

Which ideas will help make wearable technology more mainstream? We pick out three smart garments that could soon help sports enthusiasts everywhere measure health and performance.

Breakthroughs in wearable technology

Today, in the space between wearables (like the Fitbit on your wrist) and ingestibles (honestly, they're not that far away), sits an emerging wearable technical textile market – clothing that can size up what is happening inside the body and wirelessly make use of that information. This is a market rich in innovation and promise, and earlier this year ("Wearable tech textiles coming out of beta phase", *WSA* May/June 2015), we surveyed prototypes and partnerships that may soon achieve a crucial paradigm-shift in performance apparel. Who will produce that shift? We can assume we will eventually look back at this time with a vague sense of "hmm – I think that's when I got my first smart shirt", and the wearable concepts that are today so new will be seamlessly integrated with all the other devices connecting everything. But what product will convert wearable tech textiles, in the minds of consumers, merely from intriguing to essential?

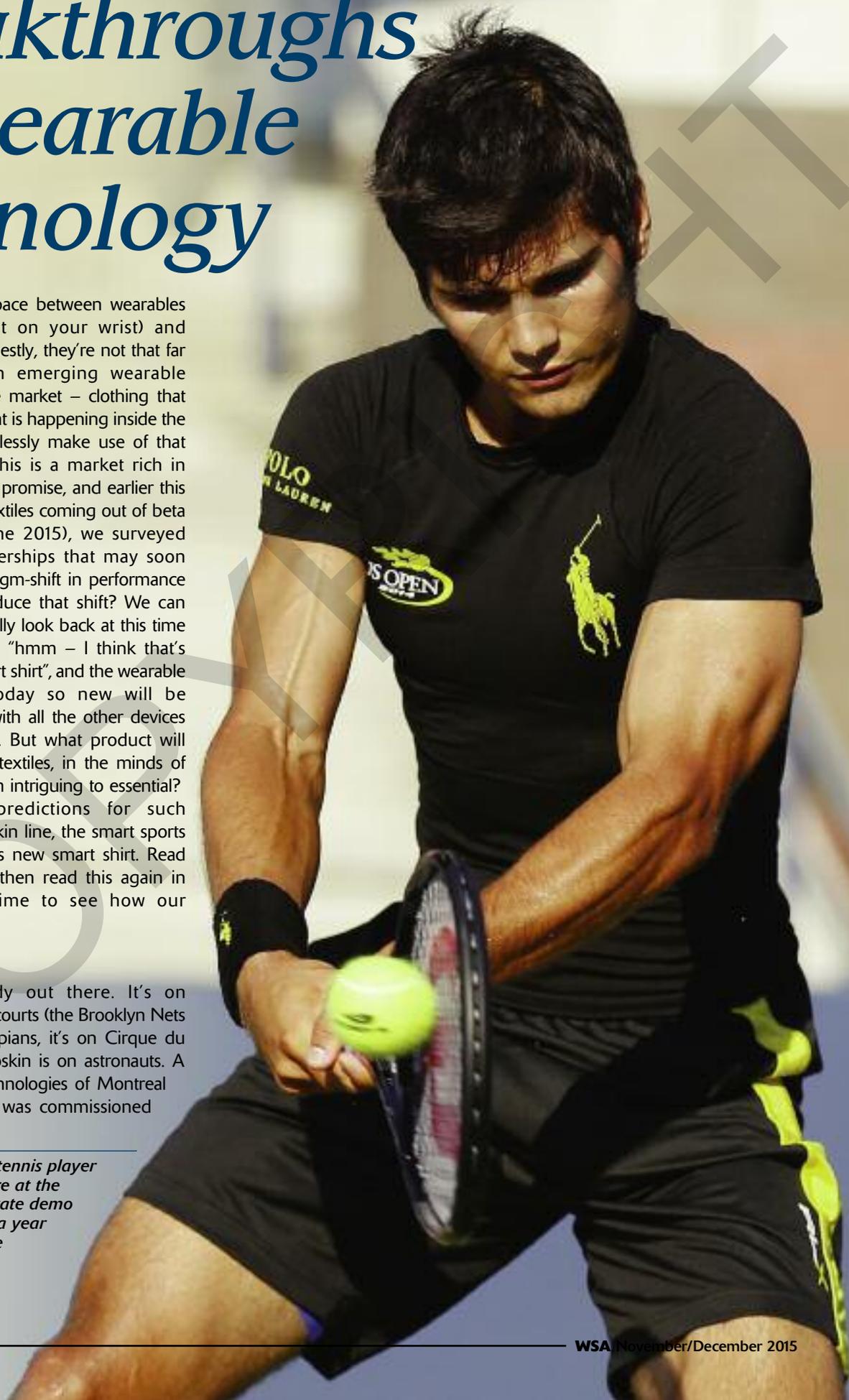
We have three predictions for such bellwethers: the Hexoskin line, the smart sports bra and Ralph Lauren's new smart shirt. Read on to learn why, and then read this again in about three years time to see how our predictions held up.

