eVision

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Abstract - *An electronic spectacle designed to empower visually challenged with vision. Blending technologies to invent an electronic wearable eye glasses. Involves life time support through telecom services. This electronic vision helps visually-challenged to navigate and move independently.*

***Key Words*:** Electronic spectacle, Telecom services.

1. INTRODUCTION

Eyes play a vital role in our day to day lives and are perhaps the most precious gift we have. This world is visible to us because we are blessed with eyesight. Clear and bright eye sight makes this world a better place to live in. Good eyesight is very important for our daily activities. However, there are people amongst us who are affected by vision defects. These visually impaired people face the problems of orientation and mobility in an unknown environment. There are many devices available to help those visually impaired people, and more are rolled out every year. They range from traditional a cane which is a simple and purely mechanical device dedicated to detect static obstacles on the ground, uneven surfaces, holes and steps via simple tactile-force feedback. This device is light, portable, but range limited to its own size and it is not usable for dynamic obstacles detection neither than obstacles not located on the floor. Another method is the guide dogs which are trained specially to help the blind people on their movement by navigating around the obstacles to alert the person to change his/her way. However, this method has some limitations such as difficulty to understand the complex direction by these dogs, and they are only suitable for about five years. The cost of these trained dogs is very expensive, also it is difficult for many of blind and visually impaired persons to provide the necessary care for another living being. Other techniques include speaking clocks and watches and tactile mobile phones. In this paper, we present a system that would be of great advantage than the other methods for the visually impaired people by helping them to navigate independently using blended technologies.

2. LITERATURE SURVEY

Over the last decades, research has been conducted for new devices to design a good and reliable system for blind people to detect obstacles and warn them at danger places. There are some systems which has some deficiencies.

Ranu Dixit and Navdeep Kaur in [1] have involved the synchronization of different sound signals and reading of each signal bit wise. These signals store in database, apply the HMM algorithm and distribute each sound signal in one information database to guide the blind.

Rupali Kale and A. P. Phatale in [2] have presented this paper which aims to make the blind person fully independent in all aspects. The proposed system is based on Global Positioning System (GPS) and Obstacle detection and object avoidance technologies.

Shovalet. al in [3] developed a Navbelt, an obstacle avoidance wearable portable computer which is only for indoor navigation. Navbelt was equipped with two modes, in the first one the system information was translated to audio in different sounds. One sound for free for travel direction and other for blocked, it was difficult for the person to differentiate the sounds. Other problem was the system would not know the user momentary position.

D. Yuan et al. in [4] have discussed about the virtual white cane sensing device based on active triangulation, which can measure distances at a rate of 15 measurements/second. A blind person can use this device for sensing the environment, pointing it as if it was a flash light. Beside measuring distances, this device can detect surface discontinuities, such as the foot of a wall, a step, or a drop-off. This is obtained by analyzing the range data collected as the user swings the device around, tracking planar patches and finding discontinuities.

S. Innet and N. Ritnoom in [5] have introduced a stick for distance measurement using infrared sensors, which is a complex and time wasting process. The stick has different vibration modes for different range which is difficult for a blind to differentiate, it needs time for training. The stick informs the person clearly at dangerous stage which conveys less information and safety. The stick has no location and positioning features.

EvangelosMilios et al. in [6] have presented a device that allows three-dimensional (3-D) space perception by sonification of range information obtained via a point laser range sensor. The laser range sensor is worn by a blindfolded user, who scans space by pointing the laser

beam in different directions. The resulting stream of range measurements is then converted to an auditory signal whose frequency or amplitude varies with the range.

3. PROPOSED SYSTEM

In order to overcome the difficulties in the existing method and to provide the cost effective and user friendly system for blind navigation, the following design is proposed. Fig.1 shows that this project mainly consist

3.1 Microcontroller

The microcontroller used in this GPS and GSM based device with user input interface can be Preferably ARM7 based ATMEGA 328 microcontroller, since it is a low power CMOS 8 bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instruction s in a single clock cycle, the ATMEGA328 achieves throughputs approaching 1 MIPS per MHZ allowing the system designer to optimize power consumption versus processing speed.
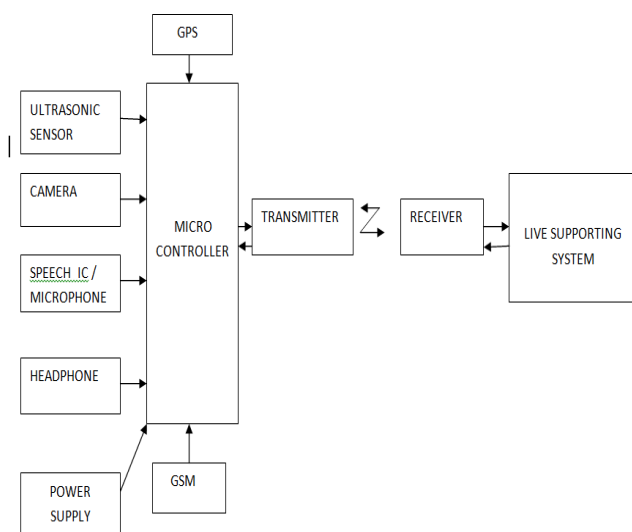

