

Voice Navigation Stick for Blind

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ABSTRACT

The almighty gifted sense to human being which is an essential thing in our lifestyles is vision. We are able to see the beauty of nature, matters which appear in everyday existence with the help of our eyes. But there are some human beings who lack this ability of visualizing these things. They face many difficulties to move on with their each day life. The trouble gets worse when they cross to an unfamiliar location. Visually challenged people face numerous challenges when moving in unfamiliar public places. Only few of the navigation structures for visually impaired humans can provide dynamic interactions. None of these systems work perfectly for outdoors. Propose navigation system for the visually impaired focus on travelling from one vicinity to another. This focuses on designing a device for visually impaired human beings that help them in visiting independently satisfied to use. The device is linked with a GPS to discover the location of the blind person. Moreover, it provides voice alert to avoid limitations based totally on ultrasonic sensors. An emergency button is additionally brought to the system. The complete device is designed to be small and is used in conjunction with the stick.

Keywords — Blind People, GPS, Ultrasonic Sensor, Stick, Voice Navigation

I. INTRODUCTION

Blindness or visible impairment is a situation that influences many humans round the world. This circumstance leads to the loss of the treasured experience of vision worldwide extra than 160 million people are visually impaired with 37 million to be blind. The want for assistive devices used to be and will be continuous. There is a extensive vary of navigation systems and equipment current for visually impaired men and women the blind individual clearly necessities and identifying objects.

1.1 Background

There are 285 million human beings global that have some degree of visible impairment. The blind navigation device catering wants of the blind people who are no longer able to cross from one area to different place barring the help of others. Recent survey supply says India is now come to be the united states having world's giant variety of blind people. There are 37 million blind people throughout the globe, over them 15 million human beings are in India. The blind tour in India depends on different information like cane, people information, and skilled dogs. A information canine is educated to information its users to avoid the accidents from objects and barriers. When a visually impaired individual is the usage of a on foot stick, they waving their on foot stick and finds the obstacle by striking obstacles in advance of them. Hence here a system is proposed to help this crew of population. God proficient sense to human being which is an important element in our lifestyles is vision. We are in a position to see the splendor of nature, things which occur in everyday lifestyles with the help of our eyes. But there are some humans who lack this ability of visualizing these things. They face many difficulties to pass on with their

every day life. The hassle gets worse when they pass to an unfamiliar location. Visually impaired humans face many challenges when shifting in unfamiliar public places. As many of these people have challenge understanding where they are or the place they are going, often feeling totally disorientated or even isolated, supplemental navigational training is very important for them. Navigation includes updating one's position and orientation while he or she is travelling an intended route, and in the event the person will become lost, reorienting and re-establishing a route to the destination. Hence a device has to be discovered to minimize the difficulties of actually impaired humans to attain their destination

1.3 Objective

The paper most important objective is to grant a talkative help to blind people. We are going to advance a smart device that works correctly accurate in outdoor. Current navigation system for the visually impaired focuses on visiting from one vicinity to another, this gadget focuses on designing a machine for visually impaired human beings that help them to travel independently which is cozy to use. This gadget is used to help blind humans to move with the identical ease and confidence as a sighted people. The machine is linked with a GPS to discover the region of the blind person. Moreover, it presents the voice alert to avoid limitations primarily based on ultrasonic sensors. An emergency button is also delivered to the system. The entire gadget is designed to be small and is used in conjunction with the stick.

