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WiFi SLAM - Indoor Localization for Mobile Devices

A team of Stanford computer scientists have developed software that can serve as a key enabling technology for location-aware services indoors. Location-aware services are an important emerging technology for mobile devices. Determining location outdoors is easy with existing technologies like GPS. Indoor localization is more difficult.

The WiFi SLAM (simultaneous localization and mapping) algorithm efficiently solves the indoor localization problem by using already-existing WiFi beacons to localize a mobile device. While competing methods for WiFi localization exist, this technology offers significant improvements. Specifically, it provides easy, low-cost map creation -- a single user can create a map just by walking around arbitrarily. It also provides highly reliable localization. Ultimately, indoor localization using WiFi SLAM can be used to provide safety, indoor navigation, enhanced customer experience, and efficient meet-up solutions.

Stage of Research
The developers have tested the algorithm in a number of applications, showing it produces excellent results in practice.

Applications

- **Indoor localization and mapping** for smart phones or robotic devices

Advantages

- **Efficient and low cost:**
    - uses existing WiFi beacons

    - software only solution that utilizes only signal-strength measurements, without hardware or network infrastructure
- **Easy to use** - no initial set up/configuration of devices
- **Simple map creation** - a single user can create a map just by walking around arbitrarily
- **Reliable, self-correcting localization**
- **Broad range of environments** - no signature uniqueness assumptions

Patents

- Published Application: 20130244688
- Published Application: 20160216359
- Published Application: 20180267133
- Issued: 9,201,133 (USA)
- Issued: 9,915,722 (USA)
- Issued: 10,422,849 (USA)

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