation centre working on the development of nanoelectronics and digital technologies, providing its expertise to businesses, start-ups and academia.

A healthcare breakthrough

Since this partnership, Schmierer says the intention has been to break into the healthcare market. "At the moment, we're mostly talking with customers who are working in the medical space. We have great hopes for this market in general, and intend to develop and launch more



Imec's prototype of a wireless EEG headset, measuring EEG signals with clinical quality.

products." For now, it's the SoftPulse electrode that is the priority.

"We did not invent the pins or legs on the electrodes," says Schmierer. "But our USP is that the material we use is soft. This is very important because when you have rigid pins made of metal or plastics, that can be painful when you apply pressure." This, coupled with the diminished skin preparation requirement, is a real breakthrough, and one that will help cut costs and improve patient quality of life.

"There's a real tendency in the healthcare system to be cost-driven: whenever you can offer something cheaper, that's always good," continues Schmierer. "Having a patient monitor something at home, using a wearable device that can easily be used without staff and then having that data sent wirelessly to a smartphone, or even directly to a centre or hospital, offers tremendous potential savings."

Schmierer believes there are other benefits too, particularly for patients. He says that much like the push for personalised healthcare in pharmaceuticals, patients will find it "liberating" to use devices at home,

work or a plethora of other settings outside the clinic.

Just the beginning

If the proposition of SoftPulse wasn't already enough, there is a further offering Schmierer is keen to emphasise: all the materials and components are developed and manufactured in-house, meaning they're customisable and can be produced at scale. "We are able to develop compounds and produce them all in house, so we don't buy ready-made elastomers, for example. We have design engineers and process engineers that can create the shapes and the tooling needed, and we make all the tools in house too, retaining all that knowledge," he says.

Using standard manufacturing processes, such as injection moulding and coating for the electrodes, makes the operation immensely scalable. "We can scale them up to billions if needed," Schmierer says, adding that that's probably not ever going to be required.

For Datwyler, this exciting product is just the start. There are plans in the pipeline for more intelligent wearable devices in the future, including smart patches. "The wearables market is a growing market, it's attractive," Schmierer concludes. "When you look at wearables, you can include multiple sensoric functions conveniently placed anywhere on the body, transmitting signals wirelessly and replacing the mess of cables around the patient. This is the direction we are heading in." ●

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