Energy-Efficient WiFi Fingerprint-Based Localization with Low-Power Radio
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Indoor localization is essential to enable location based services in wireless pervasive computing environment. In recent years, WiFi fingerprint-based localization has received considerable attention due to its deployment practicability. In order to achieve on-the-fly localization, WiFi receivers (e.g., mobile phones or laptops) being located need to scan WiFi channels continuously. Since they are normally battery driven, energy efficiency is a very important consideration in WiFi fingerprinting localization systems. Motivated by the fact that IEEE 802.11 (WiFi) and 802.15.4 (ZigBee) channels overlap in the 2.4GHz ISM band, in this work, we develop a WiFi fingerprint based localization system using ZigBee radio, called ZiLoc. We first present a novel RSS-location fingerprint model to identify each AP's beacon signal. We then propose a simple yet effective method to compute the distances between the testing and training RSS fingerprints. We conduct extensive testbed experiments to study the performances of ZiLoc, and compare three different k-Nearest Neighbor (KNN) classification methods for the location determination. Experimental results demonstrate that ZiLoc can achieve an average of 85% room-level localization accuracy and reduce around 60% energy consumption compared with the method using WiFi interfaces to collect RSS fingerprints.