

Direction-of-Arrival Tracking in WLAN Network Using Dual Antenna Access Points

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ABSTRACT

The Global Positioning System (GPS) has a world-wide service capability, and it is used in many applications. However, GPS signals cannot be received in the shadowed region such as indoor environment. To enable indoor navigation, other positioning systems need to be applied. Recently, WLAN access points (AP) have been deployed in most of the large buildings at urban area to communicate with smart phones or notebook PCs. Therefore, many indoor positioning solutions using WLAN technology have been developed such as received signal strength (RSS) method or time of arrival method. However, positioning method based on RSS has poor positioning performance, and the time-based method is hard to implement owing to high-accuracy time synchronization requirement. This paper presents a direction of arrival (DOA) positioning method using dual-antenna access points, which time synchronization between APs are not required and is fairly accurate in line of sight condition. The basic idea of DOA estimation technique is to estimate the phase differences at various frequency components of Fourier spectra between any pair of antenna sensors. For real-time application, fast Fourier transform (FFT) technique is used. Ambiguity elimination technique is used for estimating the integer number of 2π in the phase difference measurement in the Fourier spectra. At the end of the paper, a simple experiment is presented, which shows the process of DOA estimation.

KEYWORDS: direction of arrival (DOA); angle of arrival (AOA); WLAN positioning