Fig -1: Block Diagram Of Virtual Eye

3.2 GPS

The Global Positioning System (GPS) and Global System for Mobile communications (GSM) are interfaced to the microcontroller to detect the blind person location. The proposed architecture consists of a GPS signal receiver and GSM connected to ARM7.The GPS will be sending the location information to the controller continuously. The same will be routed to the GSM modem through the controller. GSM will forward the same to the live support system. The trained professionals at the live support system communicate with the person to help in navigation.

3.3 GSM

The SIM900 is used in this project. The SIM900 a complete Quad band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuring an industry standard interface, the SIM900 delivers GS M/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900 can fit almost all the space requirements in your

M2M application, especially for slim and compact demand of design.

3.4 Ultrasonic Sensors

In order to provide the obstacle avoidance, Ultrasonic sensor is used. Ultrasonic ranging provides 2cm- 400cm non-contact measurement function, the ranging accuracy can reach to 3mm.it includes ultrasonic transmitters, receiver and control circuit. Ultrasonic use I/O trigger for at least 10us high level signals. Sensor automatically sends eight 40 KHz and detect whether there is a pulse signal back. IF the signal back, through high level, time of high output I/O duration is the time from sending ultrasonic to returning.

3.5 Power supply

Since all electronic circuit work only with low dc voltage. We need a power supply unit to provide the appropriate voltage supply. This unit consists of battery, rectifier, filter and regulation.

3.6 Headphone

The headphone is used in this project for guiding the visually impaired persons to navigate independently by amplifying the predefined voice signals and also by live instruction from the professional at the live supporting system.

3.7 Microphone

The microphone is used in this project to enable the visually challenged persons to communicate to the live supporting system to seek help.

3.8 Camera and Live supporting system

The camera is used for live monitoring. The live supporting system receives the live video with which the trained professionals guide accordingly.

3.9 Transmitter and receiver

The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434 MHz. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter.

The RF module is often used alongwith a pair of encoder/decoder. The encoder is used for encoding parallel data for transmission feed while reception is decoded by a decoder. HT12E-HT12D, HT640-HT648, etc. are some commonly used encoder/decoder pair ICs.

4. WORKING OPERATION

Our project is an innovative idea of intelligent system which has basically three features the first one is Obstacle detection, the second one is Providing accurate location and position through GPS and the third one is live support. It will provide safety and support to visually impaired Persons. The ultrasonic sensors in the system will sense surrounding and will detect the obstacles and give feedback to speech ic change the path way.

1) The power supply activates the circuit.

2) The sensor transmitter transmits the frequency, which reflects from the obstacle. Sensor receiver receives the reflected frequency and gives it to microcontroller.

3) The microcontroller processes it and gives signal to speech IC. Speech IC gives sound and start to inform the person that the obstacle is detected through headphone.

4) The GPS module receives the coordinate continuously and gives it to the microcontroller.

5) Microcontroller access the location from the GPS modem and transmit the location to the GSM modem to send it to live supporting system.

6) The microphone is used to enable the visually challenged persons to communicate to the live supporting system to seek help.

7) The camera is used for live monitoring.

8) The live supporting system receives the live video with which the trained professionals guide accordingly.

5. ADVANTAGES

1) Low design time.

2) Low production cost.

3) This system is applicable for both the indoor and outdoor environment.

4) Setting the destination is very easy.

5) This system is capable of using in public places.

6) It is dynamic system.

7) Less space.

8) Low power consumption.

6. CONCLUSION

This paper proposed the design and architecture of a new concept of Virtual Eye for the blind people. A simple, cheap, configurable, easy to handle electronic guidance system is proposed to provide constructive assistant and support for blind and visually impaired persons. The system will be efficient and unique in its capability. With the proposed architecture, if constructed with at most accuracy, the blind will be able to move from one place to another without others help.

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