OBSTACLE DETECTION AND NAVIGATION SYSTEM IMPLEMENTATION FOR VISUALLY IMPAIRED PERSONS USING WIRELESS SENSORED NETWORK

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***ABSTRACT**--A large number of elderly people are present in the world and population of the world is getting older rapidly. Elder people face two major problems, low vision and forgetfulness. To support older people we have to make smart houses. Navigation devices considered as new research challenges. Visually impaired persons of particular concern, because they need to detect and avoid obstacles, and to position themselves in the indoor environment. In indoor environment things are closely placed and walking of low vision person without any individual support or stick is very difficult. In this thesis, we first discuss some of the existing projects in this field, secondly, we propose a wireless sensored system to help the visually impaired for obstacle detection and navigation to reach the destination.*

INTRODUCTION

The quantities of individuals above age 60 are twofold from 1980. From 2000 to 2050 individuals above age 60 will twofold from 11% to 22% and it is normal they will increment from 605 million to 2 billion. As the age builds it makes a considerable measure of issues for old individuals because of falling flat wellbeing however the extreme are pervasiveness of sight misfortune. Keeping in mind the end goal to do their every day work the matured individuals with exceptional needs are dependably need help devices. As indicated by the World Health Organization assesses that 285 million individuals are outwardly hindered around the world: 39 million are visually impaired and 46 are low vision 82% of individuals living with visual impairment are matured 50 or more [1]. Around 90 percent of the world's outwardly debilitated individuals live in creating nations. The quantity of outwardly hindered individuals worldwide will twofold from the current 45 million by 2020. A quarter million enrolled daze in the UK. Be that as it may, the UK has almost one million individuals qualified for be enlisted for the outwardly impeded vision troubles around 1.7 million. American relationship for visually impaired assessed that more than 6.5 million. Americans over 65 years old are suffering from low vision or blindness.

To help the old age blind people a smart environment is needed, which help them in easy walking for their daily activities. Smart environment is a small world where different kinds of smart device are continuously working to make inhabitants' lives more comfortable. In an unknown environment orientation and navigation are old challenges.

Navigation extends in the direction of obstacle detection and avoidance challenges and leading to the destination. Therefore, information given by obstacles is taken into account for route discovery and planning.

The evolution of technology can support other new methods than the traditional, such as guide dogs or sugar cane. The use of artificial sensors to obtain information from surroundings, and to act according to the situation, has become more common in these days. The possibility of creating technology, which simplifies the daily life of a person with special needs is easier today. Technologies that are able to analyze, in real time, the surrounding environment and produce useful and interactive information are definitely an added value.

1.1 WIRELESS BODY AREA NETWORK (WBAN)

Steady scaling down of electrical hardware and expanding utilization of remote systems has empowered the advancement of Wireless Body Area Network. The word was initially made by Van Dam [2] and got some analyst's advantage. Remote body territory arrange (WBAN) incorporates number of shabby, pitiful, little sensor can be situated on the body, coordinated into dress or embedded underneath the skin or installed profoundly into the body tissue . The attributes of an ordinary WBAN sensor hub in body territory system is ought to guarantee the precise detecting of the flag from the body, complete preparing of the sensor flag and remotely transmit the handled flag to a neighborhood preparing unit [3].

Remote body region sensor system is system hardware in light of radio recurrence. WBAN is centered around the correspondence inside or outside human body. The application zone for WBAN may incorporate the shopper gadgets, or stimulations and restorative and human services benefits as appeared in figure 1.1

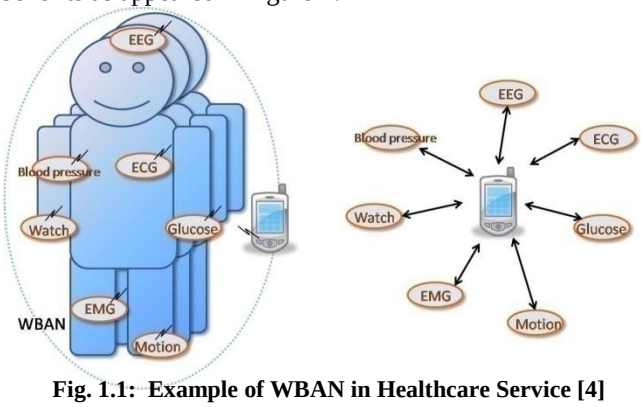

Fig. 1.1: Example of WBAN in Healthcare Service [4]

Figure 1.1 outlines an example WBASN setup for sending electroencephalography (EEG) sensors, electrocardiography (ECG) sensors, a circulatory strain sensor, a remote watch, a glucose sensor, electromyography (EMG) sensors, and movement sensors (accelerometers/whirligigs) on a human body. They are remotely associated together and controlled by an advanced mobile phone. Not quite the same as traditional remote sensor organizes in design, organization thickness, prerequisites, and versatility design, WBASN has its claim qualities. Among these, giving dependable correspondence administrations to organized information

streams with the nature of administration is a critical prerequisite; in any case, existing exploration has not sufficiently given thoughtfulness regarding this issue.

1.2 ISSUES OF WBAN

WBAN is faced with different security issues, for example, loss of information, confirmation and get to control. Less research were found in giving solid security framework in WBAN. All through the investigation of WBAN, we trust that WBAN can give different applications involving restorative and non-therapeutic. The investigation of WBAN presents general thought of the WBAN and interconnected issues genuinely the security issue. Not at all like rapid remote, for example, a remote LAN (WLAN) and a versatile correspondence framework, WBAN thought inside or outside of the human body interchanges. WSN is insufficient for WBAN despite the fact that in confronting some new difficulties, both are comparable in numerous perspectives.

