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Survey on Object Location Tracking Using RF-Based Tag Detection for Indoor Environment

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Abstract: ***In recent years numerous researchers proposed different approaches for handling material and information flows within network. RFID is communication channel that is one of the most promising and challenging technology by which particular location can be marked. Application of emerging technologies, like Global Positioning Systems, infrared, ultrasonic, cell of origin architecture and active radio frequency identification, for tracking location and managing the resources is one of the approaches. As a result, it is critical to develop a cost effective scheme to integrate the resource and information flow of network in which the visibility can be improved in order to the making the real-time decisions. The present system work in the indoor environment by utilizing the ultrahigh frequency (UHF) passive radio-frequency identification (RFID) tags. By the use of passive RFID technology, the object can be easily located with the help of readers and tag messaging.***

Keywords: Radio frequency identification (RFID) localization, real-time location systems (RTLS), location estimation, NLOS.

1. Introduction

Radio-frequency identification (RFID) is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, RFID contain electronically stored information. Radio-frequency identification (RFID) system uses tags attached to the objects to be identified. RFID tags can be either active, battery-oriented passive or passive. An active tag has battery and periodically transmits its ID signal. A battery-oriented passive tag has a small battery and is activated when in the presence of a RFID reader [1].

RFID tags contain two parts: an integrated circuit for processing information and storing , and set the radio-frequency (RF) signal, collecting DC power from the distributed reader signal, and other specialized functions and an antenna for receiving and transmitting the signal. The RFID tag information is stored in a non-volatile memory. RFID systems can be classified by the type of tag and reader. A Passive Reader Active Tag (PRAT) system has a passive reader which only receives radio signals from active tags (transmit and battery operated) [2].

Most indoor localization systems operate by sensing quantities that change with the position of the object. Radio Frequency (RF) signals, sound waves, optical signals or magnetic field have been employed to determine location. By estimating the distance of the object to known reference points, the object location can be obtained [3].

Typically, an RFID system consists of three elements: radio frequency (RF) tags, RF antenna and a data collection module. This system works as follows. First, the RF antenna emits a wave of radiation. Then, if a tag is placed in its range, the tag intercepts the signal, and its internal chip retransmits a signal to the antenna. Radio frequency tags are subdivided into three parts: active, semi-active and passive. Active and semi-active tags are battery powered and also have an internal erasable memory. They employ the battery to continuously communicate with the RF circuit [4].

RFID system consist of a set of transponders (i.e., tags) provided with integrate circuits storing an identification code and a detector (i.e., reader) that is able to retrieve the tag's identity data (ID) by means of a wireless link. RFID tags can also be used as artificial indicator in the environment, and each indicator can be identified by the reader. Furthermore, the RFID technology can be used to conquer the problems of other technologies in particular applications. Usually, localization systems using passive tags only consider, ID of the tag identified, the identification information related with an RFID reading. In some cases, some additional information like received signal strength indicator (RSSI) is used to evaluate the distance between RFID tag and reader [5].

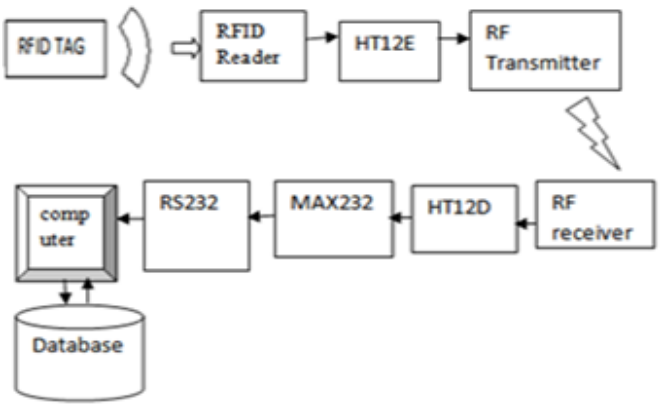

Figure: Elements of RFID System

2. Related Work

In [1], the author suggested a method that enables self recognition of a mobile vehicle's current position by utilizing ultrahigh frequency (UHF) passive radio-frequency identification (RFID) tags. This present method makes use of two UHF RFID readers with identical emission configuration attached to a vehicle to identify a reference RFID tag. By using the received signal strength indicator

(RSSI) obtained by the readers from the reference RFID tag, the exact position of the moving vehicle can be obtained.

The paper [2], Proposes the wireless communication technology (WCT), micro-sensors and location tracking algorithm (LTA), and developed to be a network node communication system. The space link quality indicator (LQI), received signal strength indicator (RSSI) and signal attenuation model (SAM), were assume this system.

