

The scientist and the smartphone

Mobile computing platforms such as the iPhone are beginning to make inroads into the laboratory—serious prospect or fairy tale?

Once upon a time phones were used exclusively for conversing with other people, and computers ran software applications. The computer became an indispensable tool in the laboratory while the phone developed into a mobile device that has disrupted countless lectures at scientific conferences. But recently researchers can be seen talking on their computer and using their cell phone for running fancy—and sometimes powerful—software programs.

This metamorphosis of the cell phone into a mobile computing platform with voice capabilities is epitomized by the iPhone—one of a new breed of smartphone that is not only popular among the general public but seemingly ubiquitous among scientists. Earlier phones had similar capabilities, but the arrival of the Apple App Store in 2008 provided a dizzying array of software applications, or apps, that could be installed at a touch of the screen. Stanford University even offers a free course on developing iPhone apps.

With a seemingly unlimited number of apps available, the iPhone can be quite a handy tool. An increasing number of apps are targeted to scientists, and lists of must-have apps for researchers have proliferated. There are apps to calculate how to prepare solutions, view restriction enzyme information, search online databases for papers and even store downloaded papers. Well-known product vendors for biological research are also beginning to release laboratory apps for the iPhone. Promega has an app with product information, tutorials, protocols and unit conversion calculators, and Bio-Rad has a quantitative PCR app.

Other smartphone operating systems—like Android from Google—also have app stores with tens of thousands of applications but have failed to gain traction in the biological sciences. A search of ‘PCR’ finds zero relevant apps for Android but three for the iPhone.

But will such devices be used in wet-lab procedures? The lab environment can be a dangerous place for a high-tech personal cell phone, and who wants to keep removing their gloves every time they go to a new step in a protocol? Although awkward, an easily removable skin would help alleviate some of these concerns. A killer laboratory app might convince at least some principal investigators to spring for dedicated devices for the lab.

It may not be long before such a killer app makes an appearance. The barcode scanning ability of the autofocus camera on new devices suggests some possibili-

ties. This is the basis of a popular app that is remarkably handy for checking prices when, for example, you are out shopping for a new HDTV. Barcode scanning combined with printing and database querying capabilities could turn the device into a powerful laboratory information management tool for samples and reagents. The camera combined with text recognition could be used to access the material safety data sheet for any chemical. Barcodes in scientific publications could direct readers to relevant online information or raw scientific data.

The ability to interface with other devices using different wireless protocols could be used for remote sensing or instrument control. The camera can even potentially be used for direct data acquisition. Two winners of the 2009 Vodafone Wireless Innovation Project were compact microscopes that interface with a cell-phone camera. There is also a nanosensor-based detector for airborne chemicals that plugs into an iPhone. Although envisioned for field use, these devices highlight the possibilities of the technology.

But for the present, the most immediate potential for these devices is in providing a painless way for researchers to keep up with their reading wherever they happen to be. Mass media publishers have embraced the iPhone for delivering their content, but there has been little activity in the scientific publishing arena—RSS news feeds notwithstanding. But the situation is changing. Several publishers, including Nature Publishing Group, have apps that will go live any day. The nature.com app will let you read full-text articles, view full-size figures and save references.

The recent pace of change in the mobile computing space has been breathtaking, and the arrival of the Android-based Nexus One phone from Google earlier this year may stimulate further advances. The open-source Android system could prove particularly appealing for programmers trying to integrate the device into the laboratory environment. Alternatively, a device with wireless networking but lacking cell-phone capabilities, like the iPod touch, may be better suited to the lab.

We would like to hear from you, our readers, what you use your iPhone or other smartphone for. Does it have a place in the lab? What is the must-have app you are looking for? One way or another, mobile computers have the potential to play a substantial role in the laboratory of the future. Just maybe, scientists and their mobile devices can live happily ever after.