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Electronic Path Guidance for Visually Impaired People

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----------**Abstract**----------

Vision, a God gifted sense to human being is an important aspect of life. With the help of our eyes, we are able to see the beauty of nature, things which happen in day-to-day life. But; there are some unfortunate people who lack this ability of experiencing these things. They face many problems in their daily chores. The problem gets worse when they are in an unfamiliar place. Hence to minimize their difficulties and that too with maximum ease, a concept has been thought of, which will guide Visually Impaired people to reach their destination(s). The Electronic Path Guidance will help them to move in an unfamiliar place independently and with the same simplicity as they are in familiar surroundings. For this we are using the RF (Radio Frequency) communication.

Keywords– *Electronic Path Guidance, Visually Impaired, RF module, Handheld Device, Magnetometer, Altimeter, Matrix keypad.*

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I. INTRODUCTION

Imagine walking into an unfamiliar place. One has to ask for guidance in order to reach to the destination. But what if the person is visually impaired!! Person has to completely depend on other people to reach destination. Generally we observe that white cane is the best friend of visually impaired person. But many a times this cane is not useful. In an unfamiliar surrounding visually impaired person might get confused. So this restricts their mobility. This makes them dependent on others. Regardless of the tool used, the factor that most determines a person's mobility is the use of essential personal skills.In order to increase their mobility even in complex, unfamiliar surrounding 'electronic path guidance system' is being designed. This system will act as an electronic eye for them.

II. LITERATURE SURVEY

In the past three decades several electronic travel aids (ETAs) were introduced that aimed at improving their blind users' mobility in terms of safety and speed. Today in the market different technologies like GPS, GPRS, etc are used to navigate visually impaired people. The studies of various published international papers have been done. Some of them are-

[1] Indoor Navigation System for visually impaired person using GPS.

This paper presents the architecture as well as the implementation of the system that helps the visually impaired person to navigate autonomously in the indoor environment. This method utilizes the Global Positioning System (GPS) and it also incorporates object avoidance technologies. The system applies a Zigbee protocol to provide the continuous tracking of the visually impaired person. It also consists of additional components like ATMEGA microcontroller, ultrasonic sensor, and microphone to provide more refined location and orientation information. The visually impaired person issues the command and receives the direction response using audio signals. The latitude and longitude values are received continuously from the GPS receiver and then transferred to the PC using the Zigbee transceivers, using these values the localization of the visually impaired person is attained using Google map.

[2] The Guide Cane- A Computerized Travel Aid for the Active Guidance of Blind Pedestrians

This paper introduces the Guide Cane, a novel device designed to help blind or visually impaired travelers to navigate safely and quickly among obstacles and other hazards faced by blind pedestrians. It comprises of a long handle and a "sensor head" unit that is attached at the distal end of the handle. The sensor head is mounted on a steerable but unpowered two-wheeled steering axle. During operation, the user pushes the lightweight Guide Cane ahead of him/herself. Ultrasonic sensors mounted on the sensor head detect obstacles and steer the device around it. The user feels the steering command as a very noticeable physical force through the handle and is able to follow the Guide Cane's path easily and without any conscious effort.

[3] Perceptible Path Organism in support of Visually Impaired People.
The paper presents a design for the visually impaired people to navigate independently within an enclosed environment or an open environment with the assistance of the effortlessly wearable Electronic Travel Aid (ETA) linked with the wireless communication networks like Zigbee and Bluetooth. The blind person can perceive obstacles in front by means of an ETA from head height to foot level. The vision sensor, which is mounted on a sunglass, captures the image in front of user .Micro processing unit processes the captured image and enhances the significant vision data by employing a set of image processing procedures. The processed information is then presented as a structured form of acoustic signal and is conveyed to the user through a set of earphones. This system also incorporates position and direction information. The remote server does optimal path planning. The user issues the commands to ETA and receives direction response through audio signals

III. PROBLEM DEFINITION

The population of India has reached 120 Cr. Of those 8.90 Cr people are visually impaired.90% of those can't walk independently. 7% of them make the use of guide cane and remaining 3%of them make the use of guide dog. But a guide dog would be a burden on them as we know that majority them i.e. visually impaired people can't even walk independently. Our project mainly focuses on this high population of visually impaired.

