Theme: Sensor Technology

Subject : IPS (Indoor Positioning System) algorithm technique

Introduction

Accurate and reliable indoor positioning system is required in the future generation of communications networks. A positioning system enables a mobile device to determine its position, and provides position-based service such as navigating, tracking or monitoring, and so on.

GPS is the most widely used satellite-based positioning system. However, GPS cannot be deployed for indoor use, because line-of-sight transmission between receivers and satellites is not possible in an indoor environment. Comparing with outdoor, indoor environments is more complex. There are various obstacles, for example walls, equipment, human beings, influencing the propagation of electromagnetic waves. Considering these issues, IPSs for indoor applications raise new challenges for the future communication systems.

The goal of this research project is to explore novel technology for the low error distance, high success probability, low delay, high scalability, and low-cost IPS system.

Scope

High accuracy and precision IPS that has low-delay and required scalability. Usually, there is a trade-off between the price and the performance of an IPS.

- Accuracy: low average error distance
- Precision: high success probability of position estimations with respect to predefined accuracy
- Low-delay: track the target that moves quickly in dynamical indoor environments
- Scalability: simultaneously locate a large number of objects
- Low-cost

Research questions

We are interested in the following research questions. These questions are not exhaustive but different research questions are open to discuss with research partners.

- Which location technique is better for high performance and low cost IPS: Triangulation (RSS, TOA, AOA), fingerprinting, proximity, inertial and etc positioning techniques.
- What would be strong candidate device for IPS to realize high performance and low cost: WiFi, Bluetooth, RFID, UWB, IR, ultrasound, electromagnetic, and so on.
- Is it possible to realize better performance by integrating various location techniques?

Expected Deliverables

- Proposal of new system architecture design using new or integrating techniques
- Alternatively, proposal of new or innovative improvement on IPS
- Presentation, discussions, and documentation on the result of the research study
- Upon agreement, sharing or co-owning of the intellectual property stemming from the research study
- Working sample/prototype demonstrating improvement on the described metric(s)