IT CRAFT Tells: How Businesses Can Use an Indoor Navigation App

Development costs for an indoor navigation app vary greatly. Cost factors affecting the end price include type of facility, technologies used to direct visitors to desired destination, and inclusion of non-navigational features.

(PRWEB) April 15, 2018 -- Indoor positioning and navigation systems help guide visitors inside large facilities where GPS is useless.

The problem with estimates for an indoor navigation app is exactly the same as with any other complex solution: there is no universal platform that suits all types of facilities and all use cases. The choice of a technological stack depends on initial conditions (venue type, existing entrances/exits, construction materials, etc.) and on the product owner’s goals.

From a visitor’s point of view, an indoor navigation app provides turn-by-turn instructions to the desired destination: the more precise, the better. From a facility owner’s side, an indoor navigation solution enables data collection on user behavior. This helps determine how much time people spend in different locations, where they stop, etc. and use this data in an analytics system. Also, facility owners use indoor navigation apps for marketing purposes; that is, to send promotional push notifications.

Costs for an indoor positioning app vary greatly based on the desired feature list and technologies. Below, we discuss these factors and how they affect the price of a mobile navigation app based on IT Craft’s experience of cooperation with UAE-based startup, Smart Navigation Systems for its indoor navigation system, InNav (https://itechcraft.com/portfolio.smart-navigation-systems).

- Indoor navigation hardware
- Location Engine
- Mapping
- Software development: basic feature list and extra features
- Post-release maintenance, updates, and upgrades

Indoor navigation hardware
There are several approaches to indoor navigation (https://itechcraft.com/indoor-navigation.ibeacon/) inside large facilities like shopping malls or airports. However, only Wi-Fi access points, BLE (Bluetooth Low Energy) beacons, and geofencing are suited for practical use. In order to ensure accuracy, the approaches will be mixed within one app.

A smartphone gets a position from both Wi-Fi and BLE beacons depending on amount of interference, overlapping and signal level. However, there is a difference.

Wi-Fi access points function as signal transmitters. They do not calculate user position: such positioning is done on the user’s smartphone, eating up battery power.

Also, Wi-Fi access points need an extra power supply.

BLE Beacons have a long battery life and an acceptable 6-10 ft. (2-3 m) range accuracy. They transmit signals into an environment supported by both Android and iOS, and do not require any extra equipment on the user
side. Also, BLE beacons-based navigation solutions calculate the route on the server to eliminate extra load on the user device.

In order to achieve accurate position calculation, user must be within range of, at least, three BLE beacons (triangulation method).

According to indoor.rs calculator, the recommended coverage for a beacon is 65-100 ft² (20-30 m²) for office buildings, up to 245 ft. (75 m) for shopping malls, and 290 ft. (150 m) for airports. The number of beacons required to ensure accurate measurement depends on the number of obstacles, e.g., walls. It also depends on the desired level of accuracy.

Also, when starting a promotional campaign, businesses can use the same BLE beacons for push notifications. Open space types of venues are challenging for BLE beacons, e.g., parking garage. In this or similar type of venue, we apply geomagnetic fingerprinting; in the case of InNav app, it is Indoor Atlas.

Geofencing uses a smartphone’s built-in compass and a geomagnetic map of the venue. Geofencing’s weak area: the magnetic field must be stable. With every new source of electromagnetic emission, the product owner updates the geomagnetic map.

Costs: The average price for a three-piece kit is $60 or $20 a piece (look for manufacturers offering discounts). Deployment and tuning – depends on the total area of a facility and number of interference sources. The measurement interval is three feet (one meter), thus installation engineers walk square by square making stops for several minutes to upload data to the navigation provider’s server for future mapping. Based on this data, the location engine creates a map to be used on the product owners’ side.

Location (positioning) Engine

In order to track smartphones, collect data, and create routes, developers of indoor navigation services provide location engines. Location engines boost indoor navigation app development eliminating work on custom logic for positioning calculations.

