

# **Smart Blind Stick Using Ultrasound Distance Measurement Sensor System**

**A Project and Thesis submitted in partial fulfillment of the requirements for the Award of Degree of Bachelor of Science in Electrical and Electronic Engineering**

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**DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING**

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## Letter of Transmittal

18<sup>th</sup> Dec, 2018  
To

The Supervisor  
Department of EEE  
Daffodil International University  
Dhanmondi -32, Dhaka-1207  
Subject: Submission of Project Report

Dear Sir,

Please find enclosed the report of the project entitled as “**Smart Blind Stick Using**” **Ultrasound Distance Measurement Sensor System**”. The study has been carried out in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering.

In carrying out the study, we have followed supervisor’s advice and collected Required information from several text books, reference books, web sites and other sources. We think you will find it useful and informative; we would be glad to furnish you explanations or clarifications if required.

Sincerely yours,

-----  
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## **Declaration**

We do hereby solemnly declare that the work presented in this report entitled “**Smart Blind Stick using Ultrasound Distance Measurement Sensor System**” has been carried out by us and has not been previously submitted to any other university, college or organization for an academic qualification, certificate or BSC degree.

We hereby warrant that the work that has been presented here does not breach any existing copyright. We further undertake to indemnify the university against any loss or damage arising from breach of the foregoing obligations.

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## **Acknowledgement**

As a matter of first importance, we offer gratitude to Allah. At that point we might want to accept this open door to offer our gratefulness and thanks to our venture and proposal boss "Mr Md. Dara Abdus Sattar" Assistant Professor And Associate Head, Department of Electrical and Electronic Engineering for being committed in supporting, spurring and managing us through this task. This task isn't possible without his valuable counsel and makes a difference. Likewise much thanks for giving us chance to pick this undertaking. .

Aside from that, we might want to thank our whole companions for sharing learning; data and helping us in making this undertaking a win. Likewise a debt of gratitude is in order for loaning us a few instruments and gear.

To our adored family, we need to give them our most profound love and appreciation for being extremely steady and furthermore for their motivation and support amid our investigations in this University

Thank you all

Authors

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## **Abstract Summary**

Visual lacking is a condition of coming up short on the visual observance because of physiological or neurological weakness. The halfway visual lacking speaks to the absence of reconciliation in the development of the optic nerve or visual eye focal point, and total visual deprivation is the full nonappearance of the visual light observation.

In this work, a primary, moderate, neighborly client, shrewd visually impaired direction framework is planned and actualized to enhance the possibility of both visually impaired and outwardly disabled individuals in an outer territory.

The proposed work will introduce a mobile hardware consists of head cap and small scale hand stick to assist the visually disable individual with securely navigating alone and to dodge any obstructions that might be experienced, regardless of whether settled or versatile, to keep any conceivable mishap.

The fundamental portion of this framework is the infrared sensor which is utilized to check a foreordained region around visually impaired by radiating reflecting waves. The reflected signs got from the hindrance objects are utilized as contributions to PIC microcontroller.

The microcontroller is then used to decide the course and separation of the articles around the visually impaired. The executed framework is modest, quick, and simple to utilize and an imaginative reasonable answer for visually impaired and outwardly hindered individuals in underdeveloped nations.

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CHAPTER 1  
INTRODUCTION

## 1.1 Introduction

Visual defect is a typical incapacity among the population groups through the whole world. According to World Health Organization (WHO) report 285 million individuals are apparently debilitated around the world, 39 million are admittedly wretched and 246 million have low vision.

About 90% of the worlds apparently interrupt live in the creating nations [3]. For the remotely peoples who are poor; visual lacking is a objurgate as they ask help to work outside and to do all other every day basic works.

This paper depicts a framework that attempts to develop the strap of visual disability and make them self-dependent to their everyday endeavors. Traveling or hanging out through a fuzzy environment turns into a natural test when we can't depend without anyone else eyes.

