Safety Stick For Blind People Using Microcontroller

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***Abstract* - Blindness could be a state of lacking the visual perception due to physiological or medical specialty factors. The partial blindness represents the shortage of integration within the growth of the optic nerve or visual Centre of the eye, and total blindness is that the full absence of the visual lightweight perception. during this work, a simple, cheap, friendly user, smart blind system is intended and enforced to boost the quality of each blind and visually impaired people in an exceedingly specific area.**

***IndexTerms* - microcontroller, ultrasonic sensor.**

I. INTRODUCTION

Lots of people suffering from serious visual impairments preventing them from traveling severally. accordingly, they have to use a large vary of tools and techniques to need them in their traveling. one in all these techniques is orientation and quality specialist who helps the visually impaired and blind people and trains them to move on their own independently and safely counting on their different remaining senses. Another technique is that the guide dogs that are trained specially to assist the blind people on their movement by navigating around the obstacles to alert the person to alter his/her approach.

However, this technique has some limitations like issue to know the complex direction by these dogs, and they are only suitable for about 5 years. the price of these trained dogs is extremely costly, also it's tough for several of blind and visually impaired persons to produce the required look after another living being. there's a global image tool of blind and visually impaired people similar to the white cane with a red tip which is used to boost the blind movement. Nowadays, different types of those canes are used like the white cane, the good cane, and the laser cane. However, this tool has many constraints: long length of the cane, limitations in recognizing obstacles, and also problem to stay it publicly places.

Recently, several techniques are developed to boost the quality of blind people who accept signal processing and sensor technology. These known as electronic travel aid (ETA) devices help the blind to move freely in an atmosphere regardless of its dynamic changes. the gap between the person and the barriers is measured by the time of the signal travel. However, all existing systems inform the blind of the presence of an object at a selected distance ahead of or near to him. These details allow the user to alter his or her approach. info about the object characteristics will produce extra knowledge to boost space manifestation and memory of the blind to overcome the previous limitations, this work offers an easy, efficient, configurable electronic system for the blind and visually impaired persons to succor them in their mobility regardless of wherever they're, outdoor or indoor. The originality of the proposed system is that it utilizes an embedded vision system of 3 straightforward IR sensors and brings along all reflective signals in order to codify an obstacle through PIC micro controller.

Hence, additionally to distance the proposed system allows the determination of 2 main characteristics of the obstacle that are material and shape. Further more, the user of the system doesn't need to carry a cane or different marked tool. He/she will simply wear a hat and hand mini stick (size of a pen) similar to others. it's high immunity to ambient lightweight and color of object. it's typical response time regarding 39 ms, and it's very suitable for real-time application.

II.DESCRIPTION

A. BLOCK DIAGRAM

The block diagram of safety stick for blind people contains Power Supply, Crystal Oscillator, Reset Circuit, and Ultrasonic Sensor & Buzzer as shown in Fig.1

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured mistreatment Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a typical nonvolatile memory pro-grammar. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and efficient resolution to several embedded management applications.

AT89S52 Microcontroller Features square measure central processor (Central process Unit) eight Bit, 256 bytes of RAM (Random Access Memory) internally, Four-port I / O, which every consist of eight bits, internal oscillator andtemporal arrangement circuits, two timer / counters sixteen bits, five interrupt lines (two fruits and 3 external interrupt internal interruptions), A serial port with