1.3 APPLICATIONS

Applications in this classification incorporate telemonitoring of human physiciological information, following and checking of specialists and patients inside a healing center, tranquilize executive in doctor's facilities and so forth [5]. Loren et al. [6] depict their work on fake retina, biomedical applications. In the Smart Sensors and Integrated Micro frameworks (SSIM) extend, retina prosthesis chips that comprising of 100 miniaturized scale sensors are fabricated and embedded inside human eye. This permits patients with no vision or constrained vision to see at a satisfactory level.

The remote correspondence is required to suit the requirement for input control, picture distinguishing proof and approval. The correspondence example is deterministic and occasional, so TDMA is the best in this application to fill the need of vitality protection. Two gathering correspondence plan are researched a LEACH-like group head based approach and tree-based approach.

Some other comparative applications incorporate Glucose level screens, Organ screens, Cancer identifiers and General wellbeing screens. Embedding remote biomedical sensors inside human body is promising, albeit numerous extra difficulties exist: the framework must be ultra-protected and solid; require negligible upkeep; vitality tackling from body warm. With more explores and advances in this field, better personal satisfaction can be accomplished and medicinal cost can be diminished.

1.4 WBAN CHARACTERISTICS

Fundamentally, WBAN is a correspondence arrange between the people and PCs through wearable gadgets. So as to acknowledge correspondence between these gadgets, methods from Wireless Sensor Network and specially appointed systems could be utilized. An ordinary sensor hub in WBAN ought to guarantee the precise detecting of the flag from the body, complete low-level preparing of the sensor flag and remotely transmit the handled flag to a neighborhood handling unit. Be that as it may, due to normal properties of a WBAN, current conventions intended for these systems are not generally appropriate to bolster WBAN.

1.5 CHALLENGES

The BAN should bolster a low many-sided quality, minimal effort, ultra-low power and profoundly solid remote interchanges for use in closeness to, or inside, a human body to fulfill a transformative arrangement of amusement and medicinal services items and administrations. To managing a wide scope of conceivable application, the key issue is the adaptability as far as information rates, control utilization, organize size, and security.

1.6 PROBLEM DOMAIN

During walking in indoor environment where the old blind person is living having some knows how about that environment but he lacks many things and useful inputs which cannot be seen by him. Changing in that environment may cause many difficulties for him as he was aware of with the previous things that where the hurdles are and where things were placed so he relay much on predefined paths and when the routes are changed or replacing objects increase complexity of his mobility in that environment. A long cane or guide dog may help to reduce the problem of navigation and obstacle collision but blind need more information for easy walking in home. A navigation system was required which can provide enough information for ease of mobility.This problem is evaluated by using proposed prototype in smart environment. The proposed prototype is designed to meet the both problems of navigation and obstacledetection. System works in smart environment, if routes are changed or objects are replaced will create no problems for impaired person in easy walking.

1.7 OBJECTIVE

To develop a prototype which will help in obstacle detection and navigate to destination point are the two objectives which are addressed in this paper. Regarding to blind prospective these are the two main problems. By solving these two issues visually impaired person can easily move from one place to another.

These problems are solved by designing a prototype which works in smart environments. The environment having sensors and RFID tags which are capable of receiving and transmitting signals accurately. All the hurdles which are usually placed in that environment are tagged and RFID modules are placed on the predefined destination points, these are the destinations which are mostly used by a person living in house as kitchen, wash room, bed room etc. prototype consists of sensors and buttons which are used for object detection and destination points respectively as if he wants to go to kitchen he presses one related button which is specified for kitchen and buzzer in kitchen will starts ringing and he starts to move in the direction of sound and during mobility if any hurdle comes in front of him infra-red sensor will sense and motor which is attached with microcontroller starts vibration. In this way he can avoid himself from colliding with obstacle and continues his movement towards destination.

RELATED WORK

Several guidance system for the blind and visually impaired pedestrians are made in last few decades, these devices is one among the several characteristics is most important, the features of the object avoidance component, which provides

information about the hurdles which are placed on the way. There are a few frameworks, attempting to decrease the issue, of visually impaired and outwardly hindered or low vision people.

2.1 DRISHTI MODEL

Drishti [7] is an in-and outside route framework. Outside it utilizes DGPS restriction to keep the client as close as conceivable to the focal line of walkways. It furnishes the client with an ideal course by method for its element steering office. The client can change the framework from out-to indoor operation with a basic vocal order, which actuates an exact ultrasound situating framework. In both cases the client gets vocal prompts which alarm to conceivable hindrances and which give direction while strolling about.

He utilized exact position estimation framework, comprising of wearable PC, remote association, and vocal correspondence interface for direction reason for visually impaired clients and help them to move in known and obscure conditions effortlessly. With respect to indoor route GPS was not accessible Drishti utilized diverse area following innovation ultrasound situating administration that gave more precise outcome as appeared in figure 2.1

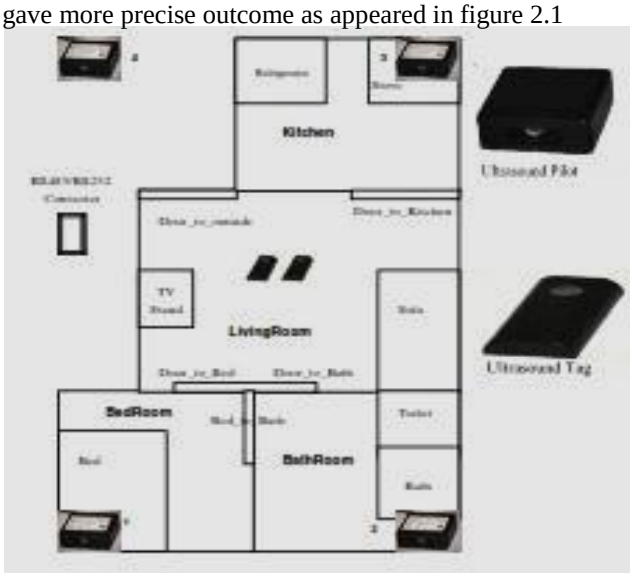

Fig. 2.1: Ultrasound location system coverage of the Smart House [8]

The proposed system is very helpful for indoor navigation as compared to Drishti model because it is quite different from Drishti model. Global positioning is used in that system which is not efficient in navigation for indoor environment. Our prototype is effective in smart environments which is consists of sensors and RFID tags.

