

Open Source Software Helps to Turn a Smartphone into a Talking GPS

Forum Nokia Developer Vibe Series

Version 1.0; January 15, 2008

Move over, necessity: Self-interest is the mother of invention, too. More than a decade ago, two blind developers, Monty Lilburn and Shawn Kirkpatrick, set out to develop an inexpensive way to combine smartphones, screen-reading software, and a global positioning system (GPS). Their immediate goal was a system that could help them walk from point A to point B. The results of their work, known as Loadstone GPS, is a free, open source application that can help any of the world's 37 million blind people turn a Symbian OS smartphone into a navigational aid.

It was back in the mid-1990s that Lilburn conceived of the idea of using GPS to help himself and other blind people navigate. "GPS was just starting up then," he recounts. "I thought how cool this was — a device that could talk to me and tell me where I was."

But several obstacles had to be overcome. For one, GPS units were still expensive. For another, GPS interfaces required that users be able to see and read maps. So for several years, Lilburn's idea was just that — a nice idea, but one that didn't go anywhere.

But then came several technological developments that Lilburn realized could help. Chief among them were so-called screen readers, applications that use voice synthesis to read aloud the text on mobile phone screens. In 2004, Nuance Communications, Inc., of Burlington, Massachusetts, introduced [Nuance TALKS](#), screen-reading software for mobile devices. Lilburn, sensing an opportunity for his idea, bought a Nokia 6600 imaging device, which is



When Monty Lilburn first got the notion of using GPS to help blind people navigate, "I thought how cool this was — a device that could talk to me and tell me where I was," he says.

based on the S60 platform, loaded with the Nuance TALKS software. He now had a mobile device that could be connected via Bluetooth communications to a GPS, which had just become affordable.

The next challenge was how to combine the technologies. While Lilburn had technical skills and a computer science degree to prove it, he hadn't done any serious programming in years. "All the pieces were there, but I had no idea how to put it together," he says.

For help, he turned to Kirkpatrick, an old friend. The two had met years earlier, while attending a Canadian summer camp for blind children, and as adults, both lived in Vancouver, British Columbia. Kirkpatrick, who in the intervening years had become a programmer, was so excited by Lilburn's idea that he learned Symbian development.

True north

Meanwhile, Lilburn had discovered a commercial product that offered GPS for the blind with a screen reader. But with a retail price of approximately \$3,000, the product was prohibitively expensive. To bring down the price of such a solution, Lilburn and Kirkpatrick decided to create free open source software that would enable Symbian OS phones to take advantage of the GPS-and-screen-reader combination. They released their code under an open source license in May 2006 and called the software [Loadstone GPS](#). The name, a variant spelling of *lodestone*, refers to the magnetic substance formerly used in compass needles.

The Loadstone GPS team's next challenge involved the maps themselves. A typical GPS identifies locations as nothing more than combinations of longitude and latitude, which it plots on maps. Without the maps, all that remains is a location's coordinates. While that data by itself is useful for mapping software, it's fairly useless for mere mortals.

By that time, the two developers had recruited Shane Wegner and Rob Melchers for their team. While that helped on the manpower front, another challenge was brewing: funding. Lilburn and his colleagues were paying for the project mainly from their own pockets.

A breakthrough occurred when the Loadstone GPS team learned that both the U.S. and Canadian governments provide free location data in the form of census maps. The team realized that they could run the public maps through a database engine and come up with millions of U.S. and Canadian-named points of interest, and that these place names could then be stored on a database server. Even better, the approach worked. In the rest of the world, though, Loadstone GPS users must create and describe their own points of interest. They do so by recording a location's longitude and latitude and then entering them into the Loadstone database.

Bargain bundle

Compared with pricey commercial GPS products, Loadstone GPS is a bargain. A user needs only a Symbian OS smartphone; free Loadstone GPS software; a Bluetooth GPS receiver (which typically costs about \$100); and a screen reader that, if not included in the phone, costs a few hundred dollars more. This hardware-software bundle provides the user with a basic and portable audio navigation solution. While it doesn't include fancy mapping and route planning, a user can enter a location into the Loadstone database and get points of interest within a specified distance. "It can get you to a building, if not necessarily to the front door," Lilburn says.

Since going live in July 2006, Loadstone GPS has gone through nearly 70 builds and has been downloaded about 1,500 times. The software has users in some 40 countries, and several hundred users have contributed locations, Lilburn says.

To be sure, there have been some snags along the way. At one point, Lilburn found several points of interest that he could use personally but couldn't make available publicly because of permissions issues. For example, one mapping source, a major Scottish bank, provides data on all its locations but wouldn't give the developers permission to share that data. As for the mapping and location data that Google and MapQuest provide, the developers found it difficult to retrieve the coordinates. "You really have to look through the HTML," Lilburn explains.

Another constant worry is funding. Lilburn is convinced that with additional funding, the tool could do so much more. But the core team has been so strapped for funds that their target phones are whatever they can buy cheaply. Lilburn even surfs the Web for used phones with cracked displays, since blind developers don't use the displays.

Lilburn today uses a Loadstone GPS-equipped Nokia E70 smartphone, based on S60 3rd Edition, to navigate around Glasgow, where he moved to work as an assistive technology development officer for the [BRITE Initiative](#). BRITE is an inclusiveness program, and Lilburn helps adapt computers for people with disabilities, especially blindness. Lilburn's girlfriend, who lives in Glasgow and is also blind, uses Loadstone GPS, too, though Lilburn reports that she finds it all a bit geeky: The GPS receiver attaches to the user's jacket or shirt pocket.

Copyright © 2008 Nokia Corporation. All rights reserved.

Nokia, Forum Nokia, and Nokia E70 are trademarks or registered trademarks of Nokia Corporation. Bluetooth is a registered trademark of Bluetooth SIG, Inc. Other product and company names mentioned herein may be trademarks or trade names of their respective owners. The information in this document is provided "as is," with no warranties whatsoever, including any warranty of merchantability, fitness for any particular purpose, or any warranty otherwise arising out of any proposal, specification, or sample. This document is provided for informational purposes only. Nokia Corporation disclaims all liability, including liability for infringement of any proprietary rights, relating to implementation of information presented in this document. Nokia Corporation does not warrant or represent that such use will not infringe such rights. Nokia Corporation retains the right to make changes to this document at any time, without notice. A license is hereby granted to download and print a copy of this document for personal use only. No other license to any other intellectual property rights is granted herein.