INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

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REVIEW PAPER ON MULTITASKING STICK FOR GUIDING SAFE PATH TO VISUALLY DISABLE PEOPLE

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Abstract: The main work of this paper is based on abating the disabilities of blindness by constructing a microcontroller based automated hardware that can corroborate a blind to detect obstacles in front of her/him instantly. This system easily navigate the blind person in desired arena .The hardware consists of a microcontroller incorporated with ultrasonic sensor, voice play back module and additional equipment .Ultrasonic waves are used to detect obstacle. To detect fire/high temperature area, temperature sensor is employed. Water is detected using current sensing principle .Acknowledgement of sensing obstacle through voice play back module. This system can be provided a new dimension RF module used for finding the stick in case of misplaced stick. Beside from the conventional navigation systems, blind aid systems can provide a new RF dimension module used for finding the stick along with dedicated obstacle detection circuitry incorporate ultrasonic sensor is depth measuring circuitry helps to measure the depth in case of dealing with the stairs and voice play back module circuitry is used to inform the obstacle alert. The identification of blind person or owner of the stick is also considered in this proposed project by incorporating his/her contact details in the memory of device. During first power on device automatically scrolls the contact details on the LCD. Battery present in the system is used to give power to all the units present in the system.

Keywords: Microcontroller, ultrasonic sensors, voice play back module, temperature sensor and water sensor, RF module.

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How to Cite This Article:

Ankita Pawar, IJPRET, 2015; Volume 3 (9): 929-936

PAPER-QR CODE

INTRODUCTION

Vision is the most important part of human physiology as 83% of information human being gets from the environment is via sight. The oldest and traditional mobility aids for persons with visual impairments are guide dogs and the walking cane (also called white cane or stick). Necessary skills, training phase and range of motion are the most important drawbacks of these aids and very little information conveyed. With the modern technology both in hardware and software front have brought potential to provide intelligent navigation capabilities. Freshly there has been a lot of Electronic Travel Aids (ETA) designed and devised to help the blind navigate independently and safely. In addition, high-end technological solutions have been introduced recently to help blind persons navigate independently. However, compare to other technologies many blind guidance systems use ultrasound because of its immunity to the environmental noise. Another reason for ultrasonic popularity is that the technology is relatively inexpensive, and ultrasound emitters and detectors are small enough to be carried without the need for complex circuitry. This project is based on a theoretical model and a system concept to provide a smart electronic aid for blind people.

This section describes appropriate related works on the development of smart canes intended for visually-impaired people.

According to Mazo and Rodriguez the blind Cane is one of the assisting tools for the visually-impaired and it is really important. According to Herman, one of the main problems of the visually-impaired is that most of these people have lost their physical integrity. Also, they do not have confidence in themselves. This statement has been proven by Bouvrie, in which an experiment name "Project Prakash" has been carried out. It was intended at testing the visually-impaired to utilize their brain to identify set of objects. According to Chang and Song, this can also be applied to different situation. When the visually-impaired walk into a new environment, they will find it difficult to memorize the locations of the object or obstacles.

The paper of author Joseline Villanueva and Rene Farcy designed stick using IR sensor which is used for obstacle detection but this sensors not detect properly in sunny days and the ultrasonic has a better range detection compared to infrared sensor. So, infrared sensor is replaced by ultrasonic sensor. [1] Another author Mohammad ShorifUddin and Tadayoshi present only one application while in this paper two to three another applications are added related to multitasking

stick for blind person. [2] Mohammad Hazzaz Mahmud, RanaSaha, Sayemul Islam this project is not equipped with water and fire sensor to detect water and fire on path. So, in order to reduce this drawback, these sensors are used . [3] G.Gayathri, M.Vishnupriya, R.Nandhini, Ms. M.Banopriya, This invention is not equipped with sensors to detect the water areas. So, Water sensor is used to detect water area. [4]

III.   PROPOSED SYSTEM

The figure below depicts the proposed design of an embedded multitasking walking stick. The system elements consist of various sub systems.

16X2 LCD DISPLAY

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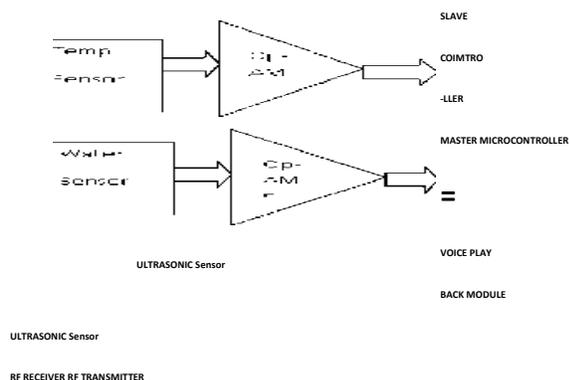
Fig 3.1 Proposed block diagram

The proposed device in fig 3.1 uses ultrasonic sensor and it can detect any object that lies on the ground, situated a distance of certain meters from the user. The minimum size of the object that can be detected should not be less than 3 cm width (or diameter). In operation a beam of ultrasound of 40 KHz frequency is transmitted at a regular interval in the forward direction. The ultrasound will be reflected from a nearby object, if any. The sensor will then detect the presence of any object that lies within that meters by detecting the reflected sound beam. The time intervals at which the transmitter will transmit ultrasound depend on the walking speed of the user. Here two ultrasonic sensors are used, one for obstacle detection and another to measure depth. For water indication electrodes are fitted at the bottom of the stick these electrodes are sensing water and conveying information to blind people. To detect fire or high temperature area, temperature sensor is used which is used to detect the fire around that visually disable people.

