

HARDWARE

# Just Tilt to Enter Text

**T**HE SAME TINY GIZMOS THAT DEPLOY AIR BAGS IN cars could soon make cell phones less cumbersome to use. Several academic and corporate labs are developing ways to use ultrasmall accelerometers and gyroscopes—which sense a car’s sudden deceleration during a crash and trigger the air bags—in the guts of cell phones and other handheld devices. This makes common tasks, such as scrolling through lists, entering numbers, and moving information from one place to another, much easier; you simply tilt the gadget in various directions.

In July, MyOrigo of Oulu, Finland, released the first motion-sensitive Web-enabled cell phone. If only part of a Web page fits on the screen, tilt the phone toward the missing content and it slides into view. It’s a novel approach that “gets at one of the core problems of navigating a Web page on a mobile device,” says Kevin Burden, an analyst at IDC in Framingham, MA.

Other researchers are using tiny accelerometers to allow simpler text entry on handheld devices. Ravin Balakrishnan and Daniel Wigdor, University of Toronto computer scientists,

have built a prototype cell phone in which, for example, tapping the “7” key while tilting the phone forward enters the letter *q* on the display screen, but tilting to the right enters the letter *r*. In tests, Wigdor and Balakrishnan found that subjects using the device could enter text 30 percent faster than they could through the usual approach, in which a user taps a number key multiple times to select one of the three letters written on it. The researchers say several manufacturers have expressed interest.



A motion-sensing phone changes display orientation.

The next step for accelerometers? Ken Hinckley, a Microsoft researcher, envisions handhelds that form instant wireless connections when clinked together like champagne glasses. Hinckley prototyped the idea using Wi-Fi-enabled tablet computers with embedded accelerometers. Bumping two tablets establishes a connection: if one tablet reports moving leftward and striking another object, and the other reports a bump on its right side at exactly the same time, both know that they have been linked. Tilting one of the tablets then dumps the contents of an open window—again via Wi-Fi—onto the other’s desktop. Microsoft doesn’t have any immediate market plans, but Hinckley is already talking about putting the same functions into wristwatches. And that could let you send files just by shaking hands. —*Larry Hardesty*

SOFTWARE

# Digital Darwin

**I**t’s a jungle out there. So businesses of every kind are increasingly turning to software rooted in survival-of-the-fittest strategies to solve extraordinarily complex problems like managing air traffic, optimizing the efficiency of service calls, and even creating new materials and food flavors.

Software based on so-called genetic algorithms is “showing up in every way, shape, and form” in the business world, says Stephanie Forrest, a professor of computer science at the University of New Mexico. Genetic algorithms create a group of solutions to a particular problem—say, how to reschedule a fleet of airplanes when a thunderstorm shuts down a major airport. The algorithms rapidly replicate, mutate, and produce new generations of possible solutions that yield better and better results, all with very

little human intervention. Millions of solutions might be created, but like fish eggs drifting in the sea, most will die. A solution that is better than its competitors eventually emerges.

It’s an approach that has been kicking around academic circles for years and has yielded some practical applications, but it is only now finding widespread commercial adoption. “Finally, this technology is coming out of the geeky environment and is being provided as a business solution,” says Navi Radjou, a principal analyst at Forrester Research in Cambridge, MA.

The list of businesses using evolutionary software is expanding. For example, Delta Airlines this year signed on with a company that develops genetic algorithms, Ascent Technology of Cambridge, MA, to optimize the schedules of many of its employees—one of the biggest individual jobs ever undertaken

by this type of software. Delta’s objective is to cut costs without reducing its level of service. And that’s a survival strategy that might have impressed Darwin himself. —*Chip Walter*

## SAMPLING OF COMPETITORS

| COMPANY                             | TECHNOLOGY   |
|-------------------------------------|--|
| Ascent Technology (Cambridge, MA)   | Evolutionary software to optimize airport and airline operations   |
| IBM Research (Hawthorne, NY)        | Large-scale, self-managing, self-repairing computer systems  |
| NuTech Solutions (Charlotte, NC)    | Evolutionary software that competes to solve problems from traffic-light coordination to artificial-flavor development |
| RDI (London and Cambridge, England) | Evolutionary software to optimize drug combinations for HIV treatment  |
| Tripos (St. Louis, MO)              | Genetic algorithms that speed drug development   |

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