Crowd favourite

Hexoskin is already out there. It's on professional basketball courts (the Brooklyn Nets are fans), it's on Olympians, it's on Cirque du Soleil performers. Hexoskin is on astronauts. A decade ago, Carré Technologies of Montreal (creators of Hexoskin) was commissioned

Professional American tennis player Marcos Giron, seen here at the 2014 US Open in a private demo of the PoloTech shirt – a year before the shirt became available for purchase.

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by NASA and the Canadian Space Agency to develop an autonomous medical monitoring system; astronauts could wear the €6,000 shirt and headband to measure heart-rate and thoracic abdominal breathing.

But why are we confident that today's Hexoskin – a derivative of the space version, now costing \$169 for the shirt only or \$399 to include the Bluetooth recording device, app and cable – will be equally welcome in the lives and workouts of non-overachieving earthlings? Because the crowds have spoken.

Two years ago, Pierre-Alexandre Fournier, CEO and co-founder of Hexoskin, launched a crowdfunding campaign to bring Hexoskin to a broader audience. "Our main goal in 2013 was to get the word out that Hexoskin exists, and that we had an innovative product ready for the sports performance and wellness markets," Mr Fournier says.

He was wildly successful. The page was set up on Indiegogo.com with hopes of raising \$100,000; in one month he secured nearly \$166,000 before ending the drive. "It was very exciting to see so much interest for our smart shirts," Mr Fournier recalls. With more than 360 contributors, Hexoskin had a built-in customer base before the products were even available. "The campaign," he says, "made us connect with our early adopters."

An established range of products also gives Hexoskin a competitive edge. Where many smart apparel companies have a single signature product (often designed for a single sex: male), Hexoskin shirts come in two versions, sized and shaped for men, women, kids and teens. It can be purchased online and – in a major milestone for the company – at Canada's Best Buy. The line is now also available in Europe, where Mr Fournier says it has received a "very warm" reception. "Europeans [have been] expecting smart clothing [for] many years, and we're still the only smart clothing company present in most European countries to this day."

Hexoskin shirts are equipped with three ECG electrodes, a three-axis accelerometer, and a 40g device to measure stats like heart-rate zones, breathing rate, minute ventilation and cadence (and, at night, Hexoskin can even analyse sleep patterns). This information is conveyed via Bluetooth to the Hexoskin device, which can then be analysed by the Hexoskin app.

Mr Fournier says he feels confident in Hexoskin's comfort and accuracy, based on feedback from customers, and the technology will only continue to improve. "Smart clothing is as much software as it is textile," he says. "Mobile and cloud software for smart clothing will evolve significantly in the next few years and will enable a wide range of new uses."

He anticipates continued growth in take-up.



"We've learned a lot since the campaign," he adds, "and we can now clearly see that smart clothing will be present in a majority of households someday."

Our first prediction: Mr Fournier is correct, and a lot of that smart clothing will be Hexoskin.

Hexoskin's range already has options for men, women, teens and kids. The Arctic shirt is a long sleeved version of the original.

 Hexoskin

Ladies first

The technology of a smart sports bra is not too dissimilar to that of a smart shirt, with sensors woven into the fabric to track details of a body's performance during a workout. The Sensilk Tech Flight bra, for example, uses an advanced conductive fibre design to read heart-rate variability, heart-rate recovery and breathing-rate and convert this information into a "Fitness Score" to help users track their health, progress and benchmarks.