Isolation referential is any artifact fit for estimating the separation between two points. the origin of estimation separation by methods for partitioned lengths of material, for example, chain, measuring tape or are lost to gadget.

Optical difference estimation also has a long history, and is fundamentally taken to originate from crafted by James Watt in 1771. The third strategy is that of Electro-attractive estimations where the season of radio or light waves movement is changed over into a separation.

Since several distinct sorts of instrument have been discovered by James Watt to make circuitous difference estimation for utilizing light waves. A wide range of artifacts or gear these days, start with the basic structure, essential hypothesis and afterward all the shortcoming pursues by enhancement well ordered.

Similar need has been felt by this undertakings also. In this augmentation can be connected to convey the points of interest to the client when estimating the separation by investigating a few issues that emerges.

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A noteworthy job has been implanted in this framework framework assumes. Ultrasonic sensors chips away at a standard like radar or sonar which assesses qualities of an objective by translating the echoes from radio or sound waves separately.

Ultrasonic sensors create high recurrence sound waves and assess the resound which is gotten back by the sensor. Sensors generally calculate the time lag between sending the signal and receiving the echo to determine the distance to an object. That signal is sent and then the echo is received by a sensor to the embedded systems.

An alternative of ordinary blind stick has been proposed through our study which can be used by the blinds very conveniently. Fully automation, easy to maintain, cheap and it's very comfortable to use will make it unique. The power consumption is low and can be operated easily. Above all the alternative is cost effective and economic over the conventional options. The circuit board will be contained by an arm band attached with it.

## **1.2 Historical Background**

Since dynamic snags more often than not create clamor while moving, their feelings constructed up by hearing to confine things. An individual without vision generally use a adjustable stick colored white or strolling stick for recognizing route.

The perambulating stick is an expansive and absolutely mechanical or physical device to recognize static snags on the ground or associated with the ground, uneven or rough surfaces, gaps and ventures through basic material power input.

The moving stick is light in weight, compatible to use, however range of the sensory and alerting stick is constrained to its own size and isn't possible to navigate dynamic segments. It may another choice that provides the best travel help to the visually disable individuals as the guide hounds.

From the point of view of the user of this there are many advantages can be seen. Interaction between the visually impaired proprietor and his pooch,

preparation and the relationship to the creature are the keys to progress. The puppy can distinguish and investigate complex circumstances: cross strolls, stairs, potential threat, know ways and that's just the foundation. The material input by the handle settled on the creature majority of the data is gone through. The client can feel the disposition of his canine, examine the circumstance and furthermore give him suitable requests.

Be that as it may, direct puppies are still a long way from being reasonable, around the cost of a great car, and their normal working time is restricted, a normal of 7 years.

H. He, et al. had structured separation estimation gadget utilizing S3C2410. The temperature pay module had likewise been utilized to enhance the accuracy. Y. Jang, et al. had considered a compact strolling separation estimation framework having 90% exactness. C. C. Chang, et al. had contemplated the ultrasonic estimation framework for submerged applications. It uses ultrasonic structure, laser system and moreover camera based structure for 3D position control of submerged vehicles. Another strategy for timing is delineated by D. Webster in 1994. He used twofold repeat move keyed banner (BSFK) which has disturbance resistance.

A few study is going on to estimate and to actualize furthermore and to recognize reality. A moveable and intelligent stick that cautions extensively hindered individuals over hindrances, pit and water in front could help

Them in moving with less worry about the movement. Some testing works plot [1] a navigational apparatus which is more superior for the outwardly impeded by comprising of a basic strolling stick not fitted with sensors which gives data and idea about the earth.

Innovation of GPS is coordinated with premodified areas to decide the ideal situation to be taken. The client can handle the area from the arrangement of goal s put away in the memory and will lead in the right use of the stick.

