

Wi-Fi received signal strength-based hyperbolic location estimation for indoor positioning systems

ABSTRACT

Nowadays, Wi-Fi fingerprinting-based positioning systems provide enterprises the ability to track their various resources more efficiently and effectively. The main idea behind fingerprinting is to build signal strength database of target area prior to location estimation. This process is called calibration and the positioning accuracy highly depends on calibration intensity. Unfortunately, calibration procedure requires huge amount of time and effort, and makes large scale deployments of Wi-Fi based indoor positioning systems non-trivial. In this research we present a novel location estimation algorithm for Wi-Fi based indoor positioning systems. The proposed algorithm combines signal sampling and hyperbolic location estimation techniques to estimate the location of mobile users. The algorithm achieves cost-efficiency by reducing the number of fingerprint measurements while providing reliable location accuracy. Moreover, it does not require any additional hardware upgrades to the existing network infrastructure. Experimental results show that the proposed algorithm with easy-to-build signal strength database performs more accurate than conventional signal strength-based methods.

Keyword : Indoor positioning; Hyperbolic location estimation; Wi-Fi fingerprinting; TDOA; Trilateration; Received signal strength.