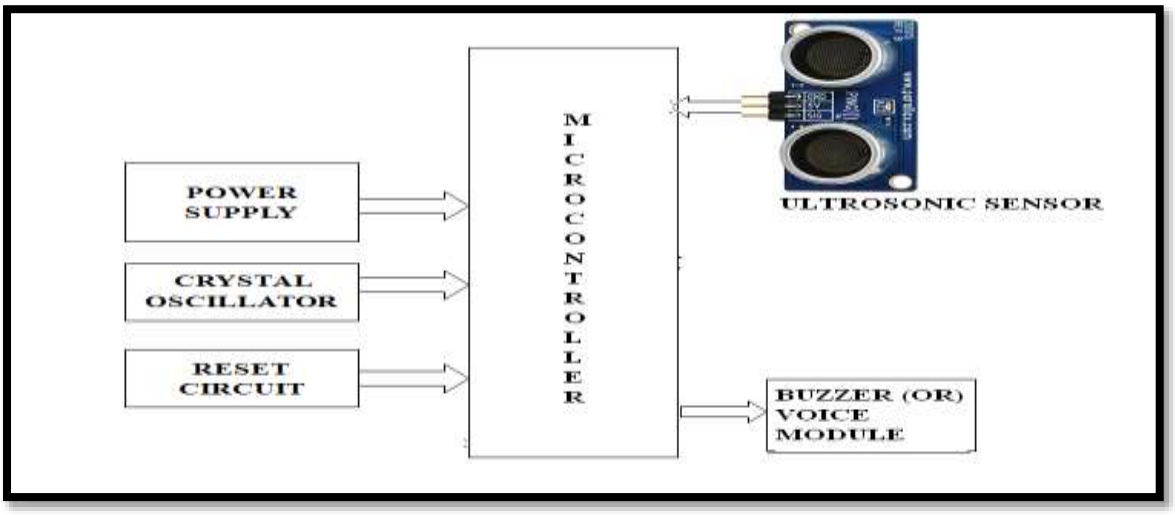


Fig:1 Block Diagram

full duplex UART (Universal Asynchronous Receiver Transmitter), can conduct the method of multiplication, division, and Boolean, size of 8 Kbyte fixed storage for program memory, Maximum speed execution of directions per cycle is zero.5 s at twenty four Mc clock frequency. Ultrasonic sensors or ultra-motion detectors square measure associate degree electronic kit that contains several sub electronic circuit in it and has several applications. When signals from the sensors of sound circuit, playback circuit or vibrator circuit have been detected, it will be transmitted to an extra circuit connected thereto, in order to activate the specifiedoutput. The operation of Ultrasonic sensing element is as shown in Fig.2.

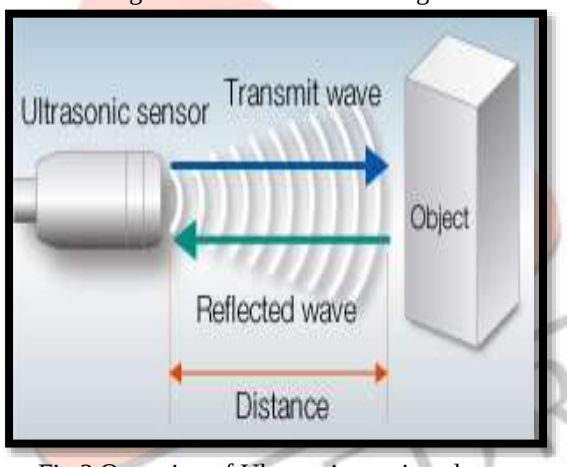


Fig.2 Operation of Ultrasonic sensing element

The main part within the system is that the microcontroller that controls the opposite Components of the system. When the supersonic sensors discover any objects or obstacles in180 degree horizontal and sixty degree vertical, it will activate the buzzer and also the vibration motor mechanically. If any of the three sensors discover any obstacles at intervals a vary of 100cm the buzzer are activated with 1000Hz and 2000 m/s delay. If the obstacles within vary of one hundred cm and fifty cm the buzzer can activate with a thousandHz and 1000 m/s delay. Finally, if the detection is below 50 cm the buzzer can activate with 1000Hz, 500 m/s delay and the vibration motor canactivate. The Ultrasonic sensing element is as shown in Fig. 3.

Fig: 3 Ultrasonic sensing element

Features of Ultrasonic sensor are power Supply :+5V DC, quiescent current : <2mA, working current: 15mA, effectual Angle: <15°, ranging distance : 2cm – 400 cm/1″ – 13ft, resolution : 0.3 cm, measuring Angle: 30 degree, trigger input pulse width:

10uS, dimension: 45mm x 0mm x 15mm. A Buzzer is an audio signaling device which may be mechanical, Electromechanical or piezoelectric. Typical uses of buzzers include alarm device, timers.

