

TECH

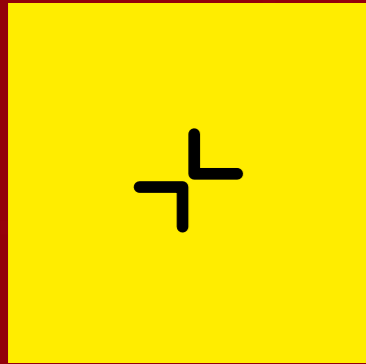


Your Activewear Has Been (Bio) Hacked

WH explores how smart clothing, where apparel meets tech, is shaping the health and fitness future

By Alex Davies





The global market for smart clothing is set to be worth around this much by 2026

SOURCE: VALUATES REPORTS

\$7.5 billion

It started with hot yoga. When Billie Whitehouse moved from Sydney to New York at the end of 2013, a regular class became her antidote to the freezing Big Apple winter. But, with 50 or even 100 yogis in the room, she began to feel frustrated by the lack of personalised adjustments from the instructor. “I’d be like, ‘I wish I knew how to do this posture correctly’ or ‘I wish they’d come up and adjust me here,’” Whitehouse says. This sparked her idea for Nadi X – a pair of yoga pants that guides your practice. Yes, we said pants. Welcome to the world of smart clothing, where your wardrobe works hard for your wellbeing.

Using tiny built-in sensors and motors, Nadi X is designed to detect the wearer’s position and guide their attention – via gentle vibrations – to the body part to focus on for a particular pose. The pants connect to a smartphone app, which offers a variety of poses, step-by-step audio cues and feedback

as you flow. “We focused on audio and haptic [touch-related] guidance, because you want to be able to close your eyes in a yoga practice,” explains Whitehouse, who already had experience with wearable technology as the CEO and creative director of Wearable X. (The company has

also worked on sports shirts that connect fans with real-time games as well as vibrating underwear for long-distance relationships.)

Nadi X is just one of the many exciting innovations in smart clothing, a global market tipped to be worth around \$7.5 billion by 2026. Google’s Jacquard platform lets you skip a song or take a photo with the swipe of a sleeve or tap of a backpack strap. In 2019, Samsung was reported to be developing a shirt equipped with sensors to help monitor the wearer’s lung health. Rumour has it Apple is working on smart fabric buttons that could connect clothing with devices. Then, there’s activewear, with the likes of Under Armour, Nike, adidas and Puma all innovating to make fit kit cleverer. (Puma actually invented the first smart shoe back in 1986, a running trainer with a data-tracking



Grin and wear it

computer chip attached – google ‘RS Computer Shoe’.) UK start-up Prevayl recently secured a \$13 million investment in its sportswear that tracks heart rate, breathing rate, recovery and more. Wearable brand Whoop has released sensor-packed garments compatible with its Whoop 4.0. Meanwhile, workout platform Asensei is incorporating its real-time coaching and form-tracking tech into apparel.

So, with everyone wanting a slice of this sartorial pie, what does it mean for the future of our health and fitness?

Great Expectations

As for what’s driving momentum, trend forecaster Sarah Owen credits a timely collision of increasingly clever tech with data-hungry health-conscious consumers.





Smarty pants

“Wellness trends are intersecting with the rise of the quantified self and smart technology,” says the global futures director of think tank Soom. “We’re becoming increasingly accustomed to tracking and monitoring our lives, from our sleep to our [kilojoules]. Now, our expectations of the devices and products in our lives are rising.”

Prepare for your regular undies to develop an inferiority complex. One company on Owen’s radar is Myant, a Toronto-born smart textile pioneer which, last year, unveiled its smart underwear range. Designed to help people remotely check on a loved one, the garments – which include a bra, tank top and briefs – use integrated biometric sensors to detect how the wearer is doing.

An electronic pod in the band then sends the data to an app, so you can track, say, an ageing parent’s body temperature, sleep quality, activity level and even heart health.

Those types of insights are crucial. While Whitehouse notes the tech itself has evolved to be “cheaper, faster, smaller” which drives innovation, she emphasises that it’s about giving people data that’s meaningful, actionable and that can make a real difference to their lives.

Material World

Smart clothing often adds tech components to existing fabrics, but scientists and innovators are also working on electronic textiles – or e-textiles – where the fabric itself *is* the technology.

