CE/CZ4171: Internet of Things: Communications and Networking

Part I - Tutorial 2: A Case Study of Device-Free Wireless Indoor Localization

Before tutorial, please download and read the following paper:

A Survey on Wireless Indoor Localization from the Device Perspective, ACM Computing Surveys, vol. 49, no. 2, Article 25, June 2016

https://dl.acm.org/doi/10.1145/2933232

(or with NTU login) https://dl.acm.org.remotexs.ntu.edu.sg/doi/10.1145/2933232

1. State the main advantage of the device-free approach, compared with the device-based approach, briefly explain the challenges faced by the device-free approach.

2. List and briefly explain two location-based application scenarios where the device-free approach is applicable, while the device-based approach is unapplicable/undesirable.

3. Explain concepts of TOA, AOA, RSS, and CSI measurements and their role(s) in the wireless indoor localization.

4. Explain concepts of the four main indoor localization algorithms, including the proximity, lateration, angulation, and fingerprinting algorithms.

5. Give an example of camera-based device-free localization system, briefly explain the roles of its blocks.

6. Explain concept of a device-free passive (DfP) localization system using WiFi and state its three main functions.

7. List a device-free localization approach that can be used for the indoor through-wall positioning systems. Explain concept of this approach.

8. Compare accuracy, energy-efficiency, cost-efficiency of device-free localization approaches.

9. List and briefly explain 6 open issues that need to be solved in the device-free localization approaches.