In [3], author presented the RFID along with Real Time Localization Systems (RTLS, also called position tracking, position sensing and localization) has newly received specific interests for a large variety of applications. For example, the technique of device-free localization (DFL) of people, which can find people and objects in the environment where the network is located, can be used to save lives. The works in [3], proposed that the RTLS can enhance service quality and safety, and optimize extremity management and time critical processes like patient observing, real-time logistic analysis, and critical equipment tracking are obvious applications of real-time location systems (RTLS) in hospital. In terms of hospital operation management, RTLS increase effectiveness in the utilization of processes and staff productivity and bring clarity within the organization and reduce inventory and over buying, decrease search times, and ensure that the right patient is available for the right procedures.

In [4], the author proposes a new algorithmic approach for passive RFID localization in smart homes based on elliptical trilateration and fuzzy logic. This new algorithm has been accomplished in a real smart home infrastructure and has been precisely tested. This paper also analyze and compare the obtained results with the main prevail approaches.

In [5], the author developed novel radio-frequency identification (RFID) smart shelf that correctly locates tagged objects using standard passive UHF RFID tags. In order to find the exact location of objects sitting on the shelf, the system utilizes novel localization algorithms that employ the detected changes in a tag's readability to deduce the presence of adjacent tags.

3. Proposed System

Location Tracking Algorithm

a) *Particle Filtering Method*
Various tag detection algorithm have been used till now. Particle filter (PF) method is used for tracking indoor rfid tag. The system uses a Particle Filter (PF) method to combine RFID data from the RFID system and image data from the webcam or to accurately identifying position of vehicle by using particle filter method[1].

b) *Received Signal Strength Indicator (RSSI) Method*
This method is used to estimate the distance between RFID tag and reader. This method indicate the range or strength of signal received by the RFID reader[2].

c) *K-Nearest Neighbor Algorithm*
The localization system uses the KNN algorithm to determine the visible position of target tag which is nearest to that reader. In order to achieve accurate location sensing of object, this utilize a novel localization algorithm that employ detected changes in a tag readability to deduce the presence of neighboring tags[4].

d) *Kalman filter Algorithm*
Kalman filter is proposed to estimate the location of reader and based on this location, determining the target tag-reader angle-path loss which is compensated from the received signal strength information measurement[6].

e) *Real Time Location System(RTLS) Algorithm*
It is used to automatically identify and track the location of objects in real time usually within a building or other contained area. RTLS is more efficient than other because,
1) It required less no. of iterations.
2) It will provide the security bonding.
3) It gives the guarantee of data packet delivery.

f) *G. Path Selection Algorithm*
This algorithm will record every-time movement of an object in the database when the object is in motion and according to that it will trace path, which will be helpful to take the real time decision based on their last movement.

4. Conclusion

This paper presents the survey of various methods for tracking location of an object in indoor environment. As in the previous methods there were many drawbacks. So to overcome the drawbacks of previous methods, we proposed a new algorithm real time location system (RTLS), for detecting tag attached to object and path selection algorithm to determine the real time location of an object. As in previous methods or algorithms, there were certain problems like security problems, data lost and time consuming process, not finding accurate result. So the new algorithm RTLS and path selection algorithm will overcome these problems.

RTLS has certain advantages like required less no. of iterations, providing security, and also give the assurance of complete data packet delivery. So, introducing the new algorithm RTLS gives more accurate result.

References

[1] Sangdo Park and Hongchul Lee, "Self recognition of vehicle Position using UHF passive RFID Tags", IEEE transactions on industrial electronics, vol. 60, no. 1, January 2013.
[2] Yeong-Lin Lai, Member and Jay Cheng, "A 2.45-GHz RFID Wireless-Sensor-Network Location Tracking System", IEEE 17th International Symposium on Consumer Electronics (ISCE) 2013.
[3] Ali Asghar Nazari Shirehjini, Abdulsalam Yassine, "Equipment Location in Hospitals Using RFID-Based Positioning System", IEEE transactions on information

technology in biomedicine, vol. 16, no. 6, november 2012.

[4] Jae Sung Choi, Hyun Lee, *Member, IEEE* Daniel W. Engels, "Passive UHF RFID-Based Localization Using Detection of Tag Interference on Smart Shelf", IEEE transactions On systems, man, and cybernetics—part c: applications and reviews, vol. 42, no. 2, march 2012.

[5] Samer S. Saab, Zahi S. Nakad, "A Standalone RFID Indoor Positioning System Using Passive Tags", IEEE Transaction on Industial Electronics, Vol.58, No.5, May 2011.