

Mobile connectivity indoors has just got better

July 10 2015

Researchers at IMDEA Networks invent the simplest solution available today to swiftly build a mobile wireless positioning system in a new indoor environment. Unlike other systems, it requires neither manual and costly offline pre-calibration nor any special hardware.

IMDEA Networks Institute announces the successful completion of the research project "Opportunistic Timing Signals for Pervasive Mobile Location". It has accomplished remarkable scientific advances in the optimization of pervasive mobile location services, bringing nearer to hand the evolution of mobile wireless connectivity towards a seamless integration of navigation and network communications. Dr. Domenico Giustiniano, a Research Assistant Professor at IMDEA Networks, a Madrid-based research institute, has led the scientific work, which was financed by the Swiss Confederation represented by Armasuisse – Science and Technology.

Despite the increasing interest in the area of mobile indoor localization, the positioning capability of Wireless Local Area Network (WLAN)-based mobile devices does not meet the joint goals of high accuracy and fast response time, given the constraint of using a commodity smartphone as target device.

To solve this, the project has built an approach that uses solely Time-of-Flight (ToF) measurements and relies on software upgrades of simple commercial off-the-shelf 802.11 chipsets that can be integrated in any access point (AP). This innovative solution not only reduces system

implementation costs by using WiFi six dollar chipsets (used, for instance, by very famous Cisco APs) to collect and filter measurements, but also the novel filtering technique applied requires just a few samples to estimate the distance range.

To ensure its working capability, the system has been tested across different and heterogeneous setups and testbeds (including scenarios with strong indoor multipath), resulting in a median error of the distance of merely 1.7 – 2.4 m. Furthermore, it has also participated in indoor localization competitions achieving comparatively positive results. Amongst the advantages of the proposed solution are its cost-effectiveness (it runs on commodity WiFi hardware) and its ease of implementation (it is the simplest solution available today to swiftly build a positioning system in a new [indoor environment](#)). Unlike other systems, it requires neither manual and costly offline pre-calibration nor any special hardware.

A new research project called MATISSE has been launched to build on the success of IMDEA Networks' former research initiative in the area of Pervasive Mobile Localization. MATISSE will expand the scope of the prior project to include a new specialist research topic: Collaborative Wideband Spectrum Sensing Systems.

Knowledge about usage of the spectrum data and about the user's location is essential to build any communication protocol and service. With this in mind, MATISSE has a two-fold objective. On the one hand, it aims to improve current poor knowledge about usage of the electromagnetic spectrum by introducing cyber-physical nodes that will be capable of monitoring the wideband spectrum at a very large scale, such as cities and nations. On the other hand, it will devise and build a pervasive localization system that is able to pin-point the position of a mobile device regardless of the environmental conditions.

The project "Opportunistic Timing Signals for Pervasive Mobile Location" operated from April 2014 to March 2015 and MATISSE was launched immediately after and until March 2016. Armassuise – Science and Technology continues to provide funding to complete this work.

More information: "A Realistic Evaluation and Comparison of Indoor Location Technologies: Experiences and Lessons Learned." (Paper), In: ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2015), 13-16 April 2015, Seattle, USA

Provided by IMDEA Networks Institute

Citation: Mobile connectivity indoors has just got better (2015, July 10) retrieved 24 April 2024 from <https://phys.org/news/2015-07-mobile-indoors.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.