

Inventors are dazzling the material world

Electronic embroidery creates fabric for skirts that light up and shirts that flash

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In a fluorescent-lit research lab above a Ste. Catherine St. car dealership, Joey Berzowska and her colleague are building bridges between art and science.

They come in the form of wild and magical fabrics - with conductive thread and bead-like electronic components - "embroidered" in old-fashioned cotton and linen.

Whimsical patterns do double duty as electronic circuits, complete with microchips, transistors, capacitors and light-emitting diodes.

There are skirts that light up in a dazzling display when squeezed, and bug-print shirts that flash when you whisper into a tiny microphone embedded in the collar.

Berzowska and her fellow researcher, Barbara Layne, work at Hexagram, the Institute for Research and Creation in Media Arts and Technologies, which is a joint Concordia University and Universite du Quebec a Montreal program. They are creating a new generation of "electronic fabrics," or "wearable computers" as they call them. They've received more than \$500,000 in government grants to finance their research, and their works are displayed around the world.

Berzowska, 32, was born in Gdansk, Poland, then moved with her family to Algeria, Gabon and then Canada.

As a high-school student in Newfoundland, she was an award-winning math ace. She grew bored taking calculus and linear algebra while studying applied mathematics at McGill University in 1989. She transferred to a fine arts program at Concordia University, but found her fellow students "too wishy-washy, talking about their feelings."

Eventually, she graduated with undergraduate degrees in math and fine arts that set her on a future path in computer graphics at the University of Australia and the Massachusetts Institute of Technology's media lab.

She then landed back in Montreal.

What, exactly, are intelligent textiles? Take, for example, Berzowska's display titled Shimmering Flower.

It is, at first glance, a colourful cotton jacquard weaving with a bold abstract poppy flower. Berzowska's



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Joey Berzowska (left) and Barbara Layne are creating intelligent textiles using high-tech components and traditional stitching methods like beading and embroidery.

weaving just happens to be made with a non-emissive electronic textile that changes colour. The cotton is interwoven with threads of nylon and stainless steel and little "leaves" that are covered with thermochromic ink that change colour when the temperature shifts.

The weaving is plugged into the wall via an electronic control board that regulates and sends power to different parts of the cloth at different times.

Last summer, Layne created a linen vest with a micro-controller the size of a chocolate mint that acts as a tiny computer programmed to turn on and off light-emitting diodes woven into the fabric. The vest can be programmed for patterns to scroll through the fabric as they might on a conventional message board.

"It's basically an embroidered circuit, a woven motherboard," explained Layne, who is also associate dean of research at Concordia's faculty of fine arts. "We've taken a hardwire kind of thing and woven it into textile, using traditional methods such as stitching, beading and embroidery."

Berzowska - who is clearly having fun at work - is already contemplating future applications, perhaps powered by solar energy or even body temperature.

Imagine these items: wallpaper that changes colour; cubicle walls whose patterns alter with the mood and temperature in the office; motif-changing place mats; or, a blouse that's brown in the office and bright pink at the club after work.

"Why shouldn't technology be playful?" Berzowska asks.

There are military applications, too. Camouflage gear that changes colour wouldn't leave soldiers, stranded in green fatigues, in the desert.

Getting scientists and artists working together increases creativity, innovation and communication, Layne says.

"In many companies, the creative types and the engineers remain separate. They don't share ideas or even the same language," she said. "It's amazing, though, what you can do when you understand each other."

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