The bra has one inherent advantage over the shirt: a clearly defined target audience. While smart apparel entering the market is often aimed first at men, then tweaked in design for females, the smart bra is specifically designed for the female form – the complexities of which are especially notable when monitoring heart rates. Smart sports bras truly address the "hills and valleys" (as once described by Sensilk's designer Ashley Tyler) that are unique to a woman's shape. Donald Yang, founder and CEO of Sensilk, tells WSA: "We see a huge demand for women to receive a product specifically designed and optimised for female wearing experience." Indeed, the Flight Tech doesn't forget its primary mission: a two-cup design maintains shape and support, seams are smoothed to avoid chafing, the material is wicking, and a mesh panel across the top is both

chic and breathable.

The women-only factor guides Sensilk's business model. "We are approaching our customers through female trainers with a specific tailored message on how our product can be a natural replacement for a traditional bra and how it can better serve their needs," Mr Yang says. "It can be difficult for our customers to understand [the bra's] unique values, so we are working with personal coaches and fitness clubs to [help customers] fully utilise our product and use the actionable information to achieve training goals."

The Flight Tech isn't the only smart sports bra on the market. UK-based SmartLife is currently taking pre-orders for their sports bra, which has integrated sensors designed to detect most of the body's electrical impulses, including ECG and EMG. An adidas and Numetrex collaboration – the miCoach seamless sports bra – was released in early 2014. As early as 2011, PureLime and Clothing+ released a sports bra with a heart rate monitor built into the straps. (Even Victoria's Secret dipped an angel's wing into this market, quietly launching a heart-rate monitor-supporting sports bra in 2014, before quietly withdrawing it earlier this year.)

Smart sports bras are certainly forming an expanding niche, but the Flight Tech bra has another advantage that all but ensures its success in this market: a staff page populated by a who's who of both IT and fashion. Mr Yang is an alumnus of tech giant Oracle, and Sensilk's textile advisor is Hap Klopp, founder of The North Face. The bra's designer Ashley Tyler is formerly of Ralph Lauren, Nautica and Levi's. Mr Yang praises Ms Tyler's work, pointing out that the bra's conductive fibre was designed with both comfort and appearance in mind. "It's not an over-engineered Frankenstein-like piece of sportswear that some of our competitors are providing to men," he says. Testimonies on the company website from a range of women – a business owner and model, a mom, a grandmother and a competitive athlete – speak to the broad appeal of a smart sports bra.

Hence, our second prediction: smart sports bras are transforming the female sportswear market, with the lovely Flight Tech bra leading the way.

The iconic edge

Ralph Lauren is not typically associated with the cutting-edge performance apparel market, but a brilliantly gradual introduction will soon leave us believing it's been here all along.

