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To Design RFID Based Cognition Device for Assistance to Blind and Visually Challenged Personal for Indoor Use

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Abstract*—Blind person and visually challenged people moves around the route of their transportation at either the very own skilled knowledge of their own or at the mercy of other people. For indoor navigation the problem becomes worst because it hardly matter of personal skill or assistance available for guidance to reach desired destinations. We proposed the simple and economical system which is low cost implementation of embedded system with RFID, its sensor and cognition device. It is proposed that the RFID tag should be embedded in walking ways in a fixed manner with unique identifiers. When blind person moves around the sensor placed in stick energies the embedded tags and reads the tag ID. The cognitive algorithm in cognition device decodes the address of information message associated with it regarding the place. It will further play an audio file which will tell the person about the locality and the moving person get the guidance about local place and his desired movement. The cost of device is economical and suitable for even a layman in our country. The accuracy is increased due to RFID grid embedded as per the exact required and controlled nature. A cognition devices spot recognition capacity can be increased as per need and number or spots to be recognized

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***Index Terms*— Blind Assistance, Cognition Device, RFID Based Assistance, Indoor Navigation.**

I. INTRODUCTION

Study of human behavior shows that vision of the world is virtual articulated facts maximizing the information about it. Visually challenged people are lacking this information and critical facts that can affect their pedestrian's safety, having often difficulties to perform elementary daily mobility and activity because of limited awareness about the visual information contents in surrounds. Some research is focused on the way finding by the blind people. Being a blind or visually impaired, the pedestrian is unable to interact with maps and street signs, to acquire information about the environmental situation becomes crucial job for them. Make them dependent on another ways of means. Today there are many system available ready for personal navigation by major vendors for car drivers etc. Using global positioning system [GPS] there are many systems available for location finding, but no precision suitable to Assist visually impaired user. Studying the various proposed and implementation cases, it can be said that some had tried to put advance technologies to achieve the purpose; some had tried to put some of best. But practically it is matter of human behavior and economically viability for every individual. The proposed solution takes the study in next paradigm of economical viability and simplicity for individual user.

II. LITERATURE REVIEW AND DISCUSSION

Over the years of human nature development and behavior pattern development shows that he sees, realizes, he understood. In case of blind person, it is painful that he can not see but he tries to ask and get realization of locality and put it into memories when he moves around by sensing the noises and some pick point he understood the situation/locality. If by mistake he removes the kept memorized tag from his mind he can not realize the locality and he got confused and has to ask his fellow or other moving persons for assistance. Similar case is about direction finding for moving towards desired destiny. It clearly shows that any persons/whether impaired or not person keep memorizing the locality information and sense tags in to memory and recover it when they wants to moves around. Literature analysis shows that there are mainly four technologies and combinations are used to work in context with similar objective for blind personals. They are mainly as below:

(1)GPS

(2) RFID information grid

(3)Mobile platform devices /sensors and Client server architectural systems and devices.

Let us discuss about above one by one.

GPS: Global positioning system uses longitude and latitude calculations for find out the position of object. Since it uses geospatial satellites signals, to calculate the positional difference from satellite; the accuracy is quite in the range of 100m to 300m.For the person who is walking on the road can receive these signals, but for indoor it is very hard to receive the same. Also the accuracy required is not achievable; hence it is a void solution for blind person to use for navigating device. RFID information grid: RFID is radio frequency identification device. It holds unique information such as number or symbol or text etc. It is passive device which is energized by interrogators emf field. To form a information grid the RfID tags are arranged in such a way that it could describe the longitudinal and latitudinal position. The searching device enquires about the positional information and sends it to server by sms. The server holds database with relational description of local position for reference send by sms. It search in database for same and broadcast it on FM which could be heard by the enquirer's device. The big issue

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in system is that the sms sending and delivering time. Again the air calls traffic congestions. The personal device may work properly but server failure detection case can not be solved. Hence addressed solution is more of problems than the solution. The two three device on different location should work in tune with single fetched query make more dependable which is not viable. The same about remaining technological solutions more or less they are combinations of two or more type of technical mix hybrid device. The RfID grid system with an RFID reader integrated into the user's shoe and walking cane with Bluetooth connection to the user's cell phone. To assist in navigation user feedback and communication via a NAVCOM belt worn around the user's waste is introduced that features a sonic range finder and a series of paper motors for distance feedback and form of vibration Braille. All these require more sophistication of technology and cost is going on increases as technology advances. Also common can not afford and aware for same. We can conclude that the solutions are not so accurate and advisable for personal use for blind person. They require special training which could be more Confucius and complex. Also the solutions are not meant for common man on large scale. They are not economical. Hence the requirement can be concluded and specified as the technology used should be economical and device should be so user friendly that it can be used by a layman without specific technical training.

III. PROPOSITION AND SYSTEM ARCHITECTURE

The proposed system will have three main components; forth will be kept for future implementation.

I. RFID tags.
ii. Sensing stick.
iii. Talking cognitive device.

The RFID tags will be buried or embedded in sequence and algorithmic manner as per the coding theory. These tags are playing the crucial role of locality recognition. These will be programmed in such manner that the sensor stick can detect them and decode the information easily. The system architecture is designed in such manner that the dependency of result will not hamper the system core and the remaining part will be remaining intact. It can be called as egg/shell type. In current application we propose to use 125 KHz RFID tags. They are used in harsh environment for interrogation. Economical in implementation hence reduces the overall cost and read rate is good at open air environment. The RFID tags are embedded in footpath. As the blind person moves over the footpath along with its sensor-stick the tag get identified and the coded information get converted in to a message which is played in audible sound for blind person, will tell him that where he is? The RFID tag will contain the information encoded address locality.

a. Reader: Sensor Reader.[Interrogator]

The reader selected is 125 KHz proximity sensing reader which will detect the tag in the proximity in harsh environment. The 125 KHz reader module is basic sensor which can read the unique number on tag. This will enable the system to detect and to read the unique stored number on tag. The antenna pattern matches to fit in the required size to be fixed on stick end area perfectly. Hence the bearer of stick can easily carried the system along with it without any additional precaution and weight. The Sensor reader energies the tags by induction method of power transfer. It then sends read request to tag .The tags sends its unique stored number as response to sensor request.

