

# Indoor WiFi Positioning System for Android-based Smartphone

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**Abstract**—WiFi positioning system has been studying in many fields since the past. Recently, a lot of mobile companies are competing for smartphones. Accordingly, this paper proposes an indoor WiFi positioning system using Android-based smartphones.

**Keywords**—Wi-Fi, Wi-Fi Positioning System, Android, smartphone

## I. INTRODUCTION

Wi-Fi positioning system (WPS) [1] is widely being studied in many fields. WPS usually uses Wi-Fi signals from already-installed private and public WiFi APs in order to provide the location based service (LBS). WPS complements the measurement error of global positioning system (GPS) in the center of the city or indoor.

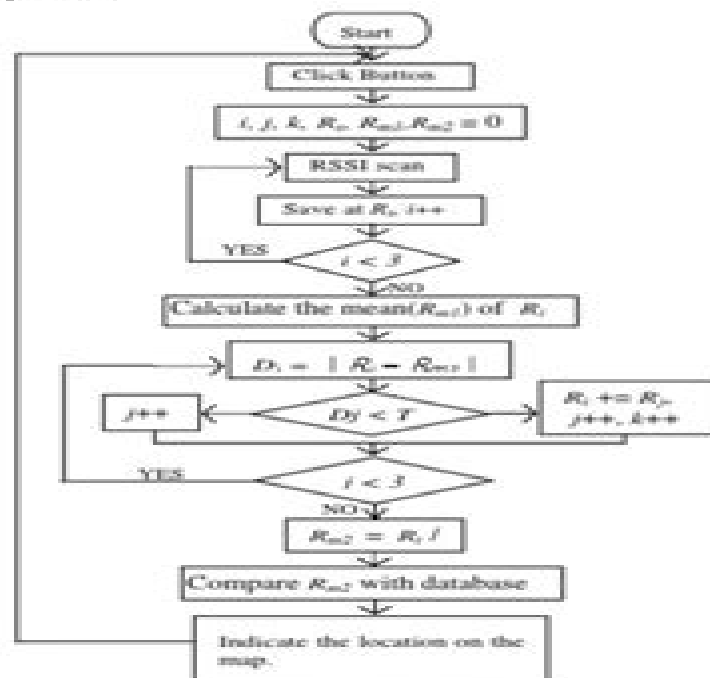
There have been several studies about WPS. RADAR [2] has the position calculation using the WiFi signal strength and has an average of three meters error on the coordinate of two dimensions. In another WPS [3], KF (Kalman Filter) stabilizes Wi-Fi signals and is used to calculate the position. In [4], a method to calculate the position by combining Wi-Fi with the GPS is proposed. However, the Wi-Fi signals provide a low precision for tracking the locations. Therefore, in order to acquire more accurate location of a target, Wi-Fi APs dedicated for localization should be installed in the target area.

In this paper, we propose a personal indoor/outdoor WPS system on the smartphone using RSS (Received Signal Strength) of signals from dense Wi-Fi access points dedicated for localization. In Section 2, the proposed algorithm for tracking the position is presented. In Section 3, the implementation of the algorithm and the results of experiments are described. In section 4, we conclude the paper.

## II. POSITIONING ALGORITHM

RSS from each AP is measured three times and the mean value of three RSSs is calculated. We use the difference between the mean value and each training value. If the difference is below a threshold (T), the training value is withdrawn and then the mean of filtered training values is calculated again. Finally, the mean value is compared with the value of database and a proper location on the map is found.

Figure 1 shows the flow chart of the proposed algorithm. We decided a threshold that gives the lowest error rate through experiment.



$R_m$  : The mean of  $R_i$                        $R_k$  : Sum of available data  $R_j$   
 $R_{m1}$  : The mean of available data  $R_j$                        $i, j$  : The number of iterations  
 $D$  : Difference between  $R_j$  and  $R_{m1}$                        $T$  : Threshold of difference  
 $k$  : The number of available data  $R_j$                        $R$  : Training values of RSS

Figure 1. Flow chart of positioning algorithm.

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**Jicheng Xie**



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