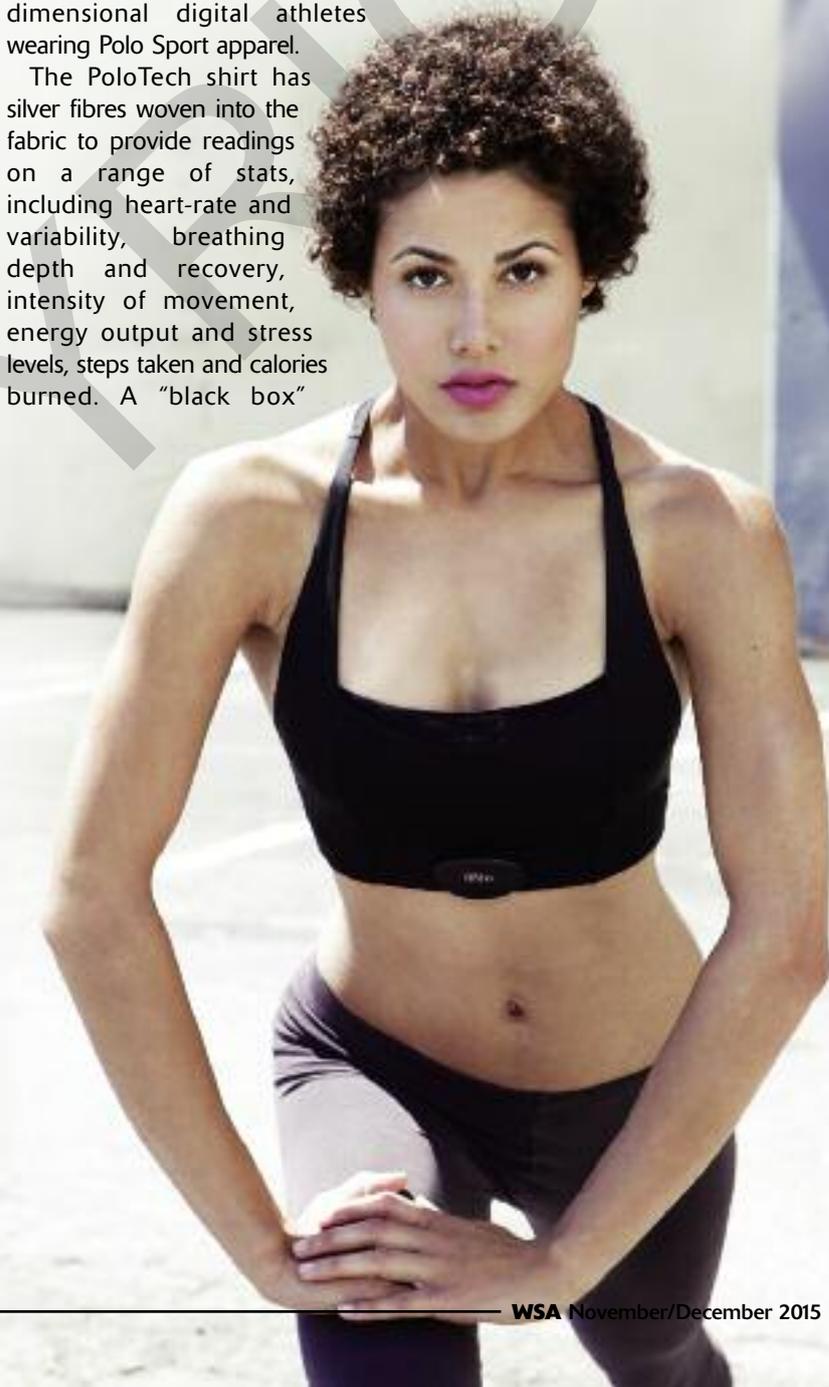
Last year, at the 2014 US Open, Ralph Lauren created a buzz when the top-ranked college player and select ball boys were seen wearing a fitted black compression shirt with bold yellow Polo logos at the Grand Slam tennis tournament. Media outlets announced Ralph

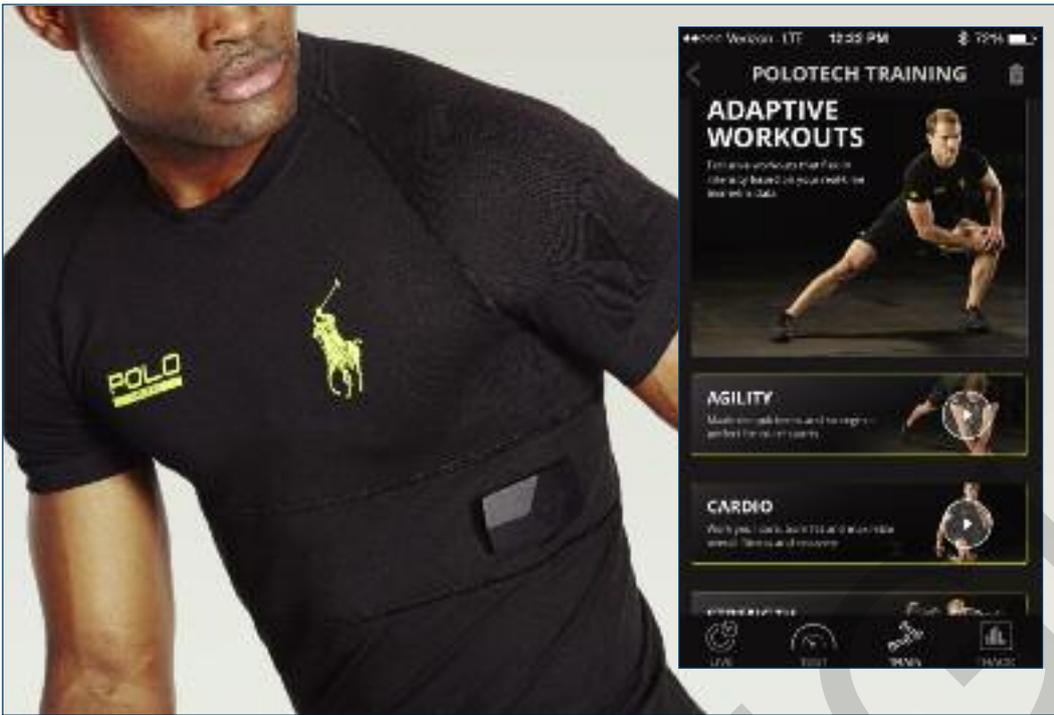
Lauren's dramatic move. "Fashion guru Ralph Lauren has sought to morph fashionable sportswear into wearable technology with the launch of the Polo Tech smart shirt," wrote *Time* magazine's Charlie Campbell. "But don't get excited. You won't be able to buy them until early 2015." After a year of anticipation, the PoloTech shirt, developed in partnership with Canadian company OmSignal, is available for retail. It was officially launched at the 2015 US Open, with a retail store on the premises of the tennis tournament where handsome fit men modelled the shirts. At the same time, the shirt became available online and at the brand's flagship store in New York City.