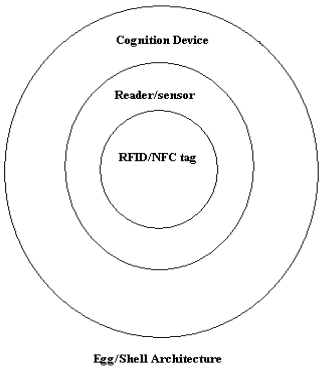
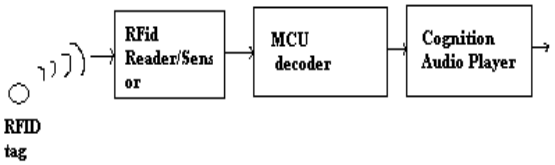


Fig 1. Block diagram



Embedded Assistant block diagram

b. Microcontroller decoding Unit.

MCU plays vital role as central communication and control house for sensing reader unit and information message decoder and play back unit. It is continuously in wake up state as soon as powered. It communicates with sensing stick for unique number. Then it starts decoding the number for its unique information stored address to decode the message associated with it. It looks in to its database for corresponding address of associate information address in cognition and play back system. As soon as the address is found it sends command to cognition unit for ready to receive address of play back message. The cognition device sends ready signal for reception. The MCU transfers the address for associated information message. Now MCU in cognition unit take on this command to further state. It looks up in its database for stored associated message. As soon as it finds the message it sends it to audio playback for execution. As a result the bearer will get audio information message about the local area. We have used 8-bit microcontroller for this purpose. The microcontroller is serially taking the RFID interrogator output as an input and the output is address line

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for cognition device which is parallel interfaced with microcontroller.

c. Cognition Audio device.

The unique number is now key for information decoding related to locality. The single pass algorithm will find out the associated information with tag unique ID. The audio message is sent to audio player and amplifier for playback. The bearer would able to hear audible information about the local area. The cognition is based on lookup table and message database stored at cognitive unit of system. As the microcontroller get unique ID it checks with stored one associated message address. As it decodes the message id, it sends it to cognitive voice chip for execution of associated message. The MCU in voice section checks with voice section to be playback for message id and execute it by playback it at voice device like speaker or headphone. We had used Aplus voice chip for cognition unit. It has capacity to store 256 clips and per clip four sections which can be addressed separately for play back. The microcontroller is sending the address for sections to cognition device and the corresponding section is played back as an audio for blind person. By adopting the simplified methodology the cost of device and system is become affordable for every person and also economical for implementation.

IV. CONCLUSIONS AND FUTURE SCOPE

Here it had been introduced the concept of using RFID tags as a method of locally storing data about the locality where the information is relevant (in-place storage of location-based information). The RFID tags, the data protocol for storing information and the user interface. We refer to the target system as the cognition system. It is also important to recognize that a blind individual is not always in the need of determining their current location at every step. If the blind individual is in a space familiar to them then they would have little need for precise location feedback. The use of the cognition device gives feedback on the location of fixed and moving objects. Carpet manufactures could integrate the RFID tags as part of the weaving process or the RFID tags could be integrated into a thin layer of material that is applied under the carpet or hard surface flooring. Rooms that have existing carpeting could be easily upgraded by rolling up the carpet, applying the RFID flooring material and then reinstalling the existing carpet. In the case of tile floors it may be possible to insert RFID tags by removing the grout at tile intersection points and then reapplying the grout. For pathways that provide travel from location-to-location such as sidewalks, hallways, stairs, etc. RFID tags can be located on the edge of the path. This allows for lower implementation costs because a grid is not required to indicate position.

This would be a modern data extension of Braille that is electronically readable by a sub-system as part of the navigation process.

REFERENCES

[1] Personal Guidance System for the Visually Impaired by Jack M. Loomis, Reginald G., Roberta L. IClatzky, Jon M. Spiegel, and Jerome.

[2] Personal Augmenting Device and Assistive Living Model for visually Impaired (Mikhail Simonov, Antonio Sciarappa, and Stefano Manca, ISMB, Services and Applications Lab., Italy.)

[3] Loomis, J. et al. (2001). GPS-based navigation systems for the visually impaired, Fundamentals of Wearable Computers and Augmented Reality.

[4] Makino, H. et al. (1997). Development of navigation system for the blind using GPS and mobile phone combination, IEEE Int. Conf. of Engineering in Medicine and Biology, vol.2, pp.506-507.

[5] Na, J. (2006). The blind interactive guide system using RFID-based indoor positioning system, 10th Int. Conf. on Computers Helping People with Special Needs, Linz, Austria, July 11-13, Lecture Notes in Computer Science, Vol.4061, Springer Berlin, pp.1298-1305.

[6] Ran, L., S. Helal and S. Moore (2004). Drishti: an integrated indoor/outdoor blind navigation system and service, 2nd Annual Conf. on Pervasive Computing and Communications, March 14-17, Orlando, USA.

[7] Makino, H. et al. (1997). Development of navigation system for the blind using GPS and mobile phone combination, IEEE Int. Conf. of Engineering in Medicine and Biology, vol.2, pp.506-507.

[8] Stock ham, T.G. (1972), Image Processing in the Context of a Visual Model, Proceedings of the IEEE.