The function of switches in this system is to manage the range of the sensor. When switches are open (off), sensors operate at their half range, and when it is closed (ON), sensors operate at their full range.

RESET CIRCUIT

Reset is used for putting the microcontroller into a 'known' condition. That practically means that microcontroller will behave rather inaccurately below certain undesirable conditions. In order to continue its proper functioning it has to be reset, meaning all registers would be placed in a beginning position. Reset is not only used once microcontroller does not behave the way we want it to, but can also be used when trying attempt out a device as an interrupt in program execution, or to get a microcontroller ready once loading a program. In order to stop from bringing a logical zero to MCLR pin accidentally, MCLR has to be connected via resistor to the positive provide pole And capacitor from MCLR to the bottom. Resistor should be between 5 and 10K and the capacitor can be in between 1µf tp 10µf.Thiskindof resistor capacitor combination, gives the rc time delay for the µc to reset.

Fig.4: RC circuit to the RESET (pin9) of µC

As shown in the above circuit we are connecting an RC circuit to the RESET (pin9) of µC .The 89S52 µC has an active high reset, therefore we connect an RC circuit. As shown the capacitor is at first at 5v throughout power ON .It charges via the supply through a 10 µf capacitor in series, therefore the reset time of our circuit is:

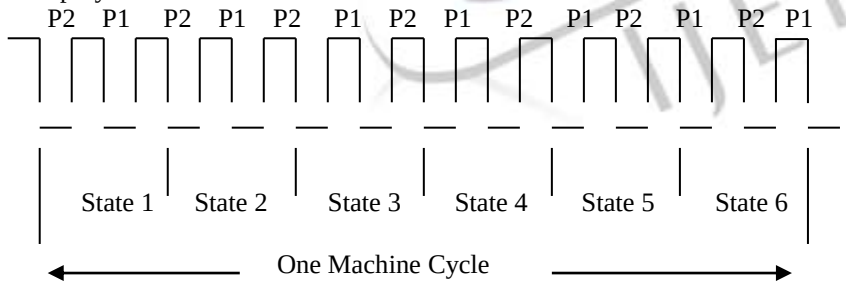
R*C = 10 µf * 10kohm = 100 msec

Recommended time of reset = 1msec

Here the RC time can vary from 10 msec to 100 msec.

CRYSTAL CIRCUIT

Pins OSC1 & OSC2 are provided for connecting a resonant network to form oscillator. Typically a quartz crystal and capacitors are employed.



Here we are connecting twp ceramic capacitors which are basically used for filtering. In other words to give a pure square wave to the µC we are connecting the two capacitors.

The basic rule for placing the crystal on the board is that it should be as close to the µC as possible to avoid any interference in the clock.

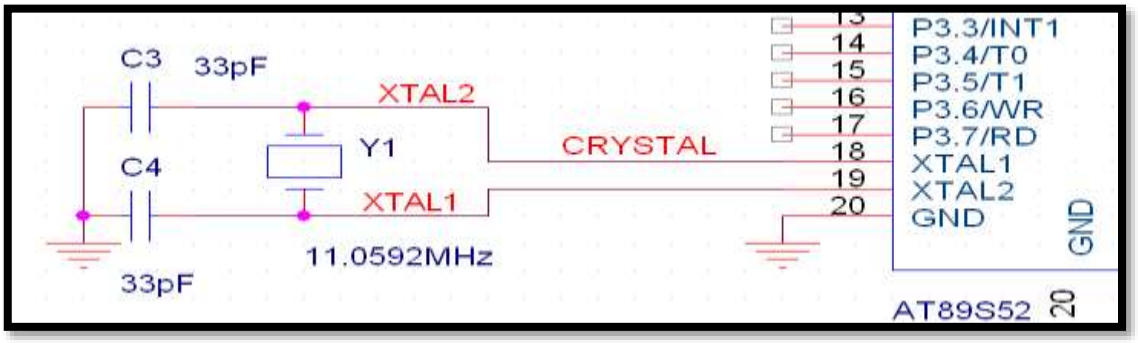


Fig.5: Crystal Oscillator

Why 11.0592 MHz?