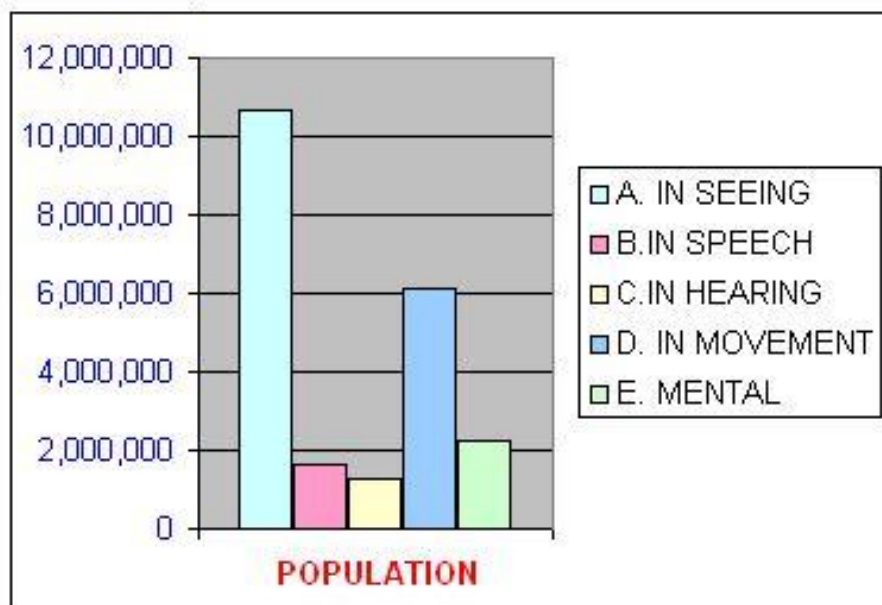


Fig 1: Statistical Analysis

II. LITERATURE SURVEY

There are quite a few methods and gadgets used to guide visually impaired persons. Several research works are being performed with the aid of many establishments at some point of the world to provide the great navigational robot in phrases of price effectiveness. This part gives a short evaluate on more than a few navigational aids for blind individuals. Blind and visually

impaired humans are at a drawback when they journey due to the fact they do not obtain adequate records about their vicinity and orientation with appreciate to visitors and limitations on the way and matters that can without difficulty be considered with the aid of humans except visual disabilities. The conventional ways of information dog and lengthy stick solely assist to avoid obstacles, not to know what they are. Navigation structures usually consist of three parts to assist human beings travel with a greater degree of psychological remedy and independence. Sensing the immediately surroundings for barriers and hazards, imparting information about vicinity and orientation all through journey these days in the market specific technologies like GPS, GPRS, and so on are used to navigate visually impaired people. The studies of a number of published worldwide papers have been done. Before more technologically advanced options to mobility aids are mentioned it is useful to outline primary homes of the traditionally used foremost aids and give an explanation for their essential houses and limitations.

2.1 Stick

The most popular mobility hand held aid. It is generally foldable and adjustable to the top of the user. A blind man or woman the usage of swing-like movements, “scan” the path in front in approx. 1 m distance (near -space protection).The stick requires about 100 hours of education for skilful use, e.g. detecting drop-offs, strolling up and down the stairs.

Advantages: cheap, lightweight constructions available, effectively informs of shorelines, landmarks and boundaries at ground-level, notifies others about visible incapacity of its user. Disadvantages: does not protect from limitations at torso and face level.

2.2 Guidance of Dog

A in particular trained dog supporting the blind in obstacle avoidance, but typically no longer aiding in way discovering (unless traveling a familiar path), e.g. the canine is skilled to give up before obstacles, reacts to commands on on foot directions. In spite of their brilliant usefulness, guide dogs are a not often used resource - only about 1% of the visually impaired use it. Most guide dog owners do no longer simultaneously use the canine and the stick.

Advantages: top in following acquainted paths, suitable usual obstacle avoidance, educated for selective disobedience when sensing hazard to his owner.

Disadvantages: very highly-priced guide canine provider period is on average 6 years, normal canine up-keeping prices and lifestyle changes.

2.3 Human Guide

A blind man or woman walks hand in hand with a sighted guide.

Advantages/disadvantages: The most obvious, but in exercise not a permanent solution for assisting the blind in mobility and navigation. A blind individual lacks privacy and can have a feeling of being a burden to his or her guide.

III. WORKING

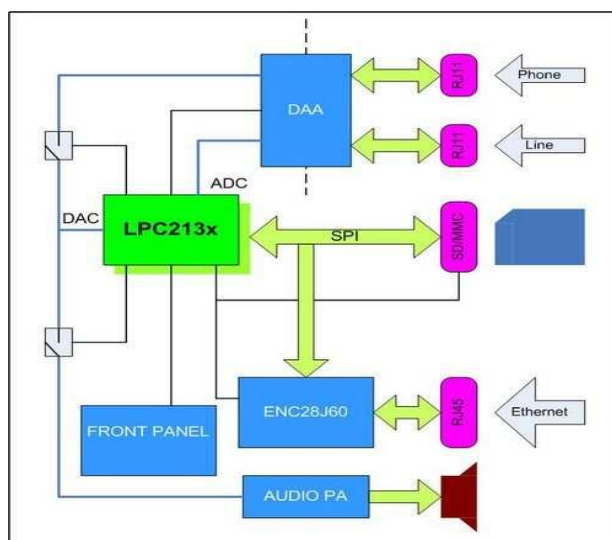


Fig 2: Proposed System

3.1 System Description

The Fig 2 shows the block design of the taking walks stick unit that is current in the walking stick of the blind people. In this paper, the primary goal is GPS and GSM section, impediment unit (IR SENSOR AND ULTRASONIC SENSOR). The blind man or woman will attain his destination location the use of voice. He will communicate his beginning and vacation spot place. All this detail will be displayed on LCD. When he wishes to go to any new region he will enter the function using keyboard. His location will be tracing the usage of GPS. The coordinates given by GPS are piled up in EEPROM. And it is given to micro-controller. It will in shape the co-ordinates and then it will display on LCD and announcement will be achieved on speaker. Accelerometer is geared up on the stick, for this reason blind individual flip to any path such as left, right, forward and backward. So he will come to comprehend the location of that region he is going through too. Ultrasonic sensor and IR sensor is used to realize the impediment such as vehicles, any individual etc. As soon as obstacle is detected the blind individual is warned with the help of speaker for this reason warding off any variety of mishap.

