

## Survey of Visually Challenged People for Blind

Mr.S.Murugesan<sup>1</sup>, Dr. N.Balaji Raja<sup>2</sup>,

<sup>1</sup>Research Scholar, <sup>2</sup>Assistant Professor

<sup>12</sup>( J.J. College of Arts and Science, Bharathidasan University, Pudukkottai)

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**Abstract:** In today's advanced technology era, the need of independent living is recognized in case of Visually Challenged blind people in their everyday lives are not well understood. But developing a computer aided tool is a still developing area. In this paper, survey of proposed system is done which will have add-on assistant features based on precedent systems. This is a RFID based System to identify certain paths easily, especially in an environments unknown or not designed with assistive purpose. This system can be provided with basic requirement of way finding and some provisions like identification of objects by placing Tag's over the objects, Providing notifications to the user according to the situations, maintaining log of current users for tracking their conditions, also personal assistant for directing blind to the required destination. The main design is that when a blind person walking on the path which has electronic tags placed under the floor of the blind path or over the objects present in the surrounding, those tags activated by radio wave came from the RFID reader sent their identity codes transmitted by the reader to the computer via wireless communication, and after the query of the database, the details of the current location of the blind or details of the object will be known immediately to the blind in order to get the accurate identification. As an overall this system will help visually Challenged person to gain the feelings of visualization.

**Keywords:** Blind mobility, GPS, GSM, RFID

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### I. Introduction

The purpose behind this assistant system is independent mobility of a visually Challenged people. Moving through an unknown environment becomes a real challenge for most of them, although they rely on their other senses. An age old mechanism used for assistance for the blind people is a white cane commonly known as walking cane a simple mechanical device to detect the ground, uneven surfaces. However such aid fails to detect dynamic obstacles to prevent from accidents occurring to the blind person. Further the biggest hurdle for blind and disabled is to travel distant unknown or dynamically changing environments. Apart from the above mentioned walking cane there are not many systems reported so far to help them by using technology. After a thorough literature survey it is revealed that visually Challenged people have always been out off the big companies' scope and successful technological means are yet to be developed which will empower them [6]. The proposed system aims to be a techno-friend of visually Challenged people to assist them in the orientation and mobility in their residences or at the required places with some assistive features of the system.

The purpose of this system will be to develop a design and propose a plan to implement RFID technology that will help the blind people navigate in buildings or unknown environment. This system will help to understand and develop a prototype model which will be used as a system used by visually Challenged people to accomplish their requirements of navigation and identification. This will be the application of RFID technology towards a social cause which will have its own economic future into the market. The basic path identification system is based on RFID technology, [2]. The main idea is that when a blind man walking on the path which has electronic tags placed under the tile of the blind path, those tags activated by radio wave came from the RFID reader then tags in response sent their identity codes to the reader and those identity codes will be transmitted by the reader to the computer through wireless communication, and after retrieving query result of the database where query will be based on identity codes, the details of the current location of the that blind person will be known immediately, and that information will be provided as a voice data to the blind via earphones in order to obtain the accurate identification.

### II. Related Work

Blind users typically interact with computers using screen readers, software that interprets what is being displayed on the screen and reads it to the user. Screen readers exist for both desktop computers.

The main encouraging factor for the application of technology for visually Challenged people is the policy measures adopted by the western countries for social inclusiveness. Lot of development work in these countries is attributed to the above mentioned policy measures and grants invested for supporting this work. In the last year's international conference dedicated to the theme of application of technology for all aspects of sight loss showcased many such devices [9]. Some notable devices exhibited were PAN OPTICUS to read the

on-screen menus of TV, MONOUSE for low vision people, fitted with a diffuser in order to minimize glare for reading covers of CD or DVD, a device for voice readout of the scrolling text, MOBI-CLICK a device to keep track of movements of a person etc. Serious work and surveys have also been undertaken to provide access of electronic resources to the visually Challenged people by changing the format of the web sites and URLs, [10].

Yet another successful project undertaken was radio Virgilio/Sesamonet to design and implement a reliable system to assist visually Challenged citizens' independent mobility in urban settings [1]. The goal was achieved by integrating traditional assistive technologies with wireless and RFID technologies to realize an intelligent and easy to use navigation system. However the system was not very successful, since it failed to integrate with the state of art internet technology.

Ultra Cane which uses a build-in sonar system and sends back vibrations through the handle according to the presence of obstacles [11]. The ultra cane enhanced the traditional white cane by giving information about the obstacles before direct contact. But it doesn't provide any new functionality to the traditional cane and the localization is still done by movement of the cane and it doesn't detect objects at head height. Most of the system developed so far focus on maintaining spatial orientation which is a major challenge for people with visual impairment. There is the need of systems in providing blind people with information on where they are, hazards that might be in the way, and a description of what lies in their surroundings [12].

### **III. Overview Of RFID Technology**

RFID (radio frequency identification) is a form of wireless communication that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to uniquely identify an object. This is used for the automatic identification and tracking.