Serial data communication needs often dictate the frequency of the oscillator because of the requirement that internal counters must divide the basic clock rate to yield **standard communication baud rates**. If the basic clock frequency is not divisible without a reminder, then the resulting communication is not standard.

$$F_{baud}\frac{2^{SMOD}\times oscillator\ frequency}{32\times 12\times\frac{[256-(TH1)]}{FD}} \tag{1}$$

SMOD is the control bit in PCON and can be 0 or 1, which raises the 2 in the equation to a value of 1 or 2.If timer 1 is not run in timer mode 2, then the baud rate is

$$F_{baud}\frac{2^{SMOD}\times TIMER\ 1\ OVERFLOW\ FREQUNCY}{32} \tag{2}$$

and the timer 1 can be run using the internal clock or as a counter that receives clock pulse from any external source via pin T1. The oscillator frequency is chosen to help generate both standard and non standard baud rates. If standard baud rates are desired, then an 11.0592 megahertz crystal could be selected. To get a standard rate of 966 hertz then, the setting of TH1 may be found as follows:

$$TH1=256-\left(\frac{2^0\times 11.0592\times 10^6}{32d\times 12\times 9600}\right) \tag{3}$$

If SMOD is cleared to 0. Note that the frequency that is generated by the timer is 16 (SMOD = 0) or 32(SMOD = 1) times the actual data communication rate. The UART must be fed a clock frequency that is much higher than the serial baud rate in order to be able to sample close to the center of each received bit. Clearly, a UART clock rate equal to the baud rate would not be fine enough to slice each serial bit into pieces.

Baud rate are as follows

FD→ 9600, F4→2400, E8→1200, FA-->4800

III PCB LAYOUT

The PCB layout of Safety stick for blind people is as shown in Fig. 6.

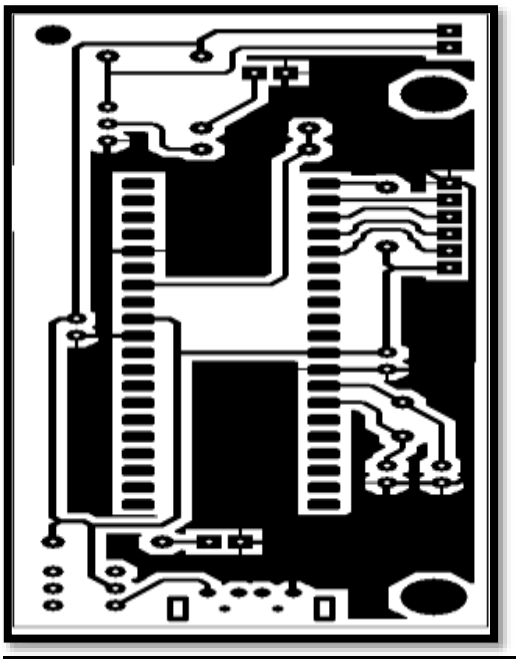


Fig.6: PCB layout

IV CONCLUSION

A cheap, simple, easy to handle, configurable, electronic steering system is planned to supply constructive assistant and support for visually impaired persons and blind. The system is designed, implemented, tested, and verified. The real-time results of the system are encouraging; it discovered an accuracy of ninety three in detecting completely different, materials, shapes, and distances. The results indicate that the system is efficient and distinctive in its capability in specifying the supply and distance of the objects that might encounter the blind. It is able to scan areas left, right, and in front of the blind man despite its height or depth. Therefore, it was favoured by those that participated within the test. The IR sensor has been absolutely used in order to advance the quality of the blind and visual impaired individuals in safe and freelance approach. This system doesn't require an enormous device to be hold for a protracted distance, and it also will not need any special coaching. This system also resolves limitations that are associated with the foremost of the movement issues that will influence the blind individuals in their setting. Future work will be centered on enhancing the performance of the system and reducing the load on the user by replacement the speaker's tune by real human sound to guide the blind precisely. Moreover, shape detection take a look at for objects that move at completely different motion speeds across many distances can additional be thought-about.

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