Chapter 10
Improved Indoor Geo-Localization System:
Bluetooth Low Energy Technology of iBeacons and Wi-Fi Network for Better IOT Systems Accuracy

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ABSTRACT

In the concept of internet of things (IOT), physical position of smart object is very useful for relevant function over sensor networks. However, the invalid information of indoor geo-localization systems relative to these wireless sensor compromises the intelligence of IOT network. Therefore, this chapter produces the recent progress in the indoor geo-localization systems and the IOTs area. It defines the best indoor geo-localization technologies that meet their needs while respecting the constraints related to sensor networks. This framework combines between simplicity of Bluetooth low energy (BLE), popular wi-fi infrastructure, and the k-nearest neighbor (KNN) algorithm (in order to filter the initial fingerprint dataset). This new conception increases real-time detection accuracy and guarantees the low energy consumption.

INTRODUCTION

Nowadays, the user of smartphone becomes an interactive actor who reacts with his environment which gives birth to a new platform composed by the Customer-Business relationship. This phenomenon is known as the domain of ubiquitous marketing which defined the emergence of a new research theme called the Internet of Things. Smaller, more reliable and reconfigurable depending on the applications, this new theme has developed a new generation of networks: intelligent wireless sensor network. Our research is based on technologies existing in the literature to increase the rates of customer's loyalty in their own platforms. Related to the rapid growth of sale networks and communication channels, organizations need to readapt new customers' profiles that are always looking for new promotions based on the information of their profiles and their interactions histories with the environment. This strategy is shown by (Leite Lucas de Azevedo and Borges, 2015). In fact, the studies of personalized targeting in ubiquitous marketing are limited in the literature because of the new context of the interaction between the mobile customer and smart objects. Thereby when everything is connected, the daily user journey becomes equipped by the huge use of the smartphones. Indeed, researchers reviewed the studies related to indoor geo-localization systems in order to provide an intelligent one in the IOT area. This chapter is an enhanced work since the first publication of (Abdaoui et al., 2017). Over there, it has developed a prototype to send a personalized advertisement to loyal customers and potential customers in ubiquitous environment. According the degree of loyalty obtained by the behavioral analysis, each target received a personalized ad. In this study, they add the new part of detecting the user indoor the building in order to increase the rates of customer's loyalty in their own platforms in real time.

In section 2, researchers post a view of the customer's behavioral techniques existed to define and find the target. Researchers describe the evolution of advertising in marketing with an overview of Customer-Business relationship techniques. After, they describe the techniques used in the literature to analyze customer's behavior and create his profile. After, researchers outline the methods used in various types of marketing to look for the target. And the added part manifests in supplying a review of the main technologies discussed in the literature to solve the indoor geo-localization issue. In section 3, researchers display the whole process of personalized advertisements. Researchers validate the prototype of personalized advertisements in section 4, using the data set in question and discussing the relevant results.

BACKGROUND

Advertising has a strong connection with the development of trade. In the first subsection, researchers focus on the evolution of advertising in different forms of marketing: Direct marketing, e-marketing, mobile marketing and the ubiquitous marketing. This evolution is treated after knowing the needs of customer. These needs describe the profile of each customer. In literature, there are several techniques used to analyze the customer's behavior. In the second subsection, researchers try to supply a review of the main technologies discussed in the literature to solve the indoor geo-localization issue. This could hand over a better dealing of the state-of-the-art of the IOT and push new research efforts in this hopeful field. Then, concentrating on one of the major challenges in the indoor geo-localization field, they explain the final choice that have been revised and compared by choosing the best solution.

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