2.2 CASBLIP OR COGNITIVE AID SYSTEM

Arrangement of CASBLIP or subjective guide framework for Blind People [9] was an European Union subsidized venture. Its principle objective was to build up a framework equipped for translating and overseeing true data from various sources with a specific end goal to enhance self-sufficient portability. Natural data from different sensors is gained and changed into upgraded pictures for outwardly debilitated clients, or into acoustic maps by means of earphones for visually impaired clients. He worked with collaboration of cognitive experts and in University ofBristol Computer Vision group succeeded to construct a portable device for blind which was consists of stereo cameras which capture the videos of surrounding environment and video processing algorithms was developed by them which defines location of objects and this information is converted into 3D sound map.As compared to our prototype CASBLIP system is very complex and sophisticated. Cognitive aid system is very costly and not practical. The proposed system is quite simple and cheap and more efficient.

2.3 SMART VISION: ACTIVE VISION PROJECT

Active Smart Vision for the visually impaired [10] was a venture supported by the Portuguese Foundation for Science and Technology. Its model is an in-and open air route framework with various modules which incorporate GPS and Wi-Fi limitation with a geographic data framework (GIS) database, latent RFID labels in walkways, and PC vision for way focusing and snag evasion. Smart Vision prototype is easily portable navigation aid for blind mobility. Its functionality addresses global navigation to guide the user and local navigation tracks, walkways and corridors avoiding obstacles problems. Block scheme of the processing is shown in figure 2.2

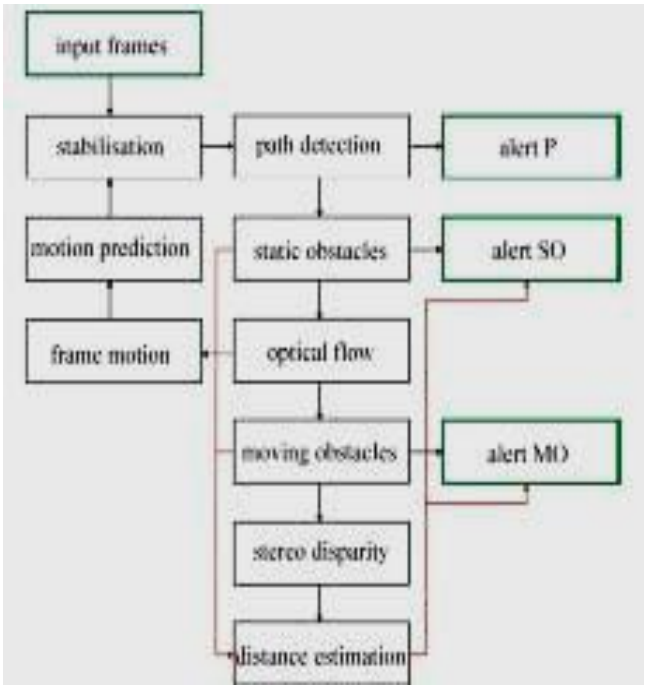

Fig. 2.2: Block scheme of the processing. At right the user interface with sounds and/or speech [11]

The smart vision and active having some formal similarities with our prototype like use of RFID tags but it is for outdoor navigation and also for in door. It is based on information collected from corridors and side walls if these are changed than it will create lot of difficulties to walk.

2.4 SCHMITZ NAVIGATION SYSTEMS

Schmitz et al created route framework [12] which flawlessly coordinates static maps with element area based literary data from an assortment of sources. Every data source requires diverse sort of securing strategy. All gained data is joined by a setting administration stage, and afterward introduced to the client as a material or acoustic guide contingent upon the sources accessible at the present position. Situating is

accomplished by a blend of an inertial following framework, RFID innovation and GPS, and the client is guided to a coveted goal by discourse yield and a hepatic stick.Regarding to lead destination this system used voice and the same method is used in our prototype as to move the blind to destination but subject to other things our project is quite different we used sensor technology instead of static maps.

2.5 BOUSBIA-SALAH SYSTEM

Bousbia recommends a framework where deterrents on the ground are recognized by a ultrasonic sensor incorporated into the stick and the encompassing hindrances are distinguished utilizing sonar sensors coupled on the client shoulders [13].The framework comprising of accelerometer, microcontroller, footswitch, sound yield, control switch, 10 push-catch switches and mode switch. This framework had two methods of operation, playback and record. The playback mode has two headings, switch and forward. The client having three conceivable outcomes from a switch, in one mode daze strolled course of intrigue and separation is figured in record mode. Travel separations are put away in memory, and reset the counter to zero. From that point onward, the visually impaired moves to next choice point above strategy loaded. Perceptible flag is given to the visually impaired when this is equivalent to that put away in the memory for that specific segment of the defeat. Piece chart of the framework is appeared in figure 2.3