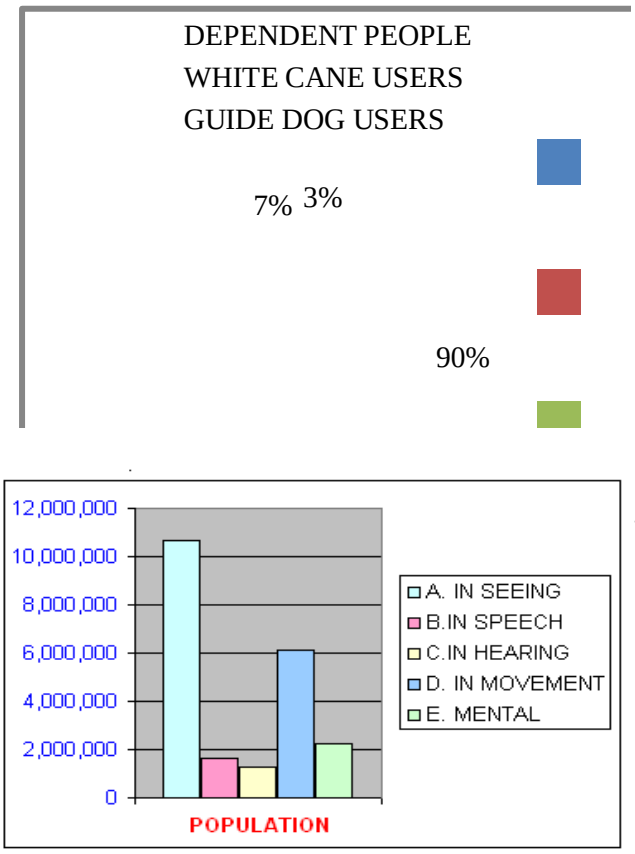

Fig. 3.1 Statistical analysis

2.1 PROJECT DESIGN FLOW

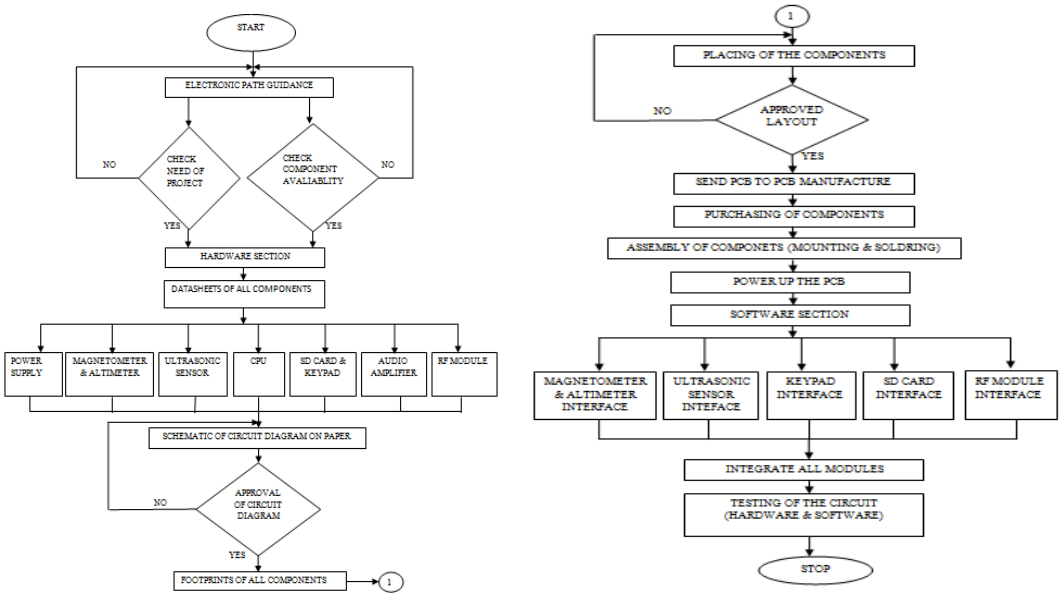

Fig. 4.1 Project design flow

2.2 BLOCK DIAGRAM

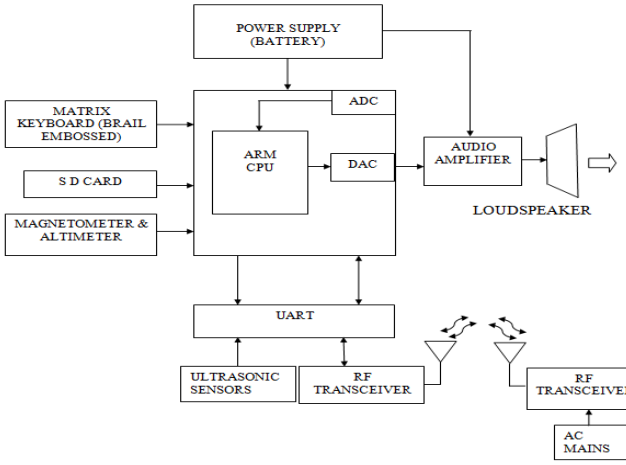

Fig. 5.1 Block Diagram

III. DESCRIPTION

System consists of two modules-hand held device and radios. The Visually Impaired person entering in complex building is provided with a handheld device. It has 4*4 matrix Brailed embossed keypad for entering appropriate destination with many other user friendly functions, like ‘search’, ’return’, ’delete’. The keypad is made up of cherry keys being mechanically strong and sound producing. As it is a handheld device connection to the AC mains with the help of transformer is not feasible so battery is essential here. Li-Po battery is power source for handheld device. With the help of altimeter and magnetometer the direction & height of the destination can be easily calculated. If any obstacle comes in between then it is detected with the help of ultrasonic sensors. CPU is the heart of any embedded system. Here ARM 7 core is used. To be specific we have used LPC2148 controller. The operation takes place at 48MHz. Audio amplifier has been used as the project foci on visually impaired people. The provision of audio jack is also made to help the person in noisy environment Audio files which must be played for giving instructions such as ‘go straight’; ‘turn to your right’ etc. are stored in S D card.

The second module i.e. Radio section consists of RF Module, controller and memory. Each radio has its own unique ID. The radios consist of RF module which has cc2500 working at 2.4 GHz ISM band. Co-ordinates of respective radio section are stored into the memory. Transceiver (RF Module) in the handheld device will communicate with another RF module in the radio which is placed at predetermined distance in the unknown surroundings. This communication will guide the person to reach the destination. The next destination in the same surrounding can be fed by the person himself. In this way the overall working of the system is carried out and the navigation in an unfamiliar surrounding will take place.

IV. CONCLUSION

An attempt has been made to make a compact and portable device which is exclusively designed for visually impaired people. It will allow the visually impaired person to travel through an unfamiliar environment with ease. If the radios are mounted all over the city, then project can be scaled to navigate over greater area. For the successful implementation of system the mandatory condition is that handheld device should be within the range of radios. It can be said that the project provides an Electronic Eye for visually impaired people.

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Biographies

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