



**D**ANIELLE WILDE is wearing an outfit that plays *The Girl from Ipanema* when she sways her body. A bit of a crude, hokey version of the song, she admits. A bit of an ungainly dress, too, consisting, as it does, of a rigid plastic tutu with electronics embedded in its rim and a white swimming cap with a small speaker attached. It's unlikely to replace the little black dress as the party number in the new future but it certainly puts the fun back into functional. Artist/scientist Stephen Barrass, meanwhile, has devised a fake-fur coat that, when it gets cold, shivers and twitches its whiskers like a drenched cat.

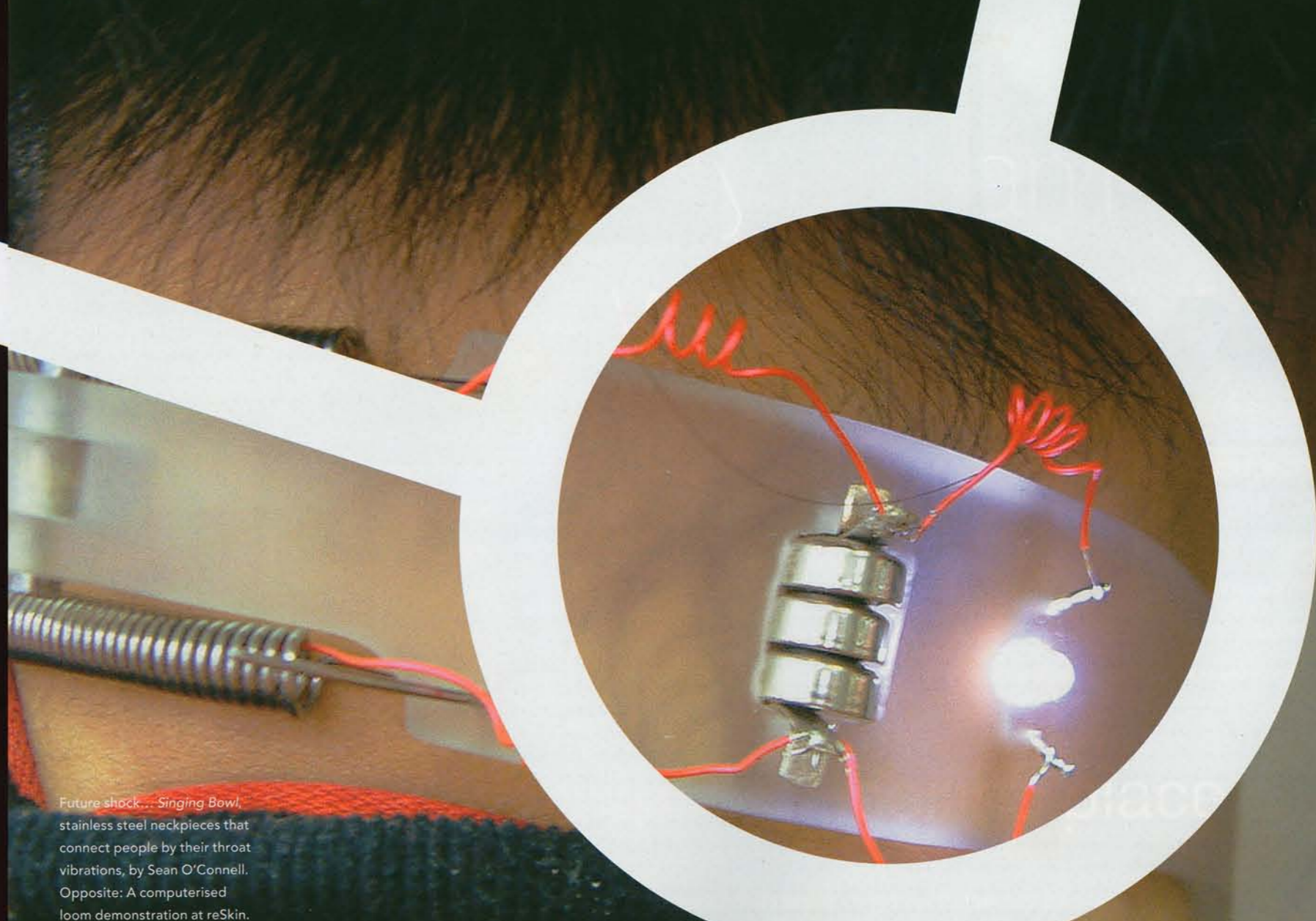
Both were taking part in reSkin, a recent workshop at the Australian National University in Canberra that examined the future of wearable technology. It drew participants from across the globe for a three-week jamming session that brought together computing, electronics, textiles and jewellery-making techniques in a flurry of laptops and needles, sewing-machines and circuit boards. The workshop seethes with fashion forward thinkers getting their heads around electronics basics such as breadboards (circuit boards) and transistors. The resulting detritus is everywhere – an eviscerated ghetto blaster 'hacked' for its innards lies near a traditional paper dressmaking pattern.