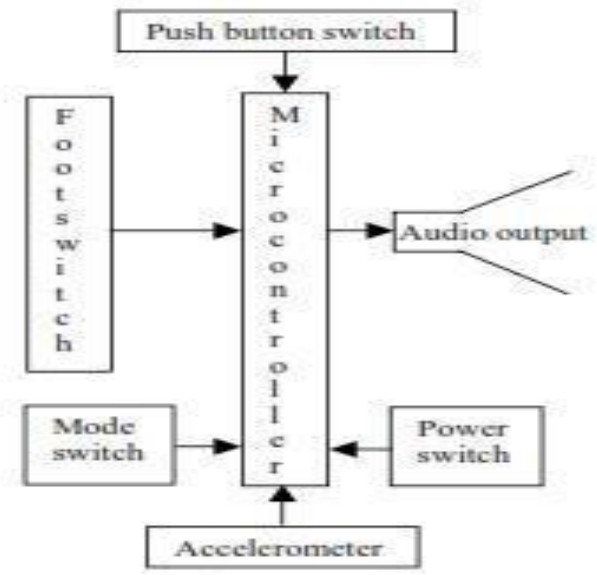

Fig. 2.3: Block diagram of the system [14]

Bousbia system has some similarities with our system in the methodology as in both systems sensors are used for obstacle detection but bousbia used ultrasonic sensors instead of infra-red sensor. Both system having push buttons but their use is quite different as this system is based on the memory and calculated distance. At some extent it provides help in mobility but there is no system of obstacle detection and avoidance.

2.6 CASTELLS SYSTEM

Castell framework utilize vision sensors in their framework setups. [15] For this situation, some portion of a dream framework is proposed to recognize conceivable hindrances as a supplement to ordinary route with the stick. Utilizing PC vision, pictures are investigated to distinguish walkway fringes and two deterrent recognition strategies are connected inside a predefined window.This system is only designed for obstacle detection having no information about navigation but our system provides obstacle detection as well as navigates to the point of destination. For obstacle detection it used sidewalk method but our system uses sensors for this purpose.

2.7 SAINARAYANAN VISION SENSORS

Another system uses visual sensor to catch nature before the client. The picture is prepared by a continuous picture handling plan utilizing fluffy grouping calculations. The handled picture is mapped onto an uncommonly organized stereo acoustic example and exchanged to stereo headphones as in framework depiction [16].Some creators utilize stereovision to acquire 3D data of the encompassing condition. Framework was named as Stereo Vision based Electronic Travel Aid (SVETA). In this work equipment utilized was little to be done effortlessly. Framework comprising of headgear shape with stereo cameras and stereo headphones and Compact Computing Device (CCD) was set in particularly composed pocket. Client needed to wear pocket, wherever he utilized SVETA framework. Stereo camera was reduced, low-control advanced stereo head comprising of two 1.3 super pixel module, participated in an essential unit. CCD was convenient with superior 500MHz Intel portable Celeron processor and 256 MB RAM. Cameras were put before headgear marginally over eye's position which catch pictures and after that handled in reduced figuring gadget. The data about obstruction is given to visually impaired individual by utilizing tones with headphones. This framework is very not the same as our model as it has massive hardware and because of this it is perplexing, costly when contrasted with our model.

2.8 SANG-WOONG LEE

He raised pedestrian guidance system, proposes a walking guidance system which uses stereovision to obtain 3D range information and an area correlation method for approximate depth information. It includes a pedestrian detection model trained with a dataset and polynomial functions as kernel functions [17]. He provided the guidance system for pedestrians walking visually impaired. The designed system help the visually impaired through intelligently respond to various situations that can occur in outdoor environments absolute natural when you walk and find destinations. It involves the main tasks for the detection of people, recognition of text, and recognition of face. In addition, add advanced functions of walking routed guidance the global positioning system, and obstacle detection using a stereo camera and included voice of the user interface. For operating all functions at the same time, he developed the curriculum in real situations and merged them. He finally tested a prototype system under natural environments to verify our approach. The results showed that approach applies to real cases. This system is only helpful in real cases and is not practically applicable.

2.9 GENETIC ALGORITHM METHODS

Anderson et al used genetic algorithm method. Carry out stereo visualization-related, produce a transparent difference map. In turn, these provide a rough distance estimation disparity map to the user, permitting them to browse throughout surroundings [18]. In [19], the general thought is 3-D space based on a change in the melting range of the information and the picture information taken from camera to create a 3-Dspace around said detection. This 3-D that is mapped to the vibration of 2-D array of blind users placed in the chest space and it changes. Vibration level provides a method for 3-D space, and it changes the user is sensed.Algorithmic method is not much effective for navigation purpose as compared to our prototype as this provides little bit information but not leads to destination. This method is not useful.

2.10 AUDIO HAPTIC MAZE

Sound Haptic Maze Audio Haptic Maze (AHM) is a computer game based and was intended to be utilized by a visually impaired client either freely or under the supervision of a facilitator in settings of research and practice, using fundamental sound and haptic interfaces together or independently [20]. A computer game AHM is in which first individual through the numerous halls and rooms in the labyrinth, which contain keys and treasures. The catches are geometric shapes that compare to specific entryways in the labyrinth. The client must lift them up and attempt them each one in turn, until it distinguishes the key can be utilized to open the entryways expected to escape the labyrinth. To add another fun component to the amusement, the score of the diversion increments with each fortune player. When the player removes from the labyrinth is likewise a consider which minimal measure of time means a higher score. The entire procedure of outline and improvement of AHM depended on a strategy for client focused plan, working specifically with the end client and making him a dynamic member in the plan through cooperations, discussions, interviews and toward the finish of the bottomless experience group in outline interface for visually impaired kids was