3.1.1 Arm 7

This generation introduced the Thumb 16-bit education set presenting expanded code density in contrast to preceding designs. The most extensively used ARM7 designs implement the ARMv4T architecture, but some enforce ARMv3 or ARMv5TEJ. All these designs use Von Neumann architecture, accordingly the few versions comprising a cache do not separate records and coaching caches. Some ARM7 cores are obsolete. One historically large model, the ARM7DI is remarkable for having delivered JTAG based totally on-chip debugging; the previous ARM6 cores did now not aid it. The "D" represented a JTAG TAP for debugging; the "I" denoted an Icebreaker debug module helping hardware breakpoints and watch points, and letting the system be stalled for debugging. Subsequent cores included and stronger this support. It is a versatile processor designed for cellular units and different low strength electronics. This processor structure is capable of up to one hundred thirty MIPS on a standard 0.13 μm process.

The ARM7TDMI processor core implements ARM structure v4T. The processor supports each 32-bit and 16-bit directions through the ARM and Thumb coaching sets. The ARM7TDMI (ARM7+Thumb tag Debug fast Multiplier more advantageous ICE) processor is a 32-bit RISC CPU designed by using ARM, and licensed for manufacture by means of an array of semiconductor companies. In 2009 it stays one of the most widely used ARM cores, and is determined in severa deeply embedded device designs. The ARM7TDMI-S variant is the synthesizable core.

3.1.2 LCD

LCD is used in a mission to visualize the output of the application. We have used 16x2 LCD which suggests 16 columns and 2 rows. Subsequently, we can inscribe 16 characters in each line. As a result, total of 32 characters we can display on 16x2 LCD. LCD can also used in an assignment to check the output of distinctive modules interfaced with the microcontroller. Thus LCD plays a vital position in a mission to see the output and to debug the device module wise in case of machine failure in order to rectify the problem.

3.1.3 Keypad

Keypad is basically used to supply the input to the microcontroller. The keypad consists of micro switches which are related to the microcontroller pins in a matrix format. Each key is assigned with the one-of-a-kind personality or image or digit. When consumer press the key the respective assigned ASCII fee of that key is supplied to the microcontroller by using software. The keypad is additionally standard 4x4 which has 8 pin connector. The 4x4 keypad has the design like the table proven below. BK is backspace whilst getting into the password. EN is enter and is used do enable/disable menu object or allow the system.

1	2	3	^
4	5	6	v
7	8	9	BK
	0		EN

Keyboards are the most widely used input device of the 8051, and the simple grasp of them is essential. At the lowest level, keyboards are arranged in matrix shape of rows and columns. The CPU accesses both rows and columns thru ports: therefore, with two 8-bit ports, an eight X 8 matrix of keys can be related to microcontroller. When an input is pressed a row and a column create a contact otherwise, there is no connection between them.

3.1.4 Scanning and Identifying the Keys

The rows are linked to an output port and the columns are related to an enter port. If no key has been pressed, analyzing the input port will yield 1s for all columns seeing that they are all connected to high (VCC). If all the rows are grounded and a key is pressed one of the columns will have zero due to the fact that the key pressed gives a path to ground. It is the feature of the microcontroller to scan the keyboard continuously detects and identifies the key pressed.

3.1.5 GPS Modem

The GPS smart receiver aspects the sixteen channels .Ultra low energy GPS architecture. This complete enabled GPS receiver provides high position, velocity and time accuracy performances as nicely as high sensitivity and monitoring capabilities.

The ultra low power CMOS technology, the GPS receiver is perfect for many transportable functions such as PDA, Tablet PC, smart telephone etc.

Benefits-

1. Ultra low power consumption
2. Easy and fast to install
3. Superior city canyon performance
4. Low value with high performance



Fig 3: GPS Component

3.1.6 Announcement System

Announcement gadget is nothing however a speaker or headphone which is linked at the output of the machine for announcement purpose. As per the gadget application, according to the visible based guide, the respective saved audio file is performed using a speaker or headphone.

3.1.7 SD Card

SD card is basically is used as an storage gadget which will required to save the required data. The device database can be used to shop in SD card in the structure of .wav file and can be accessed from that each time it is required. SD card is interfaced with the machine the use of a protocol called SPI protocol.