Wearable technology in its basic form is a given for the iPod generation but what is coming next goes a lot further than just music players strapped to our bodies. From frocks that respond to your mood or turn your heartbeat into a light show to fabrics that can heal wounds, detect chemical attacks or even shape-shift so that their camouflage pattern morphs to merge with a soldier's environment (much of this technology is trickling down from the military).

# GARMENT GEEKS

— STORY BY ROBERT BEVAN

**FROM INBUILT IPODS AND HEATED POCKETS TO SHIRTS THAT RESPOND TO YOUR MOOD OR YOUR HEALTH NEEDS, THE FUTURE OF CLOTHING HAS A HIGH-TECH EDGE THAT CAN BE DOWNRIGHT STYLISH AS WELL**



Future shock... Singing Bowl, stainless steel neckpieces that connect people by their throat vibrations, by Sean O'Connell. Opposite: A computerised loom demonstration at reSkin.



Clockwise from above... reSkin lab in action; *Scruffy Scally Scrap*, fake fur with a textile nervous system, by Stephen Barrass and Elliot Rich; *Pods*, electronic felt, by Cecilia Heffer; Danielle Wilde and hipDisk.



**“WHAT ABOUT A COAT THAT CARED ABOUT YOU, THAT HAD A PERSONALITY, THAT WAS HAPPY TO SEE YOU WHEN YOU PULLED IT OUT OF THE CUPBOARD?”**

The future is squishy; garments woven out of, and embroidered with, conductive yarns instead of wires; thermochromic inks that change colour; soft switches; smart textiles, such as Nitinol, with an inbuilt ‘shape memory’; and sensors printed on fabrics. The result? Clothes that don’t just have a practical purpose (inbuilt telecommunications, for instance) but can express some of the inner life of the wearer.

Assistant Professor Joanna Berzowska of Concordia University, Montreal, a facilitator at reSkin, is a self-confessed ‘geek’ who grew up loving electronics as much as embroidery. A stint at MIT’s (Massachusetts Institute of Technology) Wearable Computing Lab – called the Borglab for the uber-geeks that each day navigated the real world like cyborgs with electronics strapped to their heads – led Berzowska to stitch creations such as a dress with a hemline that had a mind of its own and musical pants that emitted a trail of notes.

A wearable computer, she explains, doesn’t need to be a laptop, it can be a small soft thing programmed for a specific job that electronic engineers might overlook. “A fashion application is something that can be stylish or makes you feel

sexy and that’s your killer application right there,” she says. Something that turns a pretty shade of pink is good enough: “It doesn’t need to tell you about the weather.” She’s interested in seduction and ways in which the social and psychological aspects of human interaction can be accentuated.

Australia may be lagging behind Europe and the US in this arena but Berzowska has been impressed by the “subtle and poetic” ways the participants in reSkin have used technology to build prototypes. Stephen Barrass says it has changed the way he thinks about the things he could do. “Products that capture your imagination and allow you to express your identity – these ideas don’t come out of R&D institutes.”

