

# Indoor Environment Navigation for Blind with Voice Feedback in Zigbee Network

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**Abstract**— The "Implementation of blind navigation system" which focuses on independent mobility of visually impaired or blind people who suffer in an unknown environment without any manual This system employs frequency Identification (RFID) to realize an objective of distinctive sure methods for the user navigation also as give sure options like visual perception log records of all users' tag access, emergency button and user track information. This proposed system on the user facet embody a mobile RFID reader module with associate degree integrated microcontroller, zigbee transceiver for transmitting the tag's info and TTS for enjoying info to the user and on the server facet zigbee transceiver for wireless communication. In path identification technique, RFID passive tag network is employed on the trail and for object recognition needed tools and alternative objects within the house or building are embedded with passive RFID tags. A text data distinctive to every object and path location, resides on the server. The reader reads the tags and transmits the knowledge wirelessly to the server computer that successively scans for the received Tag ID within the information and answer the user with its related text data which is played at the user side by converting it from text to speech with the help of TTS module. As an overall this system will help visually impaired person to gain the feelings of visualization.

**Keywords**— Radio Frequency Identification (RFID), zigbee, text to speech (TTS), microcontroller.

## I. INTRODUCTION

Visually impaired assistive system that focuses on freelance quality of visually impaired or blind individuals

UN agency suffer in associate degree unknown surroundings while not any manual help. This system employs frequency Identification (RFID) to realize an objective of distinctive sure methods for the user navigation also as give sure options such as object recognition, log records of all users' tag access, emergency button and user track information[1]. This proposed system on the user facet embody a mobile RFID reader module with associate degree integrated microcontroller, zigbee transceiver for transmitting the tag's info and TTS for enjoying info to the user and on the server facet zigbee transceiver for wireless communication. In path identification technique, RFID passive tag network is employed on the trail and for visual perception needed tools and alternative objects within the house or building are embedded with passive RFID tags. A text data distinctive to every object and path location, resides on the server. The reader reads the tags and transmits the knowledge wirelessly to the server computer that in flip scans for the received Tag ID in the information and answer the user with its connected text data that is vie at the user facet by changing it from text to speech with the facilitate of TTS module[2]. Moving through an unknown surroundings becomes a real challenge for the visually impaired or blind individuals, although they swear on their alternative senses. An age previous mechanism used for help of the blind or visually impaired individuals is a white cane ordinarily called walking cane a straightforward and strictly robot to discover the ground, irregular surfaces, holes and steps using straightforward tactile-force feedback. Apart from walking cane there don't seem to be many systems according to date to assist them by mistreatment technology. After a thorough literature survey it's unconcealed that visually impaired individuals have continuously been out off the huge companies'

scope and booming technological means that are nevertheless to be developed that can empower them [?]. The proposed system aims to be a techno-friend of visually impaired individuals to assist them within the orientation and navigation in their residences or at the required environments and conjointly it'll give the aiding options like visual perception, log records of all users tag access, emergency button and user track information for help[3].

Some navigation system has proposed a solutions such as by mistreatment organiser for the information storage and RFID with the employment of Bluetooth property for data transfer , Similar work with RFID and GSM to retrieve location information for the blinds , and one more projected answer uses RFID ,ZigBee and FM transmitter and receiver for the data transfer The system that is designed to last a visually impaired or blind individuals and to permit them to seek out the means from this location to the specified location within a system enforced surroundings and to induce the main points of the objects placed in a very path or in a very vary. The data are keep at the server information. The system is connected to the database mistreatment a wireless technology like ZigBee Transceivers for full duplex communication wherever antecedently used FM transmitters were limiting the amount of users and at the user finish Text to Speech module is employed to play the connected text to the user[4].

