Accurate Real-time Indoor Navigation – www.indoo.rs

Overview

Human beings spend over 80% of their time indoors. While enormous advances in positioning technology of the past decade now allow almost anyone to find their way to an outdoor location within a dozen feet of accuracy, indoor navigation still relies on static maps, often on paper. Indoor navigation providers face an array of technical hurdles determined by confined, dynamic spaces and structural interference. Indoo.rs offers a solution that uses **a multi-factor approach for best accuracy**: dead-reckoning/inertial positioning and both radio and electromagnetic fingerprinting are used in tandem to give the most accurate reading within a structure. Additionally, Indoo.rs provides real-time positioning while preserving device battery life.

Indoo.rs is a core technology with significant **advantages** over competitors: accuracy, battery life, and availability across all mobile devices, including iPhone. Indoo.rs requires **NO additional hardware installation on-site**, and is optimized per device type. Indoo.rs works with the broadest range of map data, and provides an **SDK for application developers**.

Indoo.rs is the ideal technology partner to bring indoor navigation to your customers.

Market

Analysts predict a **tripling** of the **navigation device market** between 2010 and 2015.

In 2015, 2.6 billion WiFi-capable devices will be circulating and **42% of all delivered mobile devices** will be **WiFi-capable**. Users will **spend 80-90%** of their time **indoors** and 80% of all data connections are initiated indoors.

Seamless indoor and outdoor navigation will become a core feature, likely moving to chip-based solutions on the device, as retail, travel, hospitality, amusement park and conference customers increasingly adopt integrated solutions that can deliver customers to aisle or kiosk level accuracy without any additional hardware on site.

The Indoo.rs Solution

The Indoo.rs solution is a core technology platform that provides best-in-class indoor positioning and navigation in real-time. The solution is designed to support a broad range of application and native hardware environments. The Indoo.rs navigation solution is developed by signal processing and navigation experts to offer clear benefits over competitors, and best practice in a fast developing technology field.

- **Accuracy** – the Indoo.rs solution uses a combination of WiFi and electro-magnetic fingerprinting, and dead-reckoning to provide the most accurate, real-time positioning information to any application. Additionally, the Indoo.rs team uses structural and materials data for further, predictive positioning accuracy. The Indoo.rs solution provides at least 15 foot (5 meter) accuracy without additional onsite hardware, and significantly greater accuracy with additionally placed WiFi access points or sensors.
- **Real-time navigation** – the Indoo.rs solution accesses raw signal data directly from sensors, bypassing 3rd party APIs, and using optimized processing based on device profile (antenna characteristics, etc.) Processing quality is thus both very high, and very fast. Indoo.rs is able to process WiFi data on the lowest bit-for-bit data level and can communicate directly with the WiFi device. Indoo.rs uses custom, patented algorithms for quick, accurate calibration of device location.
- **Post-process filtering** - Indoo.rs is able to estimate its own accuracy, and results are subjected to further semantic filtering and smoothing before device position is sent to the application.
- **Predictive algorithms** -Indoo.rs processes information from the building and floor plan, providing improved accuracy by dead-reckoning, as well as routing. Routing data is preprocessed to be fast and efficient as well as suitable for indoor and pedestrian use. Complex building structures including escalators, speed walls, doors and security checks are taken into account.

- **Battery efficiency** – Indoo.rs uses power efficient alogorithms. Indoo.rs is active only when needed and manages sensor power intelligently. Indoo.rs uses complex data clustering to save RAM on mobile devices.
- **Indoo.rs footprint optimization** – Indoo.rs data storage and algorithms are optimized for mobile devices. Maps as well as the data necessary for location are compressed and saved in an energy efficient manner on the client device. Data can be sent from the server to Indoo.rs enabled handsets incrementally, as needed, thus saving power and bandwidth. Indoo.rs uses little RAM, and when used as an Android library, can be configured to run as an independent process encapsulated independently from any application. Indoo.rs can use code and process sharing between apps, and can also benefit from heavy caching.

The Indoo.rs solution supports both iPhone and Android platforms and Indoo.rs offers professional services for embedded and native chip set applications.

Indoo.rs Solution Integration

The Indoo.rs solution supports '**out of the box' integration with third party software** and systems. Indoo.rs provides an **easy-to-use SDK** for applications requiring accurate, efficient location information.

No additional hardware is needed and Indoo.rs works with or without WiFi network access. Simply extend an application by adding the Indoo.rs library, and then walking through the mapped indoor area with a measuring device (client device or laptop with positioning sensors) and a digital location grid of the area is created. An overview map (no CAD map needed) of your location is all that's required (e.g. an image file, such as JPEG).

The measurement process itself works in real time. You do not need to stand still at every measurement-point for 10 seconds, as with other providers.

Indoo.rs tells your application the current position (as X,Y,Z coordinates) ~ every second. X and Y coordinates are your position on the current floor. The coordinate origin is the top-left corner in the building map. Units are millimeter. Z coordinates are the ID of the floor (e.g. -1=Sub1, 0=Ground, 1=Floor1, etc.) For example, if x=1500, y=10000, z=2 you are on the second floor and 1.5m from the left-most and 10m from the top-most corner in the building map.

Indoo.rs notifies the application when the user enters or leaves a building. The notification also contains information about the building that the user recently entered or exited.

Use Cases

An important goal of current solutions is to provide **aisle-level accuracy**, while eliminating (or at least minimizing) requirements for on-site hardware. Indoo.rs achieves this to within a target of 15 feet (5 meters), and can substantially improve on this resolution with additionally placed WiFi access points or specific sensor emplacements. Indoo.rs works with hardware manufacturers, application providers and map providers to build applications to support the **widest range of use cases**, requiring the most accurate, real-time indoor navigation capability.

- **Corporate Showcase** – **Frequentis** (www.frequentis.com) the **leading global supplier** of communication and information solutions for safety critical applications such as aerospace, maritime and military, employ Indoo.rs as a corporate showcase, with corporate HQ indoor navigation. Frequentis use the Indoo.rs application as a roadmap application for their own customers. Use cases include corporate headquarter navigation, meeting finder, guide for press and public guests, executive office locator, etc. Companies can also use Indoo.rs to locate employees or objects within their buildings.
- **Travel** - Indoo.rs partners with the **Austrian Gov't and Vienna International Airport** to provide a showcase navigation application. Travelers at airports or railway-stations receive a mobile assistant, which navigates them to the right place within the terminal structure.
- **Retail –** shopping malls can guide customers to specific shops and **combine the navigation feature with a check-in or couponing system**. Customers in hardware stores or supermarkets receive information on products and special offers, **when in proximity** of a specific **product** or product range.
- **Museums -** are able to provide information to their visitors about exhibits and customized tours.
- **Trade fairs** and **events** help visitors find specific exhibitors or food courts.
- **Hospitals** - and other **medical facilities** can determine and survey the position of staff members, patients and appliances.
- **Public safety -** police, fire brigade and emergency medical services are able to locate themselves and their colleagues inside buildings.

Professional Services

The Indoo.rs team provides **support and training** for developers using the Indoo.rs SDK for application development. Additionally, the Indoo.rs team provides consultancy and professional services for **embedded system development**, and can provide customization and porting for a number of **native chip-sets.**

Team

Indoo.rs comprises an expert team of engineers focused on digital signal processing and positioning/LBS. The team has **decades of experience in location, DSP and mobile application environments**, and have built and supported developer communities.

The Indoo.rs team is highly focused on supporting application and hardware partners with best-in-class products and support.

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