In a few frameworks, sensor sing ultrasonic technology, level converter, speaker or earphone, water sensor, GPS recipient, pit sensor, driver, vibrator, voice synthesizer, keypad, PIC controller and battery are utilized. The general point of the gadget is to give a helpful and safe

Strategy for the incognizant in regards to defeat their challenges in every day life. it depends on the utilization of new advances to enhance outwardly hindered individual's portability.

Besides GPS innovation, there are shrewd visually disable sticks which is helpful for recognizing utilizing infrared advancements. This helps individuals as well as helps the individuals with no or low vision. The mechatronic sticks can be an substitute of this.

Ultrasound or ultrasonic sensors can be put on temple or on arm as indicated by the solace dimension of the client. Indeed, even there can be keen wheelchair utilizing a similar technique and hardware actualized on an alternate or ultrasound equipment.

The expected activity can be calculated for the circuit to play out. There are intelligent condition adventurer stick and vision contact telephone. All are diverse renditions of the savvy dazzle stick.

These are available in the market in different names as electronic guiding stick or smart mobility stick or smart blind stick or intelligent guiding stick etc. The assistant works based on the similar technology of echolocation, a navigation system or image processing and.

Multiple walking systems and sticks which help the user to move around, outdoor locations and indoor locations but autonomous navigation along with identification alerts and object detection are provided by none of them.

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The Assistor uses sensors which can sense ultrasonic waves to echo sound waves and through which detect objects. An image sensor is used here which can detect the objects in front of the user and also can navigation by capturing runtime images and a Smartphone app is used to navigate the user to the destination using GPS (Global Positioning System) and maps.

CHAPTER 2  
BACKGROUND

## 2.1 Related Works and Existing System

This area portrays fitting related takes a shot at the advancement of savvy sticks proposed for outwardly weakened individuals.

As needs be innovation can help in diminishing numerous boundaries that individuals with disabilities confront. These sorts of innovations are alluded to as assistive innovation (AT).

There are numerous kinds of incapacities, including physical disabilities, hearing-debilitated, and outwardly impeded. AT has been used in helping them. Be that as it may, building up an AT is costly, making their moving value high.

As indicated by Mazo and Rodriguez the visually impaired Cane is one of the helping instruments for the outwardly weakened and it is extremely imperative.

As indicated by Herman, one of the principle issues of the outwardly weakened is that a large portion of these individuals have lost their physical uprightness. Likewise, they don't believe in themselves.

This announcement has been demonstrated by Bouvrie, in which an examination name —Project Prakash has been completed. It was planned at testing the outwardly weakened to use their cerebrum to distinguish set of items.

As indicated by Chang and Song, this can likewise be connected to various circumstance. At the point when the outwardly hindered stroll into another condition, they will think that its hard to retain the areas of the protest or obstructions. These precedents exhibit the challenges of outwardly hindered individuals.

The Guide Cane is meant to assist the visually-impaired users navigate safely and quickly among obstacles and alternative hazards.

Guide stick is employed like the widely used white cane, wherever the user holds the Guide Cane before of the user whereas walking.

The Guide Cane is significantly heavier than the white cane as a result of it uses a servo motor. The wheels are equipped with encoders to see the relative motion

The servo motor, controlled by the constitutional will steer the wheels left and right relative to the cane. To find obstacles, the Guide Cane is equipped with ten



supersonic sensors. A mini joystick set at the handle permits the user to specify a desired direction of motion. Guide Cane is much heavier than the standard white cane and additionally it is onerous to stay as a result of it can not be plated. Smart Cane is one invention that was originally the creation of a typical blind cane however it is equipped with a detector system. This invention resembles Guide Cane where this invention encompasses a variety of supersonic sensors and servo motors.

This invention is meant with the aim at serving to the blind in navigating. supersonic sensors have to find and avoid obstacles and or objects set before of the user. In the Meantime the fuzzy controller is needed to see the direction which will be dead for instance to show right, left or stop. Like Guide Cane, this invention Also in compass management button on the handle, and therefore button has four completely different directions.