Often, a navigation app uses different location engines depending on which technology gives the most accurate navigation results. At this time, the app switches seamlessly from one location engine to another letting users constantly see their path on their smartphone screen en route to their destination.

As an example, the navigation scheme shows how different positioning systems are applied through venue levels for a user to arrive from starting point to end point two levels above.

Users start their journey in a parking garage on Level 0. Estimote beacons guide them to the elevator needed to arrive to Level 1. On Level 1, the app switches to the Indoor Atlas engine that navigates them through Level 1 to the escalator going to Level 2. On Level 2, the app switches to the indoo.rs engine that directs them to their destination.

Costs: Based on the subscription plan (usually, upon contact).

Mapping

When a user positions two points on a map, the app calculates the route on a back-end server and then sends back the result to the user device. In order to eliminate the load, the server generates a path on the basis of a navigation graph which, in return, is possible when the system already has its nodes on a map.
After venue owners install all BLE beacons, they register them in the system and mark them on a map connecting to points of interest.

Costs: Based on the number of maps and on the number of objects on the map. The time/cost estimate for one map starts from eight working hours.

Software development: basic feature list and extra features

All features can be divided into “must-have” and “nice-to-have” categories. An indoor navigation is impossible without the following list of basic features:

- Positioning – set up beacons in the system and, based on these, determine the location of a user.
- Mapping – create a map with all locations and possible routes to later shorten route creation time (for this, use fingerprinting).
- Routing – create the best route and guide the visitor to the point of destination.
- Analytics and heat map – see the number of visitors, time they spend, and user behavior inside the facility.
- Administration panel – a special web app that enables managing beacons, setting up promotional campaigns, tracking statistics, etc.

The list of the app’s extended features includes the following:

- Custom logic – develop logic to improve positioning and navigation.
- Custom design – create a special design for the app to distinguish it from competitors.
- Voice guidance – get voice directions using head phones.
- 3D maps – enable visualizing the route better compared to 2D maps.
- Navigation between buildings – indicate where a visitor leaves one building, switch to GPS, then switch back to indoor navigation as soon as he/she enters another building.
- Push notifications – send promotional campaigns and service notifications.
- Log-in using Facebook account – avoid creation of an extra account.
- Find a friend – enable finding the location of a friend with his/her permission.

Costs: For the basic feature list, starting at 1,000 working hours.

For extended features, an estimate starts at 1,000-2,000 working hours and depends only on the number of positions in the feature list.

For example, the project by Smart Navigation Solutions took over 17,000 working hours within three years to offer a white label solution ready for deployment with minimal customization needed by the product owner.

Post-release maintenance, updates, and upgrades

This section depends on the equipment, feature list and 3rd-party services applied.

Third-party services. Apart from the subscription for a location engine, there are PaaS (Platform-as-a-Service) solutions to decrease development and maintenance (extra features, e.g., map storage).

Servers. Apart from the location engine that calculates the route, product owners create a server with all the information on fingerprints/deployed beacons and custom maps. It saves time on replacement when a beacon gets out of order. Another server contains information on marketing campaigns and BLE beacons used for push notifications.

BLE beacons updates. Usually done automatically through the beacons app. However, facility owners have to
monitor messages from the BLE beacons vendors.

Upgrades and updates – Indoor navigation apps require updates in response to updates in beacons and smartphone software or shutting down of 3rd-party services. The scope of work depends on how deeply the updates affect the app functionality.

Costs: In summary, development of a simple indoor navigation system is based on working hours. The end price depends on the feature list and number of navigation engines, and number of BLE beacons needed for stable navigation; that is, on the size of the building.

The app maintenance and upgrade depends on subscription costs for 3rd-party services plus expenses on servers. Upgrades are hard to predict.

Companies can save on indoor navigation development by:
Introducing only core features and step-by-step development of extra options based on the user interest.
Implementing a PaaS solution and using minimal equipment.
Using an administration panel for quick map and hardware updates.
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