Release of the PoloTech shirt also coincides with the launch of Polo Sport (or relaunch – a line of the same name was retired about 15 years ago), Ralph Lauren's new athletic brand. The company's bold entrance into the tech game is further highlighted in its Fifth Avenue window display of holographic three-dimensional digital athletes wearing Polo Sport apparel.

The PoloTech shirt has silver fibres woven into the fabric to provide readings on a range of stats, including heart-rate and variability, breathing depth and recovery, intensity of movement, energy output and stress levels, steps taken and calories burned. A "black box"

The Flight Tech smart sports bra from Sensilk merges cutting-edge technology with female-focused design.





With the company's signature elegance, the PoloTech smart shirt marks Ralph Lauren's bold entry into the performance apparel market. The shirt comes with an app that, among other features, helps customise different types of workout.

 Ralph Lauren

collects and processes the information and uses five connectors and a 3D accelerometer to capture movement intensity based on three g-force measurements. The information streams to a smart device, where the PoloTech app provides feedback and coaching. Workouts can be customised to emphasise cardio, strength or agility.

Early reviews have been strong. Viju Mathew, writing in *Robb Report*, a luxury lifestyle magazine called the shirt "innovative, inspiring, and intuitive". He likened the experience of using the shirt and its accompanying app to working with a personal trainer, but without the ongoing expense of a human coach. In this respect, the shirt itself shares certain characteristics with other smart shirts.

Unlike other smart shirts, however, PoloTech is part of the Ralph Lauren family. A recent *InStyle.com* review of the shirt by Eric Wilson helps illustrate the significance of this:

According to Mr Wilson, a year earlier he had the opportunity to try out a biometric compression T-shirt from OMSignal. He had been impressed with the shirt's ability to monitor his heart rate, breathing, and stress levels and transmit the information to his iPhone. Nonetheless, he wore the shirt no more than twice, blaming the fabric, which was "so thick and uncomfortable that it might have stopped a bullet".

But then, this past August, David Lauren himself handed Mr Wilson a PoloTech shirt to try. According to Mr Wilson, OMSignal's collaboration with Ralph Lauren yielded a superior version of the shirt. "To my delight," he writes, "the new fabric is a vast improvement, a silky blend of polyester, nylon, and spandex, and not much heavier than most compression shirts

on the market... Not to sound vain, but I didn't look bad, and the shirt was comfortable..."

So it's a smart shirt, but it's also a Ralph Lauren shirt – with all of the style and talent and intuition that comes with the name and its appeal for consumers who are not afraid of \$295 price tags. Its take-up may be initially limited; available only in the US, the Polo Sport brand won't launch in the UK until autumn-winter 2016 and is currently designed just for men (though a women's version is said to be under way).

Nevertheless, we expect that the PoloTech shirt – with its techy OMSignal pedigree and Ralph Lauren's magic touch – will soon be a ubiquitous presence not only at televised tennis tournaments, but on jogging paths and in gyms across the US.

Beyond the elite

Hexoskin's Mr Fournier feels that smart apparel will become increasingly interwoven into the wardrobes of the general population. "We're still at the very beginning for smart clothing and connected clothing," he tells *WSA*. "The industry needs to invest more in manufacturing processes, materials and automation so we can design products that will appeal to millions of people at a price they can afford."

Ralph Lauren wants to be the company that takes smart shirts mainstream. "Our vision is that this will transcend sports to help us at every age and in every aspect of life," David Lauren has said. He hopes his smart shirt will appeal "far beyond just the needs of elite athletes" and that it will "offer innovative technology for all ages and lifestyles to promote general wellness and quality of life". 