His shivering nylon fake-fur coat responds to the static found on skin – even at a few metres’ distance. At the moment it may be just a swatch of animated rug that he is sewing with conductive thread (“the nervous system of my beastie”) but it’s a big leap forward from his previous experiment – a heavy leather jacket with a spaghetti of metal wiring spilling out. “The whole surface of the coat is a sensor like the surface of your body. What about a coat that cared about you, that had a

**Fashion >**

**A timeline charting the development of technology in fashion**

**1840s Ada Lovelace**

Computer programming begins with Ada Lovelace, the mathematician daughter of poet Lord Byron. It came directly from her work on Charles Babbage’s Analytical Engine and the invention of the punch-card system for the revolutionary Jacquard automated loom of 1801.



**1850s Rayon**

The first man-made fibre – known as artificial silk – was made from cotton or wood pulp but was dangerously combustible. Later versions used cellulose but it wasn’t until the 1880s when

Sir Joseph Swan exhibited fabrics crocheted by his wife that it really took off. Commercial production began in France in 1891.



**1863 Paper patterns**

It was an American couple, Ellen and Ebenezer Butterick, who invented the tissue paper dress pattern in 1863. It was graded to allow different sizes of frock to be made from the template. Along with the mass-produced sewing-machine, it democratized fashion, allowing the latest styles to be created at home without the cost of a dressmaker.

**1930s The zipper**

Elsa Schiaparelli gained acceptance for the zipper by incorporating it into her 1935 haute couture collection (along with phosphorescent brooches and handbags that played tunes and lit up when opened). The zip was first patented in 1851 but a version that didn’t accidentally come undone was not perfected until 1914.

**1934 Nylon**



The ‘miracle’ fibre, the world’s first totally synthetic thread, was discovered in 1934 and the first experimental stockings followed five years later. The original name was ‘No run’ but the stockings still did. Postwar, nylon became hugely popular, with Christian Dior employing it in his 1954 collection and Buzz Aldrin planting a nylon flag on the moon in 1969.

PREVIOUS PAGES: RESKIN LAB; SEAN O’CONNELL. MAIN IMAGES CLOCKWISE FROM TOP: ALEXANDRA GILLESPIE; STEPHEN BARRASS; CINNAMON LEE X 2



Clockwise from above... *In Step*, sensory foot bandages by Keith Armstrong and High Tea with Mrs Woo; *Hidden*, coat with heating pockets by High Tea with Mrs Woo; computerised loom demonstration.



personality, that was happy to see you again when you pulled it out of the cupboard?" he asks.

Among the other prototypes being developed is Leah Heiss's black silk organza top with a silver ginkgo leaf brooch at its breast. It picks up on the gestures she makes when she is stressed – like putting her hand to her sternum. When touched, the brooch acts as a switch illuminating tiny twinkling fibre optics. "It is about developing an awareness of your own eccentricities," explains Heiss, "and about enhancing empathy between people and the world." She sees practical applications in, say, developing non-verbal communication for autistic children. "They can be very beautiful garments so people want to wear them rather than feeling like cyborgs."

Jeweller Sean O'Connell has personal experience of the need to aestheticise wearable technologies. He is his grandmother's carer and she will not wear the ugly, chunky, heart monitor she is supposed to hang around her neck. "It is our job to integrate the technology and get acceptance on a personal level."

But wearable electronics (with the exception of the Burton Amp snowboarding jacket that has soft-switch control buttons built into its sleeve to control an iPod) remain, for the most part, in military or civilian labs. In the new millennium, electronics giant Philips developed its New Nomads prototypes – mostly sportswear or club novelties such as knickers that flashed when the wearer was paged. The company's 2001 collaboration with Levi Strauss on a jacket incorporating wiring for a phone and MP3 player was not a commercial success. But Levi is persevering: *The AFR Magazine's* September fashion issue last year featured Levi's iPod jeans with remote control and docking station fitted in the pockets – a 2006 collaboration with Apple Computer.