## II. LITERATURE REVIEW

Andreas Hub, Joachim Diepstraten, Thomas Ertl [1] presented a concept for a wide-ranging indoor navigation support for the blind and people with impaired vision. Parts of this work were realized within a new prototype of an indoor navigation and object identification system for the blind. With the previous orientation assistant it is possible for blind persons to orientate themselves and to detect objects within modeled indoor environments. By pressing keys, the user's inquiries concerning their environment are acoustically answered through a text-to-speech engine. The previous system's limitation was that it was necessary to hit an object precisely using a picking ray within a 3D model in order to allow proper object identification. new prototype now includes the option to receive augmented navigation hints automatically just by walking in virtual corresponding navigation areas. Abdelsalam (Sumi) Helal, Steven Edwin Moore, Balaji Ramachandran, Drishti [2] is a wireless pedestrian navigation system. It integrates several technologies

including wearable computers, voice recognition and synthesis, wireless networks, Geographic Information System (GIS) and Global positioning system (GPS). Drishti augments contextual information to the visually impaired and computes optimized routes based on user preference, temporal constraints (e.g. traffic congestion), and dynamic obstacles (e.g. ongoing ground work, road blockade for special events). The system constantly guides the blind user to navigate based on static and dynamic data. Environmental conditions and landmark information queried from a spatial database along their route are provided on the fly through detailed explanatory voice cues. The system also provides capability for the user to add intelligence, as perceived by the blind user, to the central server hosting the spatial database. Our system is supplementary to other navigational aids such as canes, blind guide dogs and wheel chairs.

Sangdo Park and Hongchul Lee [3] 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 similar radiation arrangement attached to a vehicle to identify a reference RFID tag. By applying the received signal strength indicator (RSSI) obtained by the readers from the reference RFID tag, the exact location of the moving vehicle can be obtained.

Yeong-Lin Lai and Jay Cheng [4] proposes the wireless communication technology (WCT), micro-sensors and location tracking algorithm (LTA), and appeared to be a network node communication system. The space link quality indicator (LQI), received signal strength indicator (RSSI) and signal attenuation model (SAM), were consider this system.

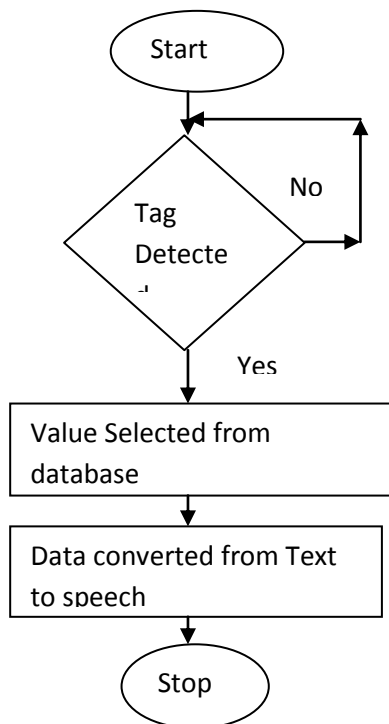
Yi Zhao, Joshua R. Smith [5] proposes the localize RFID tags with low latency and low cost for applications such as inventory, asset tracking and robotic-manipulation of tagged items. RFID positioning methods based on RF Received Signal Strength Indication (RSSI) have inadequate accuracy (meter-scale) or involve large numbers of reference tags and readers, which increases both latency and cost. This paper presents a working pattern of a RFID-based system that localizes a custom battery-free, EPC Gen2-compatible UHF tag.

Andreas Parr, Robert Miesen, Fabian Kirsch, Martin Vossiek [6] approaches Options for RFID tag tracking and localization are an essential asset for future high performance RFID reader systems. This paper introduce

a novel method for RFID tag tracking with a moving – for example Hand held – reader. An inertial measurement unit (IMU) is used to characterize the handheld trajectory. This novel technique only uses acceleration data without knowledge of the actual antenna locations.

