

signal : noise

Why Iran? – Turns out you don't need fission to make a megamess. Is this why oil-rich Iran is researching nuclear power?



Microsoft vs. Sony PlayStation – Microsoft and Sony bet big, but massively multiplayer will always be a geek thing.



Grid Computing – Supercomputers will be obsolete. Pigs will fly.



Global Crossing – The demand for bandwidth is growing. Global Crossing et al. just overborrowed and overbuilt.



Copyright Cartel – The Copyright Cartel says DVRs will kill TV. Just like the VCR killed movies.



WARNING

Rotating Blade Hazard
Always use food pusher.
Keep fingers out of openings.
Keep away from children.
Failure to do so can result in amputation or cuts.

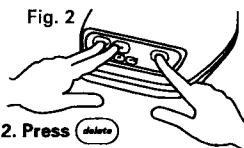
Before operating the food processor, be sure the work bowl, blades, and work bowl cover are properly assembled on the food processor power base (see page 8).

For Reboot:

Fig. 1



Fig. 2



EMBEDDED CODE IS THE FUTURE –

READY TO REBOOT

The Bugs in the Machine

by Brendan I. Koerner

Ed Yourdon was on a tarmac in Pittsburgh when he got a glimpse of the coming software hell. His New York shuttle had been cleared for takeoff when the pilot pulled a U-turn and headed back to the gate. The flaps were stuck. "We're going to have to power down and reboot," the pilot announced. It was the aeronautical equivalent of Ctrl+Alt+Delete. "Makes you think," says Yourdon, author of *Byte Wars*. "Maybe they had Windows 95 underneath the hood."

He's not necessarily joking. The so-called embedded systems crammed into jets, cars,

and "smart" appliances increasingly rely on the same bug-ridden code that corrupts PowerPoint slides, freezes *Ultima* games midquest, and costs corporate America \$293 billion a year in lost productivity. "They're starting to put Windows CE into automobile dashboards," says Philip Koopman, a computer engineer at Carnegie Mellon University. "What used to be some gears and springs is now a sophisticated computing complex. Think about it."

Or don't, if you scare easily. The software industry's nasty secret is that – surprise! – off-the-shelf code doesn't magically turn

► trustworthy once it's jammed behind a steering wheel. This slight of hand wouldn't be so alarming if lives weren't at stake. But imagine the blue screen of death at highway speed.

The problem is built into the software industry. There are 5 to 15 flaws in every 1,000 lines of code, the Software Engineering Institute estimates. Mindful of cost-benefit ratios, vendors have little incentive to boost quality; it's cheaper to write postrelease patches than to spend months triple-checking every string of code. Even if they wanted to churn out more reliable products, most programmers lack the skills. Point-and-click development aids like Visual C++ have turned software creation into a *For Dummies* exercise.

That reality is now making its way into embedded systems. Code-imbued hardware, once built as a cohesive whole by in-house designers, is more and more likely to incorporate off-the-shelf software. Only 40 percent of embedded operating systems are made from scratch, a figure sure to drop as Microsoft and its Linux rivals push their cheaper options. Why assemble a novel OS when you can shoe-horn in Windows 2005 Embedded?

So laptops crash, government servers botch Medicaid requests, and the occasional NASA robot goes haywire on Mars – c'est la vie digitale, right? Except that buggy software

is creeping into systems where failure can't be dismissed with curses and a sigh. Consider: Darpa is using wearable computers designed to beam tactical information to the "data visors" of combat troops. The devices run Windows 2000, an OS so flawed that its bug-cleansing "service packs" run to 100 Mbytes. A sniper-filled valley near Mazar-i-Sharif would be a particularly lousy spot to encounter a Runtime Error pop-up. Or take mobile phones. They worked fine when telephony was their sole task. Now that they're equipped with Web browsers and GPS chips, software glitches are routine. If you're one of the 200,000 Americans a day who dial 911 on a cell, shabby code could be a real downer. And the problem will only get worse as the tech industry's weakness for bloatware infects all those code-enriched gizmos now on the drawing board – refrigerators that email repairmen, alarms that sniff chemical leaks, cars with drive-by-wire setups.