This invention has the identical weaknesses because the Guide Cane where there will be a an issue to save lots of area or to position the good cane. Besides that, value is additionally a weakness during this project because it uses supersonic sensors and variety of servo motors. If the value is simply too high, users don't see to afford for if as result of the typical financial gain of the visually-impaired folks comparatively little.

Smart Cane has been designed by students from Central Michigan University where this invention uses Radio Frequency Identification (RFID).

RFID is employed to find objects or obstacles before of the user and detects the RFID tag that has been placed in many areas to navigate the users. This invention is simply sort of a traditional stick however is supplied with a bag, worn by the user.

The bag provides electricity power to the invention and informs the user through speakers inside the bag. For users united nations agency do not have the power to less on to, there are special gloves which will vibrate at its figure during which vibration in every finger have different meanings.

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However, this invention has many weaknesses and is simply appropriate for little areas. This is often as a result of it slowly detects realm with RFID tag otherwise this invention slowly works as a regular blind cane. In additionally, this invention needs a high cost if it is utilized in the external setting as result the larger space that required to be labeled, the upper value is required.

Mechatronic Blind Stick could be a guiding system, designed to facilitate the daily work among the visually-impaired folks. This invention has several similarities with the good Blind Cane. During which this invention uses supersonic sensors and sound vibrations. However, this invention also has many weaknesses; it cannot be pleated and troublesome to stay. Additionally, this invention is not equipped with sensors to find the water areas. Even there can be can be infrared primary based smart blind stick.

A lot of study and analysis are being done to vogue a fine instrument that has the user a way higher walking experience. One in is of theme is sensible vision.. The previous is done through a camera joined on the client's chest and the last is accomplished by multi-

scale, commented on, and organically motivated keypoints. Another work is finished by Fernandes, Costa, Filipe, Hadjileontiadis and Barros

[2].The gadget can recognize explicit tourist spots and will educate the client the separation from the impediment. Profundities are recognized utilizing two cameras which produce pictures appropriate to separate both the position and separation of articles as per their relative splendor.

Corona is another gadget that can be mounted on the current white cane and can identify low hanging snags, for example, parts of trees.

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It comprises of ultrasonic range sensor with an unusual mass vibrating engine which vibrates particularly for ground deterrent and low hanging impediment. An insightful guide stick distinguishes impediments utilizing ultrasonic sensors yet it can't tell whether the obstruction is in movement or not. A remote ultrasonic extending framework distinguishes deterrents utilizing a ultrasonic sensors and the PIC16F877 microcontroller discovers the separation from the snag. The telephone that is connected to the microcontroller changes over the data to discourse and the information is sent to the Bluetooth headphone to caution the client. In the work by Amirhossein Tamjidi, Cang Ye and Soonhac Hong a convenient indoor confinement help for 6 Degree of Freedom gadget post estimation is proposed.

This strategy is utilized as an indoor GPS framework for position estimation of the outwardly hindered. It additionally bolsters deterrent recognition and help the outwardly debilitated to move around unreservedly. In another work by C.Ye and X. Qian a RANSAC based plane recognition technique is proposed wherein the mind boggling geometry of the 3D information guarantees exactness [8]. This strategy would be utilized by an automated navigational gadget helping the outwardly tested.

The work done by S. Gallo, D. Chapuis, L. Santos-Carreras, Y. Kim, P. Retornaz, H. Bleuler and R. Gassert, "Expanded White Cane with Multimodal Haptic Feedback" includes Haptics input to emulate the conduct of a more extended stick [6]. The criticism is given by a stun creating module which discharges the dynamic vitality put away in a turning wheel in a controlled sum. If there should arise an occurrence of a moving snag, the spatiotemporal vibration design, invigorated on the client's hand makes the impression of an obvious development. An alternate methodology is found in the work introduced by Larisa Dunai, Guillermo PerisFajarnes, Victor Santiago Praderas, Beatriz Defez Garcia on "Real- Time Assistance Prototype – another Navigation Aid for visually impaired individuals" includes stereo-vision innovation incorporating constant static and moving snag and free way ident

fication [7]. The framework offers three dimensional data of nature, transferring it to the client by transmitting acoustical signs. The gadget comprises of a protective cap fitted with a couple of stereo camera, which catches the picture. The picture is forms by a workstation and the client is cautioned through an earphone.