Berzowska admits there are some significant obstacles before wearables become mainstream. She has had meetings with the likes of Marc Jacobs, Chanel and Gap on the possibilities, but they are, she says, "very afraid". Putting electricity through a garment means it is not then covered by ISO (international standards) legislation leaving the companies open to legal liability if anything goes wrong. Even with small batteries, clothes have to be well insulated to avoid the possibility of a harmless but jolting shock. The potential for mass production is also inhibited by the need to build specialised production

## EVEN WITH SMALL BATTERIES, CLOTHES HAVE TO BE WELL INSULATED TO AVOID THE POSSIBILITY OF A HARMLESS BUT JOLTING SHOCK

lines for small runs and to educate – a problem for industries such as fashion that work on tight margins. One spool of conductive thread costs up to \$300.

First things first, though, and Berzowska says popular acceptance will only be built on the back of good design: "Building a market by building a desire." The turning-point has been reached, she maintains. "This is the time to start developing products." Sexy sells, and it is innovative fashion designers such as Newcastle-based High Tea with Mrs Woo (Chinese-Malaysian-Australian trio Rowena, Juliana and Angela Foong) who are intent on making wearable electronics as covetable as their regular designs.

At reSkin, there is the trio's joint project with artist Keith Armstrong that reinterprets repressive Chinese foot-binding, using bandages with built-in sensors that can make visible the weight of your tread. They have also stitched an elegant shirt-dress, with hidden electronics, that has pockets that can be heated when you put your hands in them.

There are potential dangers to be aware of, the "dark issues" as Berzowska calls them. She notes that in the US all new mobile phones must, from this year, have a GPS chip. You will be traceable wherever you are. "Once we make smart garments we can be leaving [open] access to personal information and biometric data," says Berzowska. "Health insurance could be denied if it is detected that you smoke, for instance." The controversial subject of data mining is figuring in the debate around the proposed Australian Access Card.

Then there is the VeriChip check that can be implanted directly into your skin with various health-care, financial and security applications. It is intended for locating missing children and monitoring high-risk heart patients. If fashion follows, it will play its part in making privacy a thing of the past. ■

Fashion &gt;

### 1956 Electric Dress

Inspired by a neon-lit billboard, Japanese artist Atsuko Tanaka ditched the kimono, covered herself in vinyl and donned her Electric Dress made of blinking incandescent bulbs, enamel paint and lengths of flex – like an animated Christmas tree. As a work of art, it celebrated the city – but was virtually unwearable.



### 1960s Space-age fashion

Paco Rabanne first made a plastic dress in 1956 but it was in the sixties that he and other designers celebrated the space race through fashion. Rabanne produced non-woven outfits made from plastic, paper and aluminium, including his costumes for the film *Barbarella*. In 1966, Pierre Cardin launched his 'Space Age' collection (with matching peek-a-boo helmet).

### 1980s Lycra

Lycra, a kind of Spandex, was first invented in 1958 and commercialised by 1962 after which it was used for swimwear and corsetry. It wasn't until the 1980s that it really took off as streetwear, powered by the avant-garde visions of designers such as Bodymap, which made the outrageous figure-hugging costumes for dancer Michael Clark's shows.

### 1995 Robot Couture

The French designer Thierry Mugler owned his own factory where he built prototypes for his futuristic creations such as the Robot Couture collection of 1995 that featured Perspex and steel space armour. Cyborg fashion played with the appearance of computing if not delivering the actuality. In 1998 he created the first virtual fashion show online.

### 1997 Electronic dress

The Firefly dress and necklace by Maggie Orth, Emily Cooper and Derek Lockwood was exhibited. It lit up and had sensors powered through fabric circuitry.

### 1999 Bladerunner replicants

Alexander McQueen draws on Ridley Scott's *Bladerunner* 'replicants' for his android-chic Givenchy collection. The following year, his designs incorporated printed circuit-board patterns and glowing LEDs.

### 2004 The real thing

The SmartShirt System, developed for the US Navy, incorporates wearable computing and wireless data transfer to allow the transmission of biometric data from the battlefield.

### 2006

#### Morphing frock

For his Spring/Summer 2007 collection, British designer Hussein Chalayan sent models down a Paris runway dressed in remote-controlled frocks with hidden wires and motors that morphed and reconfigured themselves from high Victorian corsetry to a flapper dress and Christian Dior's New Look silhouettes.