Emidio DiGiampaolo and Francesco Martinelli [7] proposes a global localization system combining odometry data with radio frequency identification (RFID) readings. RFID tags are placed at the ceiling of the environment and can be determined by a mobile robot unit traveling below them. This is possible using a suitable tag’s antenna in ultrahigh frequency band, clearly designed to get regular and fixed RFID detection regions, which allows us to consider an effective Kalman filtering approach to fuse RFID readings with the vehicle odometry data.

III. PROPOSED WORK



IV. REASEARCH METHODOLOGY

- A. Database Creation: The identification information of reference tag attached to the object that present in given environment is fitted in database which is created.
- B. Comparing the tag value with existing database: Compare the current tag value with the existing database by using path selection algorithm if the

tag value is match with database that means same object is present, otherwise new tag is detected.

- C. Location Indicator Map Generator: Finally, location indicator map is generated with voice generation.
- D. Hardware Creation using zigbee for wireless communication: XBee works on the TX / RX logic so if we want to interface XBee with computer, we need to use a serial module.  
This serial module consists of MAX232
- E. Interfacing with hardware and software: PC SERIAL PORT The output of voltage converter MAX232 is given to PC through connector RS232. It is a 9 PIN input female connector .The connector on PC has male pins .The mating cable therefore terminates in a DB9/F.Thus only 3pins RD,TD and Gnd (2,3,5 respectively) of connector are used.
- F. TAGS (Transponders): An RFID tag is comprised of a chip containing distinctive data associated an antenna that transmits this knowledge wirelessly to a reader. At its most basic, the chip will contain a serialized symbol, or license plate number, that uniquely identifies that item, similar to the way several bar codes area unit used nowadays. A key difference, however is that RFID tags have a higher knowledge capability than their code counterparts. This increases the choices for the kind of data which will be encoded on the tag, including the manufacturer, batch or lot range, weight, ownership, destination associated history (such as the temperature range to that an item has been exposed). In fact, an unlimited list of alternative kinds of data will be keep on RFID tags, depending on application desires, as well as on fixed assets such as trailers, containers, totes, etc.

Path selection algorithm

- a) For the blind person:
    - Integrated RFID tag. RFID along with Real Time Localization Systems has newly received certain interests for a large variety of applications. order to find the accurate location of objects sitting on the shelf, the system employ a novel localization algorithm that utilize the detected changes in a tag’s readability to assume the presence of adjacent tags.
- In an RFID-based positioning system, location can be determined using the real time location system (RTLS) algorithm for detecting the tag and path selection

algorithm for tracking the location of any object to be identified. The RTLS algorithm has been employed also to other positioning systems such as wireless native space networks (WLAN) primarily based positioning systems. In RTLS algorithm, the location of a tag can be find when the attached tags communicate with the rfid reader and the reader will read the tag information and send to the computer system.

- Use to search destination and chose bus number which the blind want to take.

- Receive information from bus station by headphone. It will avoid noisy for the normal people.

b) At server side:

-Send bus number that the blind wish to take to the bus.

-Receive the bus number of the bus and sent to the blind (the blind will hear information regarding bus vary by headphone).

c) At location ID:

- Receive information from server.

- If have the blind want to no location area.

#### V.EXPECTED OUTCOME AND FUTURE WORK

The passive tag is attached in objects which act as the transmitter. A visually impaired person were asked to carry a receiver that encompasses the reader pc .The voice will be generated regarding the précis's description of location . In this manner any number of tag can be attached in a building for ease identification. It can be used by visually impaired users at the system implemented environment such as organization campus which can be school, college, hospitals, shopping mart, bus stands, markets etc.

#### VI. CONCLUSION

An assistive system with the help of RFID, Zigbee and TTS for blind or visually impaired people to help them for navigation and object recognition with assistive features

A system prototype includes RFID tag grid embedded under the walkway and placed over the objects, the embedded system as a navigation and recognition device, and a database server which is remotely connected to the user device via zigbee communication. The system prototype has shown the promising result although its size is still large and giving service to multiple persons. This system uses low data rate as it transfers text data instead of audio file.

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