Dr Fatemeh Mokhtari is a research scientist at the Australian Institute for Innovative Materials and a research assistant at the Institute for Superconducting & Electronic Materials at the University of Wollongong. As part of her PhD project, she created a specific electronic fibre and used it to produce a fabric on a knitting machine. The fabric can convert mechanical energy into electrical energy, Mokhtari explains, which can then be used to power a device or function.

“What kind of mechanical energy? For example, when you walk, different parts of your body move – your shoulder, your knee will be bent, your elbow would be bent. It’s this kind of mechanical movement,” she says. “When you are running [wearing the fabric], this mechanical movement could be stored in a battery and used for charging your phone, watch, a bicycle light or any kind of personal electrical devices.” If tracking is the goal, she adds, it could be used to sense things like movement and body temperature.

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The number of sensors in each smart sock being developed at MIT. The vest has a huge 1024 of them

SOURCE: MIT’S COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE LABORATORY

There’s a way to go and it’s of course a complex endeavour, combining expertise from the worlds of material science, textiles, electronics and medicine. Challenges include experimenting with different materials to boost the power output as well as making sure fabrics are human-body-friendly. But the implications are huge. Imagine tracking fitness insights on a hike and then giving your phone some juice, all from your T-shirt. Soldiers could charge their equipment through their movement, says Mokhtari, and healthcare patients could be monitored via their clothing.

Next-generation fabrics are also under the microscope in the northern hemisphere. Yiyue Luo, a graduate student at MIT’s Computer Science and Artificial Intelligence Laboratory, is working on a textile that senses the wearer’s movement via their contact with the environment. Integrating their own fibres into the mix, her team has created prototypes including a vest, glove and sock. If somebody is wearing the latter for example, “we’re able to collect the real-time pressure imprints between [their] feet and the floor,” says Luo.

“Based on that, we’ll be able to... extract useful information. We know if the person is squatting, climbing or walking down the stairs, or something like that.” A garment could give feedback that helps an athlete or coach evaluate performance, she says. It could support rehabilitation or detect whether someone has been sitting or lying down for a long time.

Textile innovation isn’t just of the electronics kind. Also in the US, Tufts University scientists have developed smart fabrics with bioactive inks that change colour in response to chemicals released from the body, in sweat for example. This could signal fatigue, dehydration or even skin health. Meanwhile, mechanical engineers at Vanderbilt University have designed an ‘exosuit’ (it looks kind of like an abseil harness) to support workers’ backs in high-strain industries such as construction and healthcare.



Fashionable Future

Whatever approach these trailblazers are taking, they have something in common – a desire to have us forget the tech is even there in the first place. “To me, that’s the ultimate goal,” says Whitehouse. “How do we design technology that fades into the background, that helps us really be present and live well?” Her team is exploring how wearable tech could be used in areas such as physiotherapy, pain management and digital fitness experiences. “I would love to see our clothes truly being enchanted [with technology] in a way that is meaningful for the person and the purpose. The goal is to have less, but really powerful, clothing that does more for you.” Sustainability is a priority, she adds.

As for the dream of subtlety, Owen has good news. “Technology will become increasingly ambient and passive,” she predicts. “It will be woven into the very fabric of our societies and lives but without ever being too obtrusive. Smart clothing will become more seamlessly connected to our devices.”

There may be challenges in the smart clothing space (machine-washability is another biggie) but we’ve entered an innovative new era – one where an outfit is so much more than just something to throw on each morning. In fact, when it comes to health and wellbeing, your go-to baggy tank or favourite gym socks could one day be the most powerful wearable of all. **WH**

HIGH PERFORMANCE

Wardrobe winners that go the extra mile



Smart glasses that let you capture photos, take calls and pause songs by touching the frame. Ray-Ban Stories, \$449, sunglasshut.com/au

Whoop’s sensor-enhanced apparel houses its Whoop 4.0 wearable to capture data. Whoop Body Any-Wear sports bra, \$109, whoop.com



Compression shorts boost circulation for better post-workout recovery. Plus, there’s a pocket. 2XU Form Stash Hi-Rise bike shorts, \$99.99, 2xu.com



With embedded sensors, these pants guide your yoga practice via vibration and audio feedback. And yes, they’re machine washable. Nadi X leggings, approx. \$335, wearablex.com



Under Armour’s new lightweight kicks connect to UA’s MapMyRun app, so you can track your runs. UA Flow Velocity 2, \$200, underarmour.com.au

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