3.1.8 Accelerometer

An accelerometer is an electromechanical gadget that will measure acceleration forces. These forces may additionally be static, like the regular pressure of gravity pulling at your feet, or they ought to be dynamic - brought about by using transferring or vibrating the accelerometer. By measuring the quantity of static acceleration due to gravity, you can locate out the perspective the device is tilted at with appreciate to the earth. By sensing the amount of dynamic acceleration, you can analyze the way the machine is moving. Accelerometers use the piezoelectric impact - they contain microscopic crystal structures that get stressed via

accelerative forces, which motive a voltage to be generated. An additional way to do it is by sensing changes in capacitance. If you have two microstructures subsequent to each other, they have a certain capacitance between them.

3.1.9 GSM Modem

GSM-Global System for Mobile communication is a digital mobile telephone system. With the assist of GSM module interfaced, we can ship quick textual content messages to the required authorities as per the application. GSM module is furnished by using SIM makes use of the cell provider provider and ship SMS to the respective authorities as per programmed. This technology permits the device a wi-fi device with no unique range limits. GSM uses a version of time division more than one get entry to (TDMA) and is the most widely used of the three digital wi-fi telephony applied sciences (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two different streams of person data, every in its personal time slot. It functions at both the 900 MHz or 1800 MHz frequency band.

3.1.10 IR Obstacle Sensor

Here we are connecting an IR primarily based obstacle sensor. The 50 ohm resistor is used for cutting-edge limiting. The present day via the LED is $5v / 50 \text{ ohm} = 100 \text{ mump}$, which is high for an LED. But to increase the range of the obstacle sensor we are using a decrease range resistor (50 ohm).On the receiver aspect we have related the IR receiver in reverse bias. So as quickly as the light falls in the IR receiver, the anode voltage increases and when the anode voltage is more than the cathode voltage then the LED in forward bias mode and begin conducting.

3.1.11 Ultrasonic Sensor

Ultrasonic sensors are essentially used to measure the distances between the impediment / object and the sensor. The ultrasonic sensor works on Doppler Effect. It has an ultrasonic transmitter and a receiver. The transmitter transmits the signal in one direction. This transmitted signal is then reflected returned with the aid of the impediment and received through the receiver. So the complete time taken by means of the sign to get transmitted and to received returned will be used to calculate the distance between the ultrasonic sensor and the obstacle.

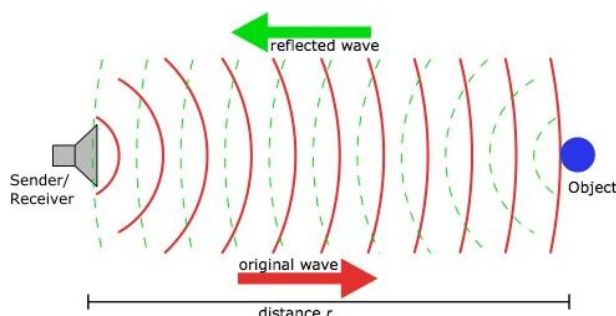


Fig 4: Working of Ultrasonic Sensor

3.1.12 Voice System Hm2007

The speech consciousness is a whole convenient to build programmable speech awareness circuit. Programmable in the feel that you instruct the words (or vocal utterances) you prefer the

circuit to recognize. This machine approves you to scan with many facets of speech cognizance technology.

IV. CONCLUSION

An attempt has been made to make a compact and transportable machine which is exclusively designed for visually impaired people. It will allow the visually impaired man or woman to journey via an unfamiliar surroundings with ease. It can be stated that the undertaking provides Silicon Eye for visually impaired people.

REFERENCES

- [1] Alshbatat, Nour, and Abdel Ilah. "Automated Mobility and Orientation System for Blind or Partially Sighted People." *International Journal on Smart Sensing & Intelligent Systems* 6.2 (2013).
- [2] Lele, Harshad Girish, et al. "Electronic path guidance for visually impaired people." *The International Journal Of Engineering And Science (IJES)* 2.4 (2013): 9-12.
- [3] Mahdi Safaa, A., H. Muhsin Asaad, and I. Al-Mosawi Ali. "Using Ultrasonic Sensor for Blind and Deaf persons Combines Voice Alert and Vibration Properties." *Research Journal of Recent Sciences* ISSN 2277 (2012): 2502.
- [4] García, A. R., R. Fonseca, and A. Durán. "Electronic long cane for locomotion improving on visual impaired people. A case study." *Health Care Exchanges (PAHCE)*, 2011 Pan American. IEEE, 2011.
- [5] Santhosh, S. Sai, T. Sasiprabha, and R. Jeberson. "BLI-NAV embedded navigation system for blind people." *Recent Advances in Space Technology Services and Climate Change (RSTSCC)*, 2010. IEEE, 2010.