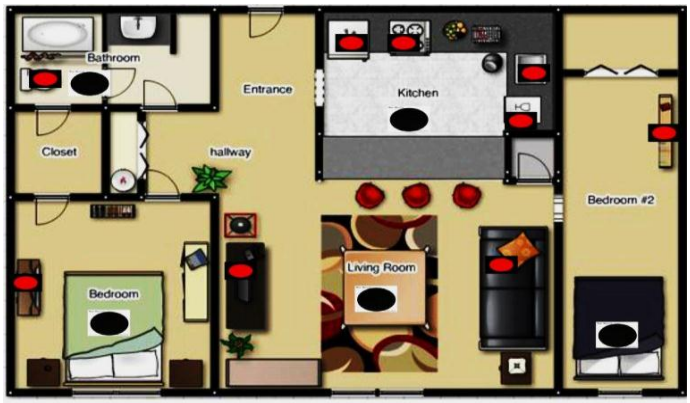

Fig. 3.10: Indoor smart environment

likewise utilized as a part of the outline procedure. AHM depends on a model for the execution of instructive programming concentrated on youngsters with visual debilitation. The model is focused on the arrangement of offices with the end goal of assessment and rewind to the end client. It additionally clears up the likenesses and contrasts between programming for individuals with incapacities and non - visual inabilities, with the end goal of execution.

2.11 PENEDO SYSTEM

A constant stereo vision framework was proposed by Penedo [21],he proposed a continuous stereo vision framework that utilizations one relative view (right camera) and a profundity outline (the stereo vision hardware) to sustain a fluffy based bunching module which fragments the situation into protest data to the client. For side-affect location pre-crash cautioning separately he proposed a silicon-retina-based stereo vision framework, new sort of sensor bio-animated Silicon Retina sensor , dynamic scope of approx. 120dB with a high fleeting determination of 1ms . At the point when the power of light changes this sort of imagersconvey information nonconcurrently. Idea of calculation is especially upgraded and focused for an execution in equipment, e.g. on a Field Programmable Gate Array (FPGA) Overviewing introduced above it can be inferred that mechanically there are numerous conceivable outcomes which can be utilized. Some are extremely mind boggling and likely excessively costly for most visually impaired people monetarily can't manage. The proposed framework is modest and basic.

PROPOSED PROTOTYPE

The proposed system is completely designed for easy walking of blind and visually impaired people in indoor environment. This proposed system addresses the main problems of blinds which they had to face in walking in indoor environment and solution of these problems. There are several difficulties for blind person both in indoor and outdoor environment. This system focuses on problems of walking in indoor environment because the outdoor activities of visually impaired persons are less and not compulsory or important as compared to indoor environment. A blind person living in house he has to go for wash room, kitchen, bed room or dining hall or he has to move in house for different activities then he needs some person for assistance or any other external help for these activities. For easy walking there are two main problems

a. Detection of obstacles or objects and avoidance of collision
b. Orientation and navigation to the destination or to their point of interest.

3.1 OBSTACLE DETECTION

The biggest problem of visually impaired people is objects which are usually present in indoor environment and are hurdles to walk. This system will help blind person in this regard by detecting obstacles in three direction and informing blind person before collision. This module will detect objects in front of person as well as in right and left.

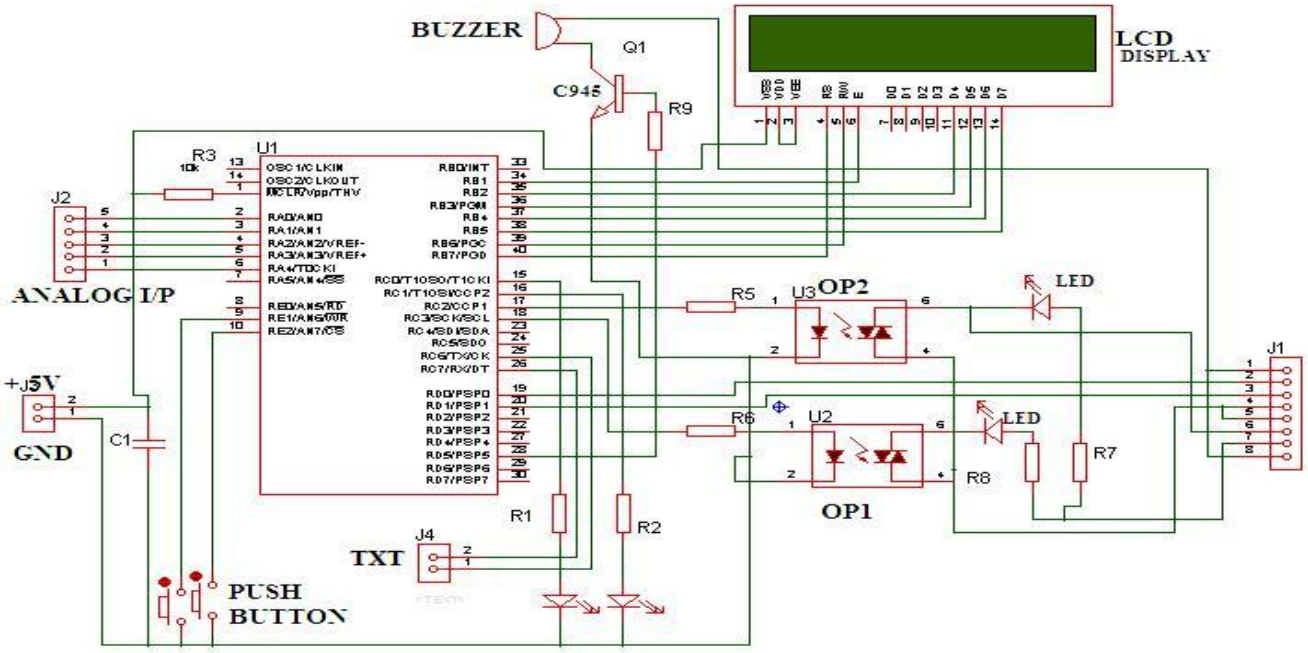

Fig. 3.2

3.2 ORIENTATION AND NAVIGATION

The second main problem of visually impaired person is navigation to their point of destination or desired place where he want to go. The presented system will lead him to his point of interest by help of ringing or sound. Blind person living in house becomes familiar to his indoor environment at some extent but for his ease system will help him by different alarms or bells for different objects as he passes by