Fig 3.2 Voice play back module

The aPR33A series are powerful audio processor along with high performance audio analog-to-digital converters (ADCs) and digital-to-analog converters (DACs).The aPR33A series incorporates all the functionality required to perform demanding audio/voice applications. High quality audio/voice systems with lower bill-of-material costs can be implemented with the aPR33A series because of its integrated analog data converters and full suite of quality-enhancing features such as sample-rate convertor. The aPR33A series C2.0 is specially designed for simple key trigger, user can record and playback the message averagely for 1, 2, 4 or 8 voice message(s) by switch. Users can let the chip enter power-down mode when unused. It can effectively reduce electric current consuming to 15uA and increase the using time in any projects powered by batteries.

1) FEATURES OF VOICE PLAY BACK MODULE:

* Operating Voltage Range: 3V ~ 6.5V

■ Single Chip, High Quality Audio/Voice Recording & Playback Solution

* No External ICs Required

* User Friendly, Easy to Use Operation

* Programming & Development Systems Not Required

* No Battery Backup Required

* Supports Power-Down Mode for Power Saving

* Built-in Audio-Recording Microphone Amplifier

* High Quality Line Receiver

* Averagely 1, 2, 4 or 8 voice messages record & playback

The ATMEGA16 is a low power, high-performance AVR 8-bit microcontroller with advanced RISC Architecture. It has 32 programmable I/O lines, 40-pin PDIP, 44-lead TQFP, and 44-pad QFN/MLF with 4.5-5.5V of operating voltage. This device has 131 powerful instruction most of which is single clock cycle execution and 32x8 general-purpose register. It has nonvolatile program and data memories with 16K bytes of in-system programmable Flash memory. The device has 512 bytes of EEPROM and 1K byte of internal SRAM. It provides programming lock for software security. Atmega16 has two 8¬bit Timer/Counter with separate prescalers and compare modes and one 16-bit Timer/Counter with separate prescaler, compare mode, and capture mode.
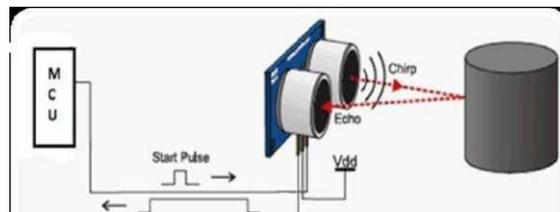
Fig 3.3 Working of ultrasonic Sensor

Ultrasonic sensors generate high frequency sound waves and evaluate the echo that is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. This technology can be used for measuring wind speed and direction (anemometer), tank or channel level, and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure tank or channel level, the sensor measures the distance to the surface of the fluid. The sensor provides precise, stable, non-contact distance measurements from about 2 cm to 4 meters with very high accuracy. Its compact size, higher range and easy usability make it a handy sensor for distance measurement and mapping. The board can easily be interfaced to microcontrollers RX pin (USART). Every 500 ms, the sensor transmits an ultrasonic burst and sends out ASCII value of distance (through its signal pin at 9600 baud rate) that corresponds to the time required for

the burst echo to return to the sensor. This sensor is perfect for any number of applications that require you to perform measurements between moving or stationary objects.
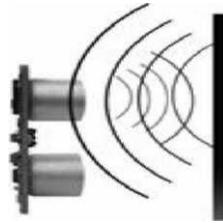
Fig 3.4 Ultrasonic Sensor

The ST-TX01-ASK is an ASK Hybrid transmitter module.

The ST-RX02-ASK is an ASK Hybrid receiver module. These RF modules used for transmitting or receiving information. RF module is used for finding the stick.

The LM358 Operational Amplifier series consists of two independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. All the conventional op amp circuits which now can be more easily implemented in single power supply systems. For example, the LM358 series can be directly operated off of the standard +5V power supply voltage which is used in digital systems and will easily provide the required interface electronics without requiring the additional ±15V power supplies.

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 LIA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a -55° to +150°C temperature range, while the LM35C is rated for a -40° to +110°C range (-10° with improved accuracy). The LCD unit receives character codes (8 bits per character) from a microprocessor or microcomputer, latches the codes to its display data RAM (80-byte DD RAM for storing 80 characters), transforms each character code into a 5 ' 7 dot-matrix character pattern, and displays the characters on its LCD screen. The LCD unit incorporates a character generator ROM which produces 160 different 5 ' 7 dot-matrix

character patterns. The unit also provides a character generator RAM (64 bytes) through which the user may define up to eight additional 5 ' 7 dot-matrix character patterns, as required by the application. To display a character, positional data is sent via the data bus from the microprocessor to the LCD unit, where it is written into the instruction register. A character code is then sent and written into the data register. The LCD unit displays the corresponding character pattern in the specified position.

For water indication electrodes are fitted at the bottom of the stick these electrodes are sensing water and conveying information to blind people. Water sensor senses the water or wetness in the land and will display in the LCD display.

IV. CONCLUSION

With the proposed architecture, the blind people will able to move from one place to another without others help. This system will act as a basic platform for the generation of more such devices for the visually impaired in the future which will be cost effective. It will be real boon for the blind. The developed model gives good results in detecting obstacles paced at distance in front of the user. The result developed is a moderate budget navigational aid for the visually impaired. However minimizing cost leads to compromises in performance. It is advised that the design be improved before commercial production. blind," in Proc. 5th Int. CSPA, Mar. 2009,pp. 250¬253.

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