



The Review on Identifying Objects Using RF Transmitters and Receivers, and Retrieving Data Using GSM

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ABSTRACT: Localization is nothing but Determining and estimating the physical location of tagged objects in an interrogating area. Many different localization systems have been developed in recent years. For finding exact location of the object, different approaches are used like Global Positioning System (GPS), Radio Frequency Identification System (RFID), and Near Field Communication (NFC) etc. location of object may be outdoor or indoor. This paper provides theoretical overview on these different approaches.

KEYWORDS:GPS, RFID, NFC, localization systems.

I.INTRODUCTION

Localization is nothing but finding the exact location of any object that resides on earth surface. There are different detecting technologies are used for localization. The localization may be indoor or outdoor. Locations of object can be done by using different approaches like Global Positioning System (GPS), Radio Frequency Identification System (RFID), and Near Field Communication (NFC) etc. as shown in fig. 1. Global Positioning System (GPS) is used for outdoor applications. Radio Frequency Identification System (RFID by which items are uniquely identified using radio waves) and Near Field Communication (NFC) can be used for outdoor as well as indoor applications [2].

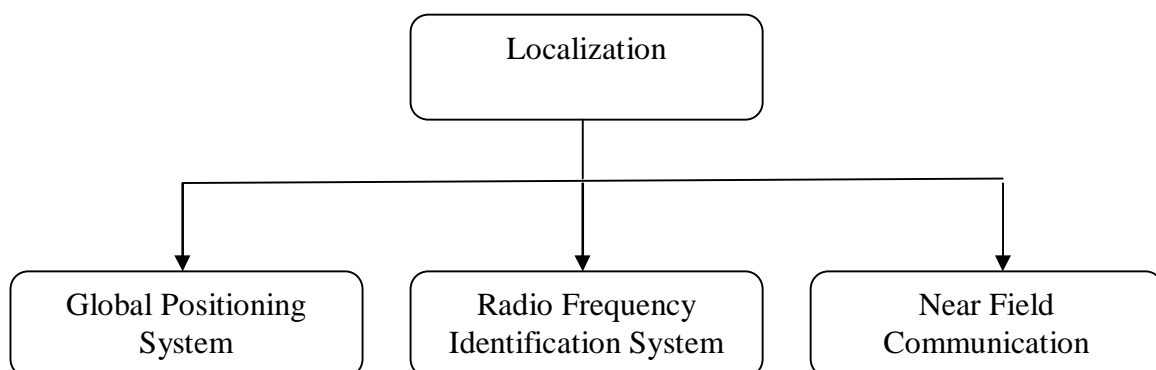


Fig. 1 approaches for localization

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II. RELATED WORK

Vijayendra R and Srinivasa K G [1], proposed Objects identification system based on RF transmitters. This proposed system has the capability of transmitting signals and a receiver that detects the transmission of the tagged object. This proposed system not only locating but also retrieving product related information using mobile phones. Fig. 2 shows the system design. This system consists of GSM modem, RF receiver, RF transmitters and a database. Here, GSM modem used for sending and receiving SMS regarding querying of the objects as well as its location and a database to store all the relevant information regarding the objects.

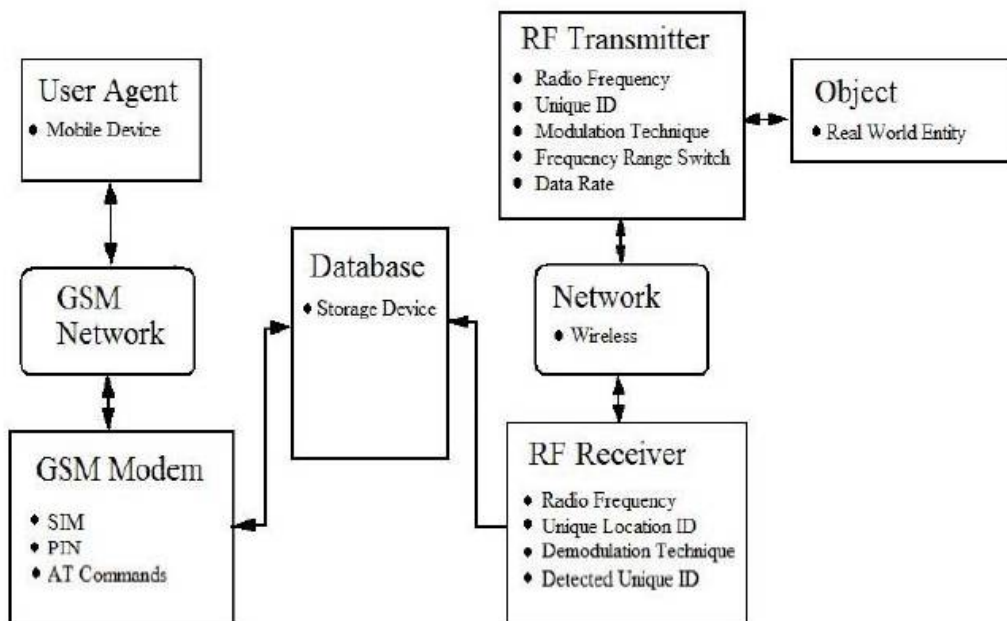


Fig. 2 system diagram [1].

In the proposed system, The RF transmitters operate in a different radio frequency ranges (3 KHz to 300 GHz), different modulation techniques (Amplitude modulation (AM), Frequency modulation (FM), Frequency shift key (FSK), Amplitude shift key (ASK), Phase shift key (PSK)) and also available with wide range of specifications (LR series, LC series, HP3 series). RF receivers uses demodulator to convert specific signals into audio, video, or data formats. RF receiver having unique location ID used to determine the location of the object and also available in various specifications e.g., MC33591, U4311B. .NET platform are used to interface GSM with the database. GSM modem fetches the location and other relevant information from the database and encapsulates this information into a message which is sent back to the mobile phone that has requested the information.