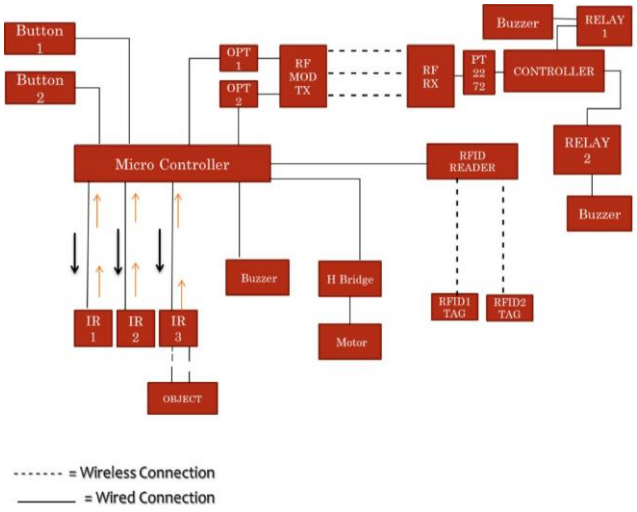

Fig. 3.3: Circuit Diagram of main board:

them. It can also be achieved by voice for different objects. Smart environment as shown in figure 3.10

- Red dots represents RFID
- Black dots represents Buzzers

In smart environment all the objects are tagged which are used for obstacle detection and buzzers are placed on predefined destinations which help in navigation.

3.3 SYSTEM ARCHITECTURE

The circuit diagram of main board as shown in figure 3.3 The circuit diagram of board placed at destination as shown in figure 3.4

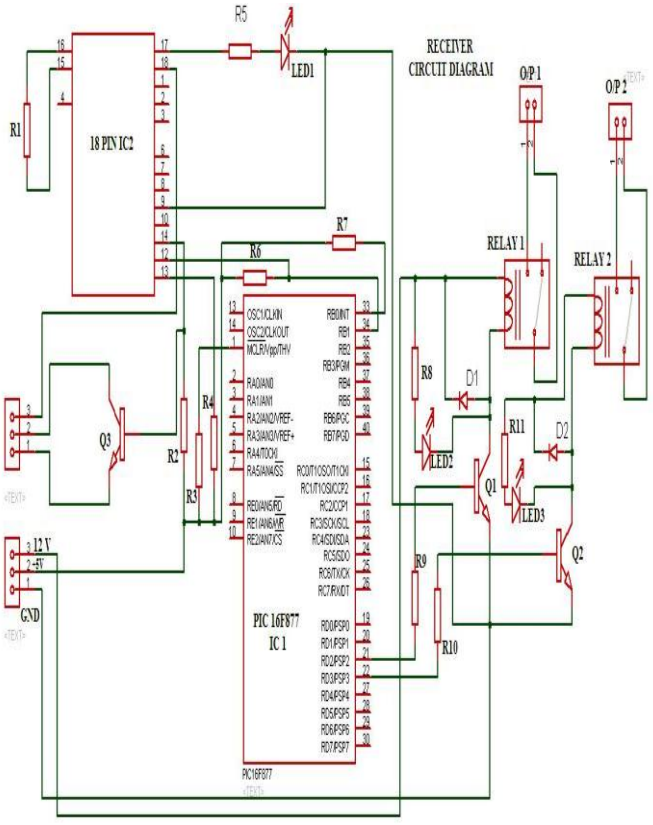

Fig. 3.4: Circuit diagram of board placed at destination:

3.3.1 Main Components of System

i. Microcontroller

All functionality of system is dependent on microcontroller .In this module PIC microcontroller is used because it is easily available in market and low cost and its compiler are also available in market.pic is 8 bit microcontroller with 40 pins. PICs are trendy by means of mutually manufacturing developers and hobbyists identical because of their little price, extensive accessibility, huge customer support, wide-ranging gathering of function observations, accessibility of small price or at no cost development tools, and serial programming (and with flash memory re-programming) facility. They are also frequently used in programming learning because they frequently approach with the easy to use Small instruction set to learn, RISC architecture built in oscillator with selectable speeds. Entry level is easy, in circuit debugging plus in circuit programming.

ii. Infrared Sensor

In indoor environment things are closely placed so for short range detection IR sensors are used. IR sensor detects obstacles or objects in three directions. We attach a motor with micro controller the slow and fast vibration of motor help blind whether the object is in front of him or beside him

iii. RFID Reader

In this prototype for orientation RFID a tag are used and for detecting these tags RF reader is used and the value of tags are displayed on LCD.

iv. RF Module

RF module consist of transmitter and receiver and push buttons are used withmicrocontroller for operating RFas button is pressed RF transmitter sends signal toreceiver and receiver is connected to relays and with relays any type of ringer can beattached.

v. Vibrating Motor

The vibrating motor is connected to microcontroller via H. Bridge and load is attached with motor for vibration. Motor vibrates fast when objects comes in front of blind and slow when beside.

vi. H Bridge

An electronic circuit H bridge is that which enables a voltage to be applied across load in any path. It is used to run motor continuously in either forward or backward direction.

vii. Power Supply

This prototype is operating on 12 volt. For this purpose first we used step down transformer and then replaced it by 12 volt battery.