Figure 2.1: Examples of Mobility Aid Devices

The above figure demonstrates various products available in the market and also some recently innovated smart stick or smart guide. Some of them are undoubtedly more advanced technology than the presented project. But many of them are complex with difficult and costly maintenance. This problem renders them as out of reach for the developing world, let alone for the indigents and remotely living rural area people. Old people many times cannot operate such difficult devices. They desire an easy to operate product with minimal service and obviously at low cost. Our product aims at serving this purpose.

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CHAPTER 3  
COMPONENTS AND PARTS

Alongside resistors, capacitors and transistors the following equipments were used:

### 3.1 Microcontroller chip

#### PIC 16F72:

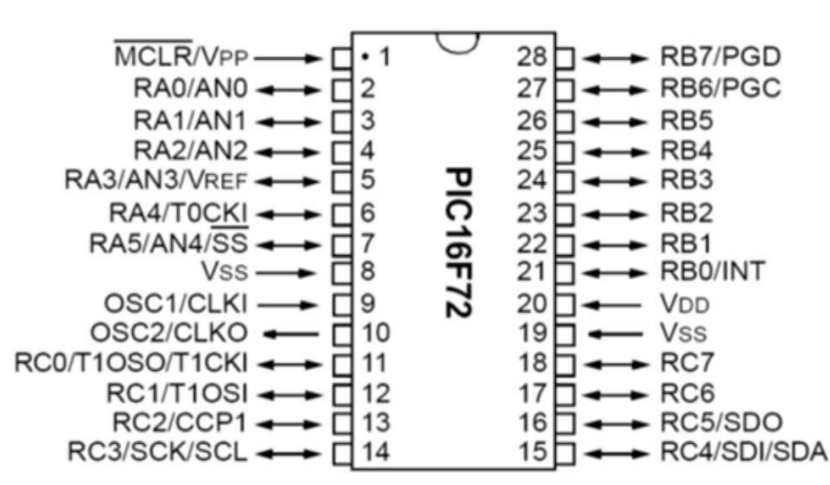


Figure: 3.1 PIC 16F72

PIC microcontrollers are a family of specialized microcontroller chips created by semiconductor Technology in Chandler, Arizona. The word from PIC stands for "peripheral interface controller," Though that term is never used these days. A microcontroller may be a compact personal computer designed to manipulate the operation of embedded systems in motor vehicles, robots, work place machines, medical devices, mobile radios, vending machines, home appliances, and various other devices. A typical microcontroller includes a processor, memory, and peripherals.

The PIC microcontrollers attractiveness to hobbyists and experimenters, particularly within the fields of physics and artificial intelligence. Key options embody wide availability, low cost, ease of reprogramming with built-in EEPROM (electrically erasable programmable read-only memory), an extensive collection of free application notes, abundant development tools, and a great deal of information available on the Internet. The PIC microcontrollers typically seen beneath the name PIC microcontroller. Every PIC microcontroller includes a set of registers that additionally perform as RAM (random access memory). Special purpose management registers for on-chip hardware resources also are mapped into the info area each PIC includes a stack that saves comeback address.

