

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.

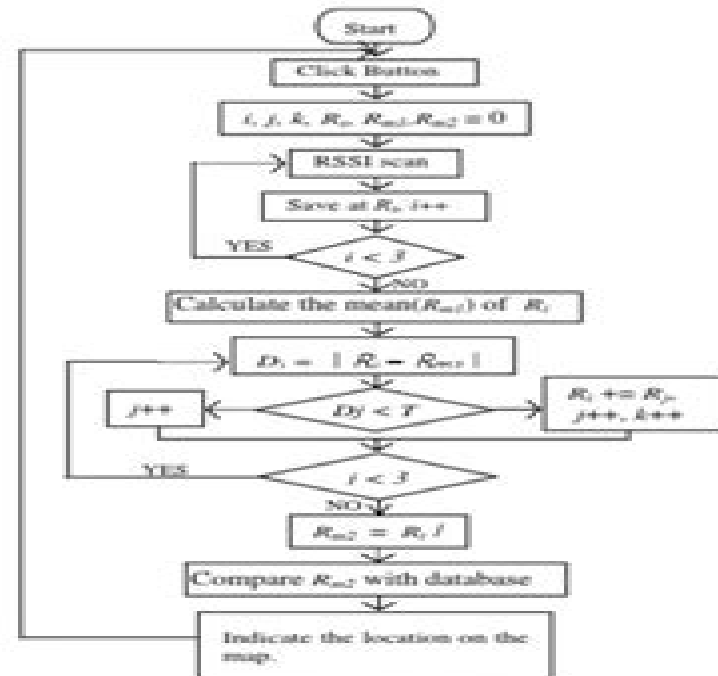
There have been several studies about WPS. RADAR [2] has the position calculation using the WiFi signal strength and has an average of three meters error on the coordinate of two dimensions. In another WPS [3], KF (Kalman Filter) stabilizes Wi-Fi signals and is used to calculate the position. In [4], 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 If the difference is below a threshold (T), the training value is withdrawn and then the mean of filtered training values is calculated again.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_{m2} : The mean of R_n R_n : 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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Table of Contents Indoor Wifi Positioning System For Android Based Smartphone

1. Understanding the eBook Indoor Wifi Positioning System For Android Based Smartphone
 - The Rise of Digital Reading Indoor Wifi Positioning System For Android Based Smartphone
 - Advantages of eBooks Over Traditional Books
2. Identifying Indoor Wifi Positioning System For Android Based Smartphone
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Indoor Wifi Positioning System For Android Based Smartphone
 - User-Friendly Interface
4. Exploring eBook Recommendations from Indoor Wifi Positioning System For Android Based Smartphone
 - Personalized Recommendations
 - Indoor Wifi Positioning System For Android Based Smartphone User Reviews and Ratings

- Indoor Wifi Positioning System For Android Based Smartphone and Bestseller Lists
- 5. Accessing Indoor Wifi Positioning System For Android Based Smartphone Free and Paid eBooks
 - Indoor Wifi Positioning System For Android Based Smartphone Public Domain eBooks
 - Indoor Wifi Positioning System For Android Based Smartphone eBook Subscription Services
 - Indoor Wifi Positioning System For Android Based Smartphone Budget-Friendly Options
- 6. Navigating Indoor Wifi Positioning System For Android Based Smartphone eBook Formats
 - ePub, PDF, MOBI, and More
 - Indoor Wifi Positioning System For Android Based Smartphone Compatibility with Devices
 - Indoor Wifi Positioning System For Android Based Smartphone Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Indoor Wifi Positioning System For Android Based Smartphone
 - Highlighting and Note-Taking Indoor Wifi Positioning System For Android Based Smartphone
 - Interactive Elements Indoor Wifi Positioning System For Android Based Smartphone
- 8. Staying Engaged with Indoor Wifi Positioning System For Android Based Smartphone
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Indoor Wifi Positioning System For Android Based Smartphone
- 9. Balancing eBooks and Physical Books Indoor Wifi Positioning System For Android Based Smartphone
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Indoor Wifi Positioning System For Android Based Smartphone
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Indoor Wifi Positioning System For Android Based Smartphone
 - Setting Reading Goals Indoor Wifi Positioning System For Android Based Smartphone
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Indoor Wifi Positioning System For Android Based Smartphone
 - Fact-Checking eBook Content of Indoor Wifi Positioning System For Android Based Smartphone
 - Distinguishing Credible Sources

13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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