3.3.2 Construction and working of prototype

According to design of our prototype the first portion of this is power supply board as voltage comes from step down transformer or battery then it is converted from AC to DCwith help of four diodes and filter capacitor then regulators are used for regulated supply. LED is used to display when current comes in this part. Microcontroller is working at the voltage of 6 volt and relays are being used at 12 volt.

Then move towards the main board which consists of microcontroller and bush buttons. The analog pins of microcontroller are left free because these are not being used and for frequency generation crystal of 4 MHz are used and resistor is attached with Vpp pin for pull up because it is being used in running state not in programming mode. A buzzer is attached with variable resistance and LED is used at this step which indicates coming voltage. Two opt couplers are connected with microcontroller for switching purpose.There is small circuit of H Bridge which is attached with microcontroller consisting of four transistors. It is for vibration of motor in forward or back direction.one pin of controller is connected with LCD which is for displaying RFID card number. A second microcontroller is attached for purpose of operating relays which are connected in front of it. These relays operate at voltage of 12 volt. In every board LEDs are used to confirm the voltage supply.When blind person want to move indoor environment and he wants to go to his predefined destination it may be kitchen, wash room, bed room or dining hall. He pushed the button of his desired destination, the bells which are attached with the relays which are already placed in predefined destination points and he starts moving towards that direction. The push buttons are connected with microcontroller and transmitter sends the signal and receiver of RF module after receiving sends the signal to microcontroller which is connected to relays and relays are with bells. When he is moving in indoor environment when any objects comes in front of him infrared sensor sense and send signal to microcontroller and motor which is connected to controller via H bridge starts vibrating and person comes to know there is some object in front of him. It continuously vibrates until his change his way.IR sensor will work in three directions in front, left and right direction.When object is in front of him vibration will be fast and when beside vibration will be slow. During his movement RFID tags can also help him leading to destination. This prototype only detects the tags with help of reader and displaying number son LCD because unavailability of voice generating cards. It will be more efficient when voice is added in it which will be more helpful to lead and orient blind person to destination.

3.3.3 System description

3.1.3.1 RF Section

RF section of prototype is shown in figure 3.5

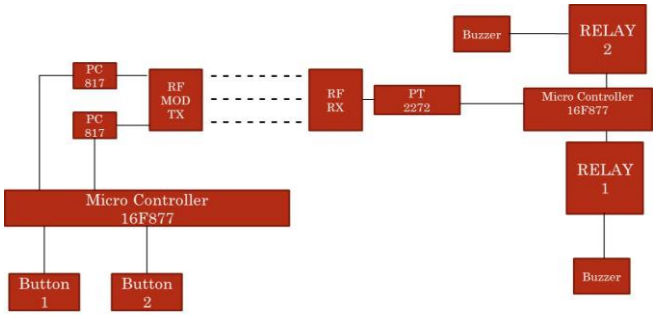

Fig.3.5: RF Section of Prototype

In this portion of prototype two push buttons are attached with microcontroller and RF transmitter is connected with microcontroller with two optocouplers which are for switching purpose. RF receiver is connected to another microcontroller via remote decoder PT2272. It has Wide Range of Operating Voltage: VCC=4~15V.The second controller attached with two relays and we can add any type of ringer in front of these relays. When blind person press

any one of these buttons RF transmitter sends signal to receiver and second microcontroller operates and bells or ringers which are attached with the relays rings.

3.1.3.2 RFID Section

FRID section of prototype consists of microcontroller, buzzer and RFID reader as shown in figure3.6

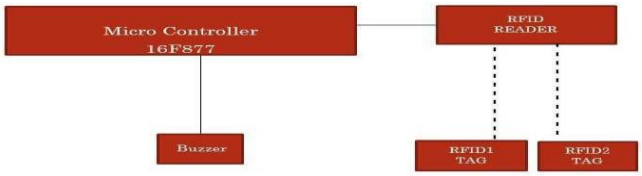

Fig. 3.6: RFID Section of Prototype

This is the simple portion of prototype consisting of LCD and RFID reader. When RFID tags comes near the reader it displays their number on screen we can use different bells for each card and also voices or sounds or buzzer.

3.1.3.3 IR Section

This section consists of microcontroller infra-red sensor, H bridge and vibrating motor as shown in figure 3.7

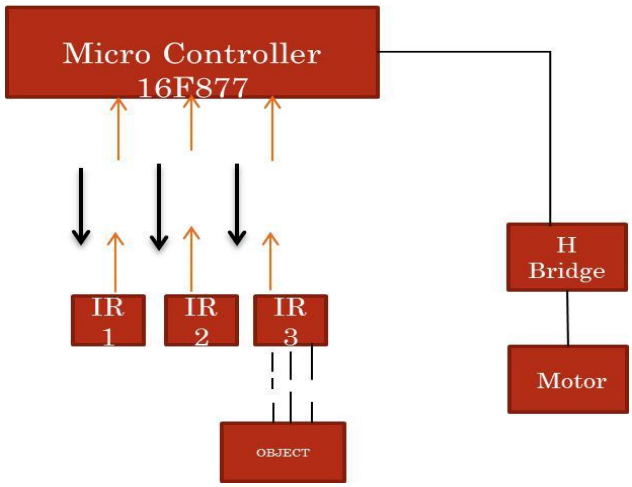

Fig. 3.7: IR Section of Prototype

This portion is related to object detection. It consists of infrared sensor and motor which is connected to microcontroller through H Bridge. Infrared sensor is detecting objects inthree directions when any object comes in front or besides it, it sends signal to micro controller while microcontroller operates motor through H Bridge. When object is in front of sensor motor will vibrate fast and slow when object is on right or left.The burned diagram of main board which is designed in easy PC is shown in figure 3.8The diagram of board placed at destination which is designed in Easy PC is shown in figure 3.10

3.3.4 Benefits

I. Gives the user, detection of objects at particular distance
II. Collision from any obstacle will be obsolete or less chance.
III.Vibration motor vibrates, that will be sensed by user.
IV. Can detect obstacle in 3 directions.
V.When object in front fast & when side slow.