Ms. Aarti Vaidya et al. [2] proposed system with radio-frequency identification (RFID) enables self-recognition of a persons' current position. This paper provides the comparative study three technologies GPS, RFID and NFC, also provides the comparison for various positioning algorithms based on RSSI in Table 1 and Table 2 respectively. From these tables, following points are found regarding the radio-frequency identification:

- 1) Cost involved in RFID is very less
- 2) Exact location can be found i.e. accuracy is more than that of GPS.
- 3) Network can be easily established
- 4) No use of internet for the application

Finally author decided concluded that RFID technology along with RSSI and Kalman filtering is best combination for position detection for indoor application



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Table 1 Comparison Table for Technologies [2].

Sr. No.	Technology	Distance	Make Use of	Cost	Advantages	Disadvantages
1	GPS	Whole Earth	Satellites, Transmitter, Receiver	Less	Easy Working Like GSM	Accuracy Is Less
2	RFID	30cm To 3km Based On Frequency Used	Readers, Tags, AVR (Advanced Virtual RISC Controller)	Less	More Suitable For Indoor. Fast Data Transfer	
3	NFC	10 To 20 Cm	NFC Enabled Cards	Very Expensive As Newly Introduced	Fast Data Transfer	Distance Range Cannot Be Increased

Table 2 Comparison Table for various positioning algorithms based on RSSI [2].

SR.NO.	Algorithm	Output Region	Resource Utilization	Robustness	Performance	Errors
1	Lateration	Circumference	Less	Medium	Adequate	Less
2	Minimum Maximum	Centroid Of Rectangle	Very Less	High	Good	Average
3	Ring Overlapping Circles	Centroid Of The Region's Slice Where The Majority Of Anchor Nodes	More	Very High	Adequate	More
4	Modifying Minimum Maximum	Combination	Less	Less	Good	Less

Jae Sung Choi et al. [3] provides the properties and characteristics of passive UHF RFID system for indoor localization system. Using passive RFID and the pure RSSI based localization system has following problems:

- 1) Distance estimation with the use of RSSI in passive RFID system has an inherent high error.
- 2) A RSSI value can correspond to multiple physical positions in the monitoring area.
- 3) Passive RFID tags do not behave equally, even when the tags are from the same manufacturer and mode

To reduce the variation of tag performance system uses RSSI revision process. Also elimination of unessential reference tags using ratio of target tag's and a reference's interrogation rates. In the passive RFID based localization approach k-Nearest Neighbour algorithm is used, in which mean of the estimation error is 33.15 cm. but in the proposed system i.e. Passive UHF RFID mean of the estimation error is reduced to 20.89 cm which is over 34% improvement.

Jing Hang Choo et al. [4] presents the Indoor Interactive Navigation System for users to navigate within a building easily and conveniently through NFC-enabled smart phones. This system uses prototype of I2Navi implemented at Faculty of Engineering (FOE), Multimedia University (MMU). This system helps students and visitors to locate

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offices, rooms, labs etc., quickly and easily. Figure 3 shows the software components of the I2Navi navigation application.

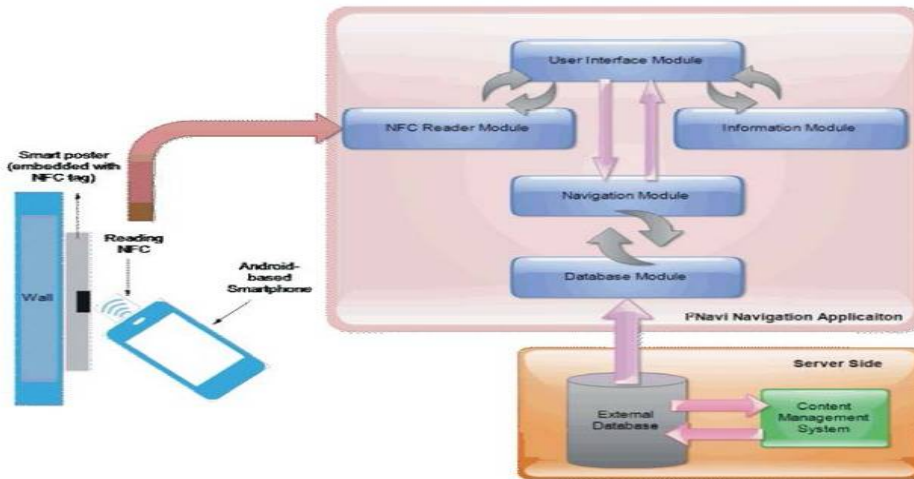


Fig. 3 Software components of the I2Navi navigation application

Proposed system contains 5 modules: User Interface Module, NFC Reader Module, Navigation Module, Database Module and Information Module. NFC Reader Module reads coordinate information from the NFC tag embedded inside a smart poster whenever an Android NFC-enabled smart phone running the I2Navi navigation application is placed near it. Here NFC Reader Module reads coordinate information, this information is then sent to the User Interface module. Using this information Navigation Module computes a suitable route based on the current location and provides the directions to a particular destination. Database Module provides total information which compare with user information and rout is decided by Navigation module. Proposed system gives good result it is found that, participants either agreed or strongly agreed that the I2Navi system is able to guide them in locating their desired location.

VI.CONCLUSION

This paper provides the architecture, design, and evaluation of an object localization system. Here we different approaches are used like Global Positioning System (GPS), Radio Frequency Identification System (RFID), and Near Field Communication (NFC) and also provides Comparison Table for these Technologies given in the review work.

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