

# IEEE EXPERT INTELLIGENT SYSTEMS & THEIR APPLICATIONS

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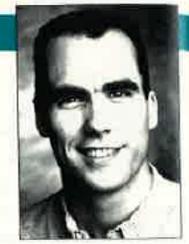
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INTERNET SERVICES

# The PalmPilot and the handheld revolution



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**H**ave you thought that perhaps the computer belongs in your hand rather than on your desk? With many failed and still-failing efforts, handheld computation has been taking a long time to arrive. However, the unquestionable success of 3Com's PalmPilot heralds the start of a revolution in computation.

Contrary to many past and present devices, the Pilot proves that portable computers don't have to mimic desktops to be useful and successful. As a result, handheld computers are incorporating new technologies, and the market is rapidly changing. Soon, many of us will spend more time interacting with our handheld devices than with our desktop computers.

### The many guises of portable computers

Portable computers come in many forms and under many names. At one extreme are laptops, which are basically desktop PCs that have been reduced enough to be lugged around. At the other extreme are Personal Digital Assistants (PDAs), which use a stylus or a few buttons, rather than a keyboard, for navigation and input. In between, suffering something of an identity crisis, are the handheld PCs (HPCs) and palmtop devices, sporting tiny fold-up keyboards and running a pared-down version

model is inappropriate for space-starved portable devices. The now-failed Go Corporation was the first company to break tradition and introduce interaction using only a stylus. Apple continued the endeavor, leading to the present MessagePad 2100, but stylus-based PDA's have caught on only gradually. Now, the Pilot has taken the lead at an exceptional pace. According to PC Data, the Pilot accounts for 70% of US retail PDA sales. According to DataQuest, in 1996, the Pilot accounted for 51% of the 1.6 million handheld devices sold worldwide. These figures are amazing, given that

the Pilot first appeared on the market in early 1996. In retrospect, the Pilot will be seen as a turning point in the migration of computation from desktop machines to handheld devices.

### Behind Pilot's success

The Pilot comes with numerous built-in applications to manage personal information—for example, calendar, to-do lists, memo pad, and address book. The touch-sensitive monochrome LCD display is used for navigation, and a simplified and easy-to-learn alphabet called Graffiti is used for input. The touch of a button synchronizes the Pilot with a desktop PC, using 3Com's HotSync technology, which also backs up data and installs new applications.

The key to the Pilot's success is its simplicity. The design is achievable rather than overly ambitious. For example, requiring the user to learn a simplified alphabet allows for accurate and predictable letter recognition. The simple design translates into affordability: the PalmPilot Personal costs \$249, compared to \$1,000 for Apple's MessagePad 2100. It also leads to wonderful portability. The Pilot weighs under six ounces, including batteries, and is a little larger than a wallet. Finally, its open architecture and available software-development systems—for example, CodeWarrior, by Metrowerks—have allowed developers and compa-



eager to get in the market. Sharp just released the SE-500 Mobile Organizer, which looks like the Pilot but lacks handwriting recognition and runs with a proprietary OS. Franklin Electronic Publishers created the Rex PC Companion, a stripped-down device with no input, which lets you browse information downloaded from a PC.

**It's all about information**

Why are these devices so successful in the first place? The answer is clear: people need to keep track of all sorts of personal information. We have always had this need, and our lives are becoming even busier and more connected. We need to schedule our day, look up phone numbers, remember the names of people to whom we were introduced, keep track of birthdays, read the latest news, trade our favorite stocks, and remember what to do, including when and where. There's a name for all these things: *Personal Information Management*.

The PIM market for desktop PCs is already well-established, including products such as Microsoft Outlook, Lotus Organizer, and Now Up-To-Date. A strong market also exists for paper-based organizers. The Pilot makes carrying all this information with us practical, so that we can access it anywhere and anytime. It's the same crucial information with which we've always been working; the Pilot is just a better means of getting to it and maintaining it.

**In the pipeline**

We're at the beginning of a long race in which many will eagerly contend. Although the Pilot might or might not retain its lead, we consumers will continue to win. Competition will bring prices down while



ently back up your data, at all times. In fact, you will no longer worry about where your data actually is, because that will not matter. People will share access to the same underlying data, stored on a central server, despite being separated in space or time. An executive, while traveling, will see changes to his or her calendar as they are made in real time back in the office. All family members will be able to update the grocery list, anywhere and anytime, and whoever does the shopping will see these changes.

Using this network, your PDA will eventually subsume the functionality of the remote controls in your home. You will control and configure your home appliances through your PDA. You will set your alarm clock; read your personalized TV guide and program your VCR; turn down the stereo or select a different song or radio station; and program, from your car or the subway, your home's heater to turn on shortly before you arrive there. This network won't need to be, and probably will not be, very high performance to provide most of these new services. Rather, it will serve as a stepping stone, motivating and then financing better infrastructure.

The network relaxes where and how computation occurs. For example, applica-

In due time, your PDA will absorb the other things you now feel compelled to carry in your pockets. Keys, now rendered as metal, plastic, or a magnetic strip, will instead be stored as bits in your PDA. All forms of currency will have digital correlates, letting you buy groceries without worrying about visiting the ATM first. Likewise, forms of identification—for example, your driver's license and Social Security card—will be digital. People will no longer be able to lie about their age and identity.

**Global Positioning System.**

Using satellites and land towers, a GPS device, soon to be one chip plus an antenna, can locate its position on the Earth's surface within three meters. PDAs will incorporate GPS. You will consult your PDA to navigate in a foreign city or to find the nearest ATM or gas station, or a good place to eat. Over the network, your PDA will monitor traffic congestion, the weather, and construction conditions, altering its recommended route as needed. You will be able to locate your children or track the entire family in the mall or on the ski slope.

**Cryptography.** Security is a big concern with present and future PDAs. I store all sorts of very private information on my Pilot—account numbers and passwords, PINs for my credit cards, telephone numbers—all of which I do not want to fall into the wrong hands. And as PDAs come to absorb everything on our key chains and in our wallets, it would seem that if you lose your PDA, you lose yourself.

In the short term, however, there are excellent tools that use strong cryptography to protect your information—for example, Andreas Linke's Secret 2.0 freeware. These tools require you to punch in a password every time you need to access your critical data. Although this is adequate, the danger

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