#### **A. How do RFIDs work?**

RFID methods utilize radio waves to accomplish this. At a simple level, RFID systems consist of three components: an RFID tag or smart label, an RFID reader, and an antenna. RFID tags contain an integrated circuit and an antenna, which are used to transmit data to the RFID reader (also called an interrogator).

This information is an identity code stored in digital binary format which can be a single binary bit, or be a large collection of bits. The Passive tags have no power resource of their own and as an alternative it derives power from the incident electromagnetic field to get activated. A reader transceiver communicates with a tag. Usually the heart of each tag is a microchip; when the RFID reader generates RF field, tag draws enough power from the reader generated field to access its internal memory and then transmit its stored information with the help of same RF field.

### **IV. Overview Of GPS, GSM Technology And Stored Db Server**

The base system can use any of the GPS, GSM technologies or stored DB server to retrieve the location details. Following section presents details of GPS, GSM and stored DB server [18, 19].

#### **A) Global Positioning System (GPS)**

The Global Positioning System (GPS) is the Global Positioning System that uses satellite signals to triangulate one's location. The GPS is a navigation and precise-positioning tool [18]. GPS technology is global technique with strengths like works in all type of weather and provides 100% coverage on the planet, moderately low costs hence it can be integrated with required applications, its correctness can differ from millimeters to quite a lot of meters depending on the method that is used but it lacks behind because of some weakness such as GPS satellite signals are weak hence it needs constant radio access to the satellites, so it doesn't work properly in indoors, underwater, under trees, in tunnels, or underground etc. and the uppermost exactness requires line-of-sight from the receiver to the satellite.

#### **B) Global System for Mobile (GSM)**

GSM is a Global System for Mobile Communications, originally Group Special Mobile which is developed by the European Telecommunications Standards Institute (ETSI) [19]. This is a cellular network, where cell phones or mobile device connect to GSM by searching for cells in the immediate vicinity. GSM can update the database for the location of the mobile device based on the some components of the GSM Network Architecture like Location Area (LA), Home Location Register (HLR), Mobile Switching Centre Visitor Location Register (MSC VLR).

### **C) DB Server**

In case of this proposed system, if we study as per requirement of location details view then we can conclude that there is no need of accessing all the locations globally as we do by GPS and GSM because the majority user will be specific to the location who will not need global location details as they will accessing specific locations such as School College, Hospitals, Market, Shopping centers etc. Hence we can design this system specifically for particular areas so that it will be distributed for the maintenance of data in those respective locations only. Where each area will have its own DB server with its own location details so that we can achieve maximum accuracy for the location identification. This DB server can be connected to the user device through wireless communication technology.

## **V. Overview Of Zigbee Wireless Communication Technology**

ZigBee is a wireless technology developed to overcome the restrictions of Bluetooth and Wi-Fi. It is designed for low-power consumption which allows batteries to essentially last forever. The network layer of zigbee supports various topologies such clustered tree topology, star and self healing mesh topology. ZigBee has a wide application area such as industrial networking, home networking. Every ZigBee network has to enclose a network coordinator also Full Function Devices (FFD's) may be set up in the network. They can work as network routers, network coordinators, or as devices that work together with the physical world. The last device is the Reduced Function Device (RFD), which interact with the physical world [21].

## **VI. Overview Of Path Identification Feature**

Following section describes overall design of the blind path identification [1, 2].

### **A) Overall System Structure**

The path identification system consist of some components such as the electronic tags which will be placed under the path, the RFID reader will be carried by the user, computer to process the data, earphone to provide information in the form of voice data, power supply and Any one of the technology seen in Section IV for updating the data, also for send and receive process of the data with wireless communication device explained in Section V and the software consist of the middle ware. A blind person walking on the path which has electronic tags pre-built under the floor of the blind path and the stick will have an antenna with the reader which will be carried by the same person. While walking when reader is approaching the electronic tags, the wireless signal active tags and tags sent back the exclusive identity code to the reader and this signal is put into computer via reader to the wireless communication between user cane and remote computer. Middle ware software picks up the related info based on the identity code, and broadcast via earphone to the blind person. The earphone sounds the location information of the respective place where tag in contact is placed, for example for Tag #1 it will sound Laboratory No. 1.similarly it sounds arriving locations as it passing by the #n tag. The database storing all the information related to the tag ID's can be modified from the server which will be centrally available to the particular area. As we know that GSM will have global access which may not necessary for this kind of applications because data is necessary for the implemented environment only it's not necessary to access it for some other place, for DB updating purpose we can integrate it with the internet for the centralized access. Hence the better solution is to design a system data base according to the required environment wherever we need to implement the system where ZigBee can be used to setup the network for the user to remote server computer wireless communication within the installed environment.

