

Finland team uses Earth's magnetic field for phone indoor positioning system

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(Phys.org) -- Finland-based engineers have worked up a novel approach toward an indoor positioning system (IPS) inspired by the way certain animals--from homing pigeons to spiny lobsters--navigate their way with the help of cues that arise from local anomalies of the earth's magnetic field. The researchers have formed a company with seed capital investment to commercialize their approach. Namely that approach has resulted in a smartphone app that uses magnetic fluctuations to map indoor locations. Aptly named [IndoorAtlas](#), the company is a spinoff from their University of Oulu beginnings.

They now have a smartphone app that uses the Earth’s magnetic field to help people—in businesses and developers—that can help people tell exactly where they are. It can provide smartphone users a way to make use of indoor maps and can also provide developers with a toolbox for positioning-focused applications.

They authored a [paper](#), “Ambient magnetic field-based indoor location technology - Bringing the compass to the next level,” that explains their notion that the earth’s magnetic field is not only a useful factor for animals but also for true navigation for modern-day applications.

“Some animals, such as spiny lobsters, are not only able to detect the direction of the Earth's magnetic field, they can even sense their true position relative to their destination. This means these particular animals are able to derive positional information from local cues that arise from the local anomalies of the Earth's magnetic field.”

Likewise, they said, modern buildings with reinforced concrete and steel structures have unique, spatially-varying ambient magnetic fields that can be used for positioning, though on a far smaller spatial scale. They said that each building, floor and corridor creates a distinct magnetic field disturbance that can be measured to identify a location and generate a map.

“In principle, a non-uniform ambient magnetic field produces different magnetic observations, depending on the path taken through it. In IndoorAtlas' location technology, anomalies (fluctuations) of ambient magnetic fields are utilized in indoor positioning.”

Dr. Janne Haverinen, the head of the project, said both what they know about magnetic fields and what they saw in the smartphone marketplace combined to drive their product development. “When iPhone and Android phones arrived with built-in compasses, we realized that we

could develop an innovative indoor navigation solution by applying our digital signal-processing expertise,” said Haverinen.

As such, *New Scientist* points out the interesting feature of this technology: Compasses don't normally work inside buildings because metallic structures disturb the [Earth's](#) magnetic field, while IndoorAtlas can make use of these disturbances to create a unique map within each building.

The company is offering a “toolbox” made of three components, Floor Plans, Map Creator, and an app creator using the company API. Before indoor positioning information can be used on a smartphone, developers need to collect [magnetic field](#) information and overlay the information with a floor plan. They need to create an image of the location's floor plan and then walk through the location while collecting data.

IndoorAtlas says their toolbox can create indoor location-awareness applications for a range of applications, such as to guide people inside shopping centers and airport terminals.

As for smartphone use, the technology is described as a software-only location system that requires nothing more than a smartphone with built-in sensors. No radio access points or other external hardware infrastructures are necessary. The accuracy in IndoorAtlas' technology in modern buildings ranges from 0.1 meter to two meters.

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