Yet the shoddiness of these products is hardly inevitable. With a bit more elbow grease, software designers can write increasingly reliable code. One smart move would be to use mutation testing, a quality-control technique that flushes out errors by analyzing the behavior of software that's deliberately infested with bugs. Though effective, it's rarely used by com-

ONE SOLUTION IS TO UNLEASH THE LAWYERS

mercial coders because it adds to development costs. But if software jockeys are going to be responsible for lives as well as spreadsheets, their fixation on the bottom line must change.

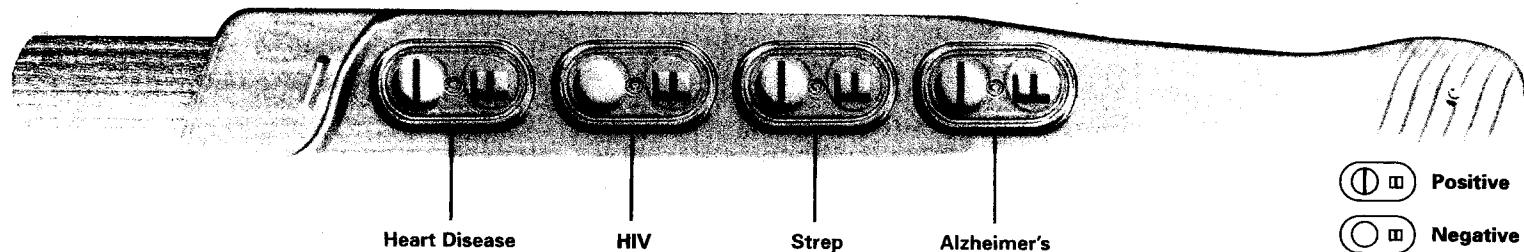
If it doesn't, there's always the American way: Unleash the lawyers. At the moment, shrink-wrap licenses and clickthrough agreements shield software makers from damage claims – even if they broke it, you bought it. Just as the legal fallout from exploding Pintos shamed Detroit, exposing software to class-action lawsuits might induce Silicon Valley to code more cautiously.

Of course, there will be bobsledding in Hades before the software industry willingly accepts such an arrangement. Software is intrinsically complex, lobbyists might aver, and bugs are an ineradicable part of the bargain. Let them think that – at least until the day they find themselves aloft in a plane that needs to reboot.

Brendan I. Koerner wrote about embryo police in Wired 10.02.

MEDICAL TESTING

Diagnosed in 60 Seconds



HOME NANOTESTS: CHEAP, QUICK, AND PRIVATE

In a world of outpatient brain surgery and one-hour kidney transplants, the field of medical diagnostics has been the laggard: a slo-mo backwater of expensive lab work that often yields sketchy results. That's about to change. A handful of companies are using nanotechnology to make fast, cheap medical tests for everything from strep to heart disease – or even a genetic predisposition to cancer. Eventually, they'll design test kits for the home medicine cabinet. Two leaders in the field:

► Nanosphere of Northbrook, Illinois, is developing the gold nanoprobe – a minuscule piece of gold fused with a snippet of DNA – to search out proteins and bits of DNA that code for disease, genetic risk factors, or individualized drug responses. A quick wash in silver chloride after exposure to a patient's blood, urine, or saliva produces a permanent and visible record of thousands of medical variables. The current prototype is about the size of a breadbox; a handheld version should appear within two years.

Nanosys of Palo Alto, California, is working on silicon nanowires painted with molecules that attract proteins specific to human diseases. When the sought-after protein from the patient sample touches the nanowire, it sticks, producing an electrical signal. The more molecules present, the stronger the signal.

Either technology could be in medical labs by 2003 and in drug stores within five to seven years. Consumers, after all, are the most lucrative market: Last year, do-it-yourselfers paid \$1.12 billion to check themselves for all sorts of afflictions, including cholesterol and hepatitis C. They accounted for nearly a third of the \$3.8 billion diagnostics market. And that's no small change. – **Charles Graeber**