3.3.5 HARDWARE

The diagrams of implemented hardware is shown in figure 3.10

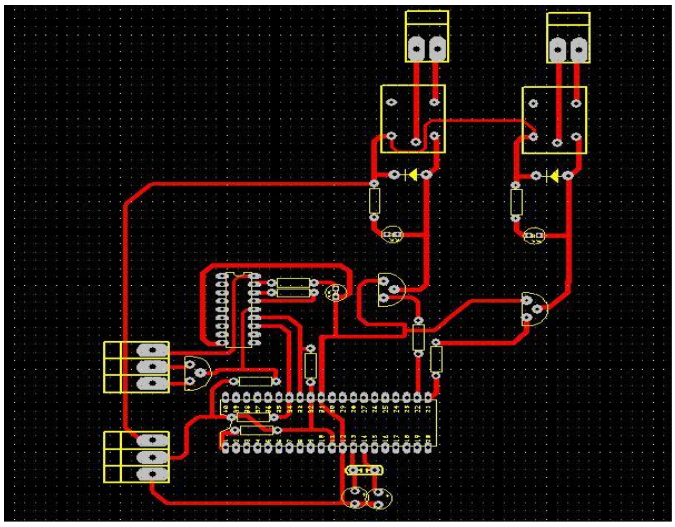

Fig. 3.8: Easy PCB Design of Main Boar

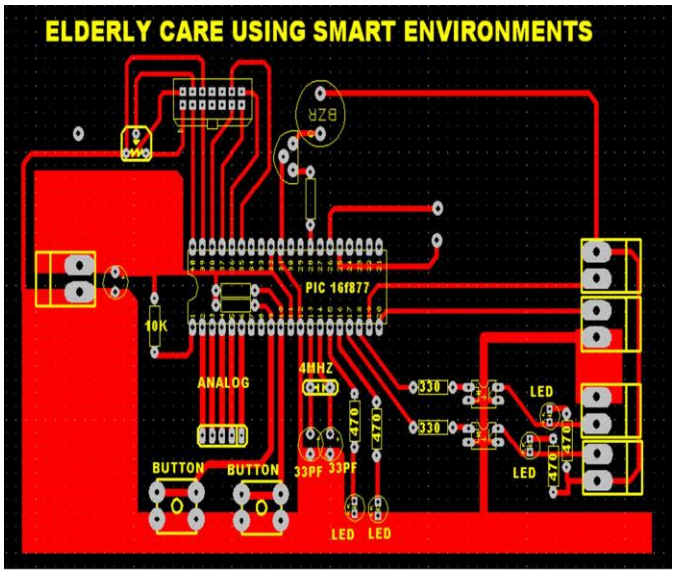

Fig. 3.9: Easy PCB Design of Board Placed at Destination

Fig. 3.10: Implemented Hardware

The designed prototype is tested and results showed that prototype is working quite accurately. The results obtained from the evaluation of 60 years old age blind person from his movement from his room to different destination point. His movement towards the desired destination in the presence of

different objects is checked by giving him proposed module and without module. It was noted that without this module his collision against different objects was greater although he had been living in that environment for long time. He felt greater ease in movement with the help of this equipment. This provides help to move to his destination as well avoided him by striking with objects. The results were quite satisfactory.As we were designing only prototype so step down transformer was used which was providing 12 volt to our circuit, battery of 12 volt can be used instead of transformer.Another issue was size of module as we did not care of it because it was just prototype or model, size can be very small when it will be used in real life. It can be in form of belt or wrist watch or any other minimized form. The biggest problem of visually impaired people is objects which are usually present in indoor environment and are hurdles to walk. This system will help blind person in this regard by detecting obstacles in three direction and informing blind person before collision. This module will detect objects in front of person as well as in right and left.The presented system will lead him to his point of interest by help of ringing or sound. Blind person living in house becomes familiar to his indoor environment at some extent but for his ease system will help him by different alarms or bells for different objects as he passes by them. It can also be achieved by voice for different objects. By observing other systems presented it can be concluded that technologically there are many possibilities which can be used. Some are very complex and likely too expensive for most blind persons financially cannot afford. The proposed system is cheap and simple. This system is quite different from other prototypes as it has not bulky electronics and due to this it is not complex, expensive as compared to other prototypes. As we overviewed other systems some are very complex and likely too large and expensive which cannot be afforded to lift them as well as financially not bearable for most blind persons. The proposed system is quite simple and cheap and efficient.

CONCLUSION

The intention of this learning was to plan, put into practice and assess such prototype which can help blind and visually impaired people for their indoor activities. This will help to lead an independent life by mitigating the dependency on other individuals to navigate them to different common desired destination point. There will be no use of sticks to detect obstacles in their way and avoidance from objects .This system reduced the components and user do not need to carry a wearable computer of large size. Several issues remain to be studied or improved as size of module. In future when every object will be tagged then it will be easy for researchers to navigate blind by voice. Bionic eye can also help in this regard. In future voice sensors will be more useful in this domain if the sensor guide user by voice that what the object is in front of him and RF module integration with sensors tells him about the current position of the user and his predefined destination is how much for away from the user then the problem of obstacle detection, orientation and navigation issues can completely be solved.

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