### **B) The key concern of the system**

#### **1. Tag:**

It is mainly divided as the low-frequency, high-frequency, super high-frequency and microwave. The typical frequencies are the following: 125 kHz, 133 kHz, 13.56 MHz, 27.12 MHz, 433 MHz, 902~928MHz, 2.45GHz, 5.8GHz and so on. The communication distance grows with the increasing of the frequency, like close-coupling (0~1cm), remote coupling (0-1m) and remote system (>1m), [1, 2]. Location Orientation by Tag Moreover, for the active Tag, the communication distance is tens of meters. Due to the short identification distance low frequency tag has, it can locate exactly, but it needs more tags, and can be used for indoor location. On the other hand, the communication distance of high-frequency tag and super high-frequency one is longer, according to the test results; the distance of super high-frequency tag is 2 to 4 meters, more proper for the blind path. It only needs few tags between two neighbor stores or locations, and the signal can be received even in the transition zone.

#### **2. Reader or Sender:**

Here any basic RFID reader can be considered for the conceptual implementation of the proposed system as per older preferences the reader used was LXRP-400 fixed super high-frequency RFID reader

manufactured by Legend Silicon Corp, the frequency is between 860~ 960 GHz and the interfaces are USB and RS232. The longest reading distance is more than 4 meters due to the limitation of circumstance and quality of the tag [1, 2].

### **3. Middle-Software:**

There is a need to design the software based on the characteristic of the system, it consists database setup, interface programming between computer and reader, voice recording and broadcasting programming, interface programming between computer and wireless technology like ZigBee or GSM and GUI programming. It has a database query of the corresponding voice recording or text data, and then broadcast this voice or data in order to guide the blind from the earphone, if text data is used to send then it can use less data rate as compare to the voice data. Then this text data can be converted in to the Speech by using any of the Text To Speech Module placed on the user side. GUI will be provided for easy interaction of the Administrator. It can manually or automatically broadcast the information, manage and maintain the system by command keys designed on GUI of system, also it will have an interface design for the other assistive features to be included in the system as described in the Section VII.

## **VII. Assistant Package Features For The Visually Challenged People**

Independent mobility is an important objective to achieve but with this there is a need to provide certain features so that it will be assistant package for the visually Challenged people. As necessary provisions can be provided like identification of objects by placing tag's over the objects, providing notifications to the user according to the situations, maintaining log of current users for tracking their conditions, also personal assistant, and search of the objects at home or at known places.

### **A) Identification of objects**

To make guide system perfect it can be integrated with another feature of objects Identification by placing Tag's over the objects. In order to overcome the inability of blinds in recognizing objects before tactile contact, this system is able to provide them audio information about objects, in a way compatible with the software of blind path identification system. This feature allows the user to store essential information about objects, and to listen them, using RFID tags and a Computer connected to a headset via wireless connection, on which the software and the information's database are installed 4 Basic System with Object Identification feature For the integration of this feature with the base guide system following steps can help,

1. Place tags at the objects.
2. Installation of database on the computer where database will store all the description information of the tagged objects.
3. RFID Reader system will be embedded in the user cane.
4. Visually Challenged person will have wireless headset.
5. Computer will be in wireless communication with headset and RFID Reader.

### **Task Flow:**

1. When Visually Challenged person will come nearby or touch to the tagged object. Like base guide system, tag unique ID code will be transmitted to the reader then from reader to the computer through wireless communication.
2. Then computer will process that Tag unique ID Code as a query on database which will return description of the object as a result of that query.
3. That result will be in the form of voice data which will be transmitted to the respective person through wireless communication with the headset.

In this way system will work as an object Identification assistant. Here path identification system will be isolated in the functionality with identification or to know about the object. Also, object detection can be provided by directly placing Tag's over the objects and creating separate DB for Object detection information on the server. Whenever user will come with the reader in the range of the Tag placed on the object it will give information about that object. This is simple technique for implementation.

### **B) Log records of all Current users Tag access**

- All the records related to the Tag Access will be maintained with the help of this feature
- The Log Record will maintain information like User ID such as Zigbee Mac ID as User ID, Tag ID Accessed, Location of Tag, Time of Tag Access, etc
- This Log will be maintained at that time when Tag ID will be received by the DB Server.

- This feature will help Admin to track present and past Tag access by the users.

### C) Notifications to the user based on the situations

- This feature will play an important role to dynamically direct the user or to intimate the user to change the path according the unexpected events occurred at some of the locations of the organization or in a system implemented environment.
- This feature will be implemented with the help of Log Record, where Log record will help to know which users are there near by the locations of the unexpected events.
- After retrieving the user's information that all are present nearby an unexpected event location those will get redirected or guided to the safe location by sending them an emergency message from the server.
- This Emergency message can also be forwarded to all the users to keep them alert for not to visit or follow that path.

## VIII. Conclusion

In this paper, the proposed strategy is assistant system for Visually Challenged people, which comprises a mechanism that aim at ensuring convenience for the visually Challenged, and it broadcasts the detected location via voice in order to find the details of locations or objects and to get assistive features information. Mainly it interests in extra features with the base system to make it complete package for providing independent mobility to visually Challenged people. This system is under development its actual results and implementation details will be introduced in the next version of this paper.

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