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BIOLOGICAL TRANSISTORS

BIOENGINEERS ARE APPLYING THE CONCEPTS OF ELECTRICAL ENGINEERING TO CONTROL GENES MORE PRECISELY AND FLEXIBLY

SUPERCONDUCTIVITY'S FIRST CENTURY
SUPERSTRONG MAGNETS ARE NICE, BUT WHAT'S NEXT?

REPACKAGING THE CHIP
NEW DESIGNS ARE MAKING SMARTPHONES SMARTER

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hands on

A TYPEWRITER IS A TERRIBLE THING TO WASTE

A manual typewriter's keyboard makes a perfectly good computer keyboard—with a little bit of hacking

IN THE 1940s, my mother tapped out her college term papers on what was then a snazzy new Royal typewriter. In the 1970s, she gave it to me for my high school essays. I, too, may pass a manual typewriter on to my kids, but with a twist—a couple of circuit boards bodged to the bottom and a USB cable coming out the back. An obsolete manual typewriter can thus be reborn as a computer keyboard.

It's the brainchild of Jack Zylkin, a Philadelphia-based electrical engineer who has designed a kit that makes the conversion reasonably easy for anyone who enjoys hands-on projects. Zylkin spent the better part of a year refining his creation at Hive76, a local workspace organized by hackers of various kinds. The typewriter modification is based on an Atmel ATmega168 microcontroller board, a pile of shift registers, and several dozen hand-hammered leaf-spring contacts.

Here's how the computer attached to the typewriter knows which key has been pressed: When a letter is typed, the key's metal support bar touches a single contact on the board. Meanwhile, the microcontroller is stepping a single logic "1" down the row of shift register pins and thus the leaf-spring contacts wired to them, letting the microcontroller detect the circuit made between the typewriter and the board. Then, like any other USB keyboard controller, it sends the appropriate code back to the PC. A few strategically placed magnets and reed switches detect the shift key, carriage returns, and whatever the user wants to configure as Alt or Ctrl.

OLD MEETS NEW: Three portable typewriters, a Royal [above], a Smith-Corona [below, right], and an Underwood [below, left], come out of retirement to serve as keyboards for, respectively, a Dell all-in-one computer, an iMac, and an iPad. PHOTOS: JACK ZYLKIN

Why use shift registers instead of the switch matrix buried within a modern keyboard? Because ordinary humans can build it. A matrix would need fewer components and perhaps less code, but it would require either putting the microcontroller on the same board as the contacts (a tough fit inside some typewriters) or soldering more than a dozen wires between the two boards. The shift registers take only four wires. "The other advantage," Zylkin notes, "is that unlike some kind of matrix, the shift registers form a repeating pattern that can be cut to any length." So regardless of how large or small your manual typewriter, his board can be chopped to fit inside with no electrical repercussions.

Assembling the kit is fairly straightforward. There's a lot of soldering (40-odd contacts plus eleven 16-pin ICs), none of it particularly fussy.

The only unusual step is making the leaf-spring contacts yourself by flattening the leads of two dozen half-watt resistors with two hammers or a hammer and an anvil. Zylkin says that there are no easy sources for the kind of copper or phosphor-bronze strips that you can expect to use for making contacts. (As this article goes to press, Zylkin plans to phase the resistors out: "I'm taking your advice and moving away from resistor leads for the electrical contacts. From now on, the kits will use chemically etched brass strips for the contacts—no hammering required.")

After a while, the rhythm of the work becomes almost automatic: Hold the resistor body while you pound a lead flat on the anvil, turn it over to flatten the other side of the lead, flip end-for-end to do the other lead, pick up another resistor, and so on.

Separately, you solder wires to some reed switches and wrap them in heat-shrink tubing to protect their fragile glass. Then, for example, you can mount a magnet on the carriage-return lever and one switch right next to it on the body of the typewriter, so that when you pull the lever the magnet closes the circuit and notifies the microcontroller that you've done the equivalent of pushing the return key.

Zylkin found that he needed to give special thought to designing a kit for do-it-yourselfers because some parts aren't easily found, while others would be hard to incorporate. It would have been nice, for example, to use off-the-shelf USB or Bluetooth ICs to handle the keyboard's communication with the rest of the world, but such chips are surface-mount only. Zylkin sells modified typewriters as well as kits and will modify typewriters sent to him. He recently left his corporate engineering job to build and sell retro-technology full-time.

So what is this retro-keyboard like to type on? For many of us, it'll be more comfortable than a modern-day one. Remember, manual typewriters were designed to be operated entirely on finger power for hours every day, and the key travel needed to reach contacts is only a fraction of the distance required in the old days to slam a type bar onto the platen. Now if only someone could go the other way around and build a CPU and some mass storage into the rest of the typewriter.

—PAUL WALLICH

profile

From QuickBooks to Slow Food

Ridgely Evers doesn't just write software for businesses, he keeps starting them up. Now he's making wine and olive oil

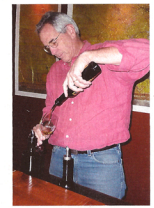
For Ridgely Evers, developing new technology has always been a means to an end. In boarding school, programming got him out of waiting tables. In college, he figured it would help bring world peace. In the 1980s, sick of keeping the books for a real estate start-up, he wrote software to do it for him.

"Manual bookkeeping is a stupid process," Evers says. "Spreadsheets are not a good place to do accounting, either."

In 1987, Scott Cook, the founder of Intuit, looked at Evers's accounting package and hired him as a consultant to write an invoicing add-on for Quicken personal finance software. Evers started working on the project but argued that small businesses needed a dedicated accounting package, not just an add-on. Cook finally agreed, and Evers set out to build what's now known as QuickBooks.

Evers led a design team of nine people, created the architecture, and wrote about 25 percent of the code himself. It came out in 1991, and today QuickBooks is still the world's most popular small-business accounting package.

While QuickBooks took the small-business accounting world by storm, Evers eventually left Intuit—then a 30-person outfit, now a public company with US $3 billion in annual sales—and built what he calls a balanced life. He does strategic consulting for large companies, and he is about to launch Captina, a company that will sell cloud-based software he created to handle inventory, marketing, order taking, and shipping for small businesses. Again, he was his software's first customer—he uses it to run his olive oil and wine company, DaVero.



POUR HOUSE: Software entrepreneur and winemaker Ridgley Evers enjoys the fruits of his labors. PHOTO: TEKLA S. PERRY

Evers also manages his 28-hectare farm, where he grows the olives for his oil and grapes for his wine. Farming is one process, he's found, that technology can't do much for; plants have to grow themselves in their own good time. And he's just fine with that. "I really love and am proud of the diversity of my life," says Evers. "I never let myself get pigeonholed."

—Tekla S. Perry

For more about the origins of QuickBooks and how a technologist got into the olive oil business, see "From QuickBooks to Slow Food" at http://spectrum.ieee.org/evers0311.