

The Phone's Compass as a Game Controller

The Nokia 6210 Navigator¹ is the first device from Nokia that features a magnetometer. It allows using the phone as a compass – very important for pedestrian navigation. GPS alone can only determine the direction in which you're facing when you are moving. With a compass, the phone instantly knows in which direction you're facing and rotates the map accordingly. This makes me happy when I step out of the underground and want to know where to go – without having to walk several meters only to find out that I chose the wrong direction.



A traditional compass only works when it is held horizontally. As Paul Coulton recently described in his Forum Nokia Blogs posting², the Nokia 6210 includes a 3-axis magnetometer. Through some calculations, it is possible to find out the absolute direction in which the phone is facing, no matter how the phone is oriented. The S60 Sensor Framework³ provides a processed sensor output that gives you the degrees relative to the North Pole.

Compass Applications

Traditional applications that greatly benefit from a compass are apps like the “Magic Wand” (recently described by Paul⁴; our students have also been working on a similar app during the winter semester): just point the phone to a building and the phone tells you what it is. By combining information from GPS, the accelerometer and the compass, it is possible to determine where the user is pointing his phone and for example to augment the camera picture with additional information about what he sees.

Another possibility would be to use the same method for showing information about the stars and constellations. Just point your phone to a star and instantly get information about it. I'm not yet aware of any such applications for S60 phones that integrate the magnetometer. General planetariums are of course available, like for example Solun⁵.

A few days ago, I've been chatting with Philipp Breuss⁶, one of the winners of the first Android challenge and now teaching Android at our Mobile Computing department in Hagenberg⁷. He told me that there are currently two such planetarium applications that make use of the magnetometer for the Android platform; one of them being his own. An easy to understand concept that has great potential.

¹ http://www.forum.nokia.com/devices/6210_Navigator

² <http://blogs.forum.nokia.com/blog/paul-coultons-forum-nokia-blog/2009/03/17/understanding-the-magnetometer-digital-compass-sensor>

³ http://wiki.forum.nokia.com/index.php/S60_Sensor_Framework

⁴ <http://blogs.forum.nokia.com/blog/paul-coultons-forum-nokia-blog/2009/01/06/point-n-see-the-return-of-the-geo-wand>

⁵ <http://www.piecafe.co.uk/>

⁶ <http://www.mobilizy.com/?lang=en>

⁷ <http://www.fh-ooe.at/mc>

Compass Games



The compass is of course not limited to applications. A novel idea is to use it for controlling games. Christian Feldbacher⁸ and his colleagues Philipp Rakuschan and Clemens Stangl have been busy developing a 3D car game with a clever artificial intelligence over the last two semesters.

As an experiment, we decided to include the compass as an additional control method.

Playing the game with the compass requires physical action – the car drives in the absolute direction you're facing. Want to turn the car left? Just turn yourself to the left. How to turn the car around? Make a 180° turn yourself (e.g. from North to South).

In contrast to the compass, the acceleration sensor is only able to measure relative movements on this axis. The rather small resulting sidewise acceleration forces would not be sufficient for accurate game control. Instead, accelerometer based car games usually rely on tilting the device – something that can be measured easily through the different distribution of gravity to the three accelerometer axes. However, there would not be a difference at all if you're facing to the North or the South – the gravity is always just directed downwards. Through the compass, the game is now able to integrate the absolute direction in which you're facing.

His video on YouTube⁹ demonstrates the look and feel of the game, as well as the compass-based control mechanism.

Of course, steering via the compass isn't well suited for playing the game in a bus and is probably problematic for long gaming sessions. However, it's great fun!

As a next step, why not make a game that determines how often you can turn around before you get dizzy and fall to the ground (detected by the accelerometer, to use the available sensors to their full extent)?

CarChallenge is essentially finished and will be released shortly. Watch the project page at [symbianresources.com](http://www.symbianresources.com)¹⁰ for updates!

- Andreas Jakl
andreas.jakl@fh-hagenberg.at

⁸ christian.feldbacher@fh-hagenberg.at

⁹ <http://www.youtube.com/watch?v=z6ezAGhJNjc>

¹⁰ <http://www.symbianresources.com/projects/carchallenge.php>