To make wearable obstacle detection system for visually impaired individuals respond quicker, it ought equipped with advanced microcontroller to process complexity. PIC 16F877A was chosen to notice any switch triggered and generate the audio sounds and vibrations. The PIC does not have associate in helping OS( Operating system) and easily runs the program in its memory when it is turned on. PIC microcontroller may be tiny laptop on one computer circuit that stores a collection of directions. It consists of a processor core, memory, and programmable input/output peripherals. PIC is an important component in the proposed system which deals with a Micro Chip programming code which was installed in it. The system is featured by its tiny size and low price once its compared with different systems that use separate microchip, input/output devices, and memory. Mixed signal microcontrollers are common, desegregation analog elements required to regulate non digital electronic systems. PIC microcontroller operates at +5 V which might be regulated victimization the transformer (L7805) that conserves voltage at +5 V if the input voltage for it exceeds +5 V. additionally PIC cannot run while victimization its quartz oscillator that is employed to execute the programming code. The PIC is employed as a data processing element; thus, a high frequency generator is employed.

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## **General Features:**

1. High Performance RISE CPU.
2. Solely 35 straightforward word directions.
3. Operative speed: clock input (200 MHz) instruction cycle (200 ns).
4. All single cycle instruction apart from program branches that are two cycles .
5. Eight level deep hardware stack.
6. Interrupt capacity (upto 14 sources)
7. Power on Reset.
8. Power up timer (PWRT) and oscillator start up timer.
9. Fully static design.
10. Wide operation voltage range (2.0-5.56) volts.
11. High sink/source current (25 MA)
12. Commercial industrial and extended temperature ranges.
13. Low power conjunction (20.6 mA typical 3v- 4 mHz, 20mA typical @3V- 32mHz and <1A typical standly)

## **Key Features:**

1. Maximum operating frequency is 20 mHz.
2. Flash program memory (14 bit words) 8 kb
3. Data memory (6 bytes) is 368.
4. EEPROM data memory bytes is 256
5. 5 input/output ports.
6. 3 timers.
7. 2 ccp modules.
8. 2 serial communication port.
9. PSP parallel communication port.
10. 10 bit A/D module (8 channels)



## **Analog Features:**

1. 10 bit upto 8 channel A/D channel.
2. Brown out Reset function.
3. Analog comparator module.

The main part in the system is the microcontroller that controls the other components of the system. Ultrasonic Sensors.

Ultrasonic sensors or ultra movement locators are an electronic pack that contains many sub electronic circuit in it and has numerous applications. At the point when signals from the sensors of sound circuit, playback circuit or vibrator circuit have been distinguished.

It will be transmitted to an extra circuit related with it, with the end goal to actuate the required yield. The ultrasonic sensors contain finish ultrasonic gem control transmitted 40 KHz and an extremely touchy collector measure 1 to 0.5 by 3 inches. Normally ultrasonic sensors can identify with the scope of 3 meters to 7 meters.

It is a 8 bit 18 pins microcontroller that gives 200 nanosecond guidance executions. It has a glimmer program memory of 3.5 KB and CPU accelerate to 5 MPS.

Likewise, it has 4 MHz inward oscillator, 224 Bytes RAM and 128 bytes EEPROM.

Addition to that, it has two comparator and operating voltage 2 V to 5.5 V with temperature range -40 C to 125 C.

Three IR sensors are utilized to gain specific points of interest in respect to the hindrance order. In this paper, the proposed direction framework standard is appeared by presenting the primary sensors and their capacity to recognize and distinguish run of the mill objects.

The IR sensors are the fundamental electronic parts in the proposed framework since it goes about as the new eyes for the visually impaired. One IR sensor is situated on the hand smaller than normal stick to examine the front side, and the other two sensors are situated on the cap at both right and left sides.

IR sensors will check all zone in their scope of IR shaft. Any obstruction lies in the checking scope of the IR shaft will be reflected and picked back by the beneficiary unit in the sensor.

The separation and edge location rely upon the body that caused bar reflection. Figure 3 demonstrates the square chart of IR sensor. The scope of separation to be examined is controlled by a switch.

Three changes are utilized to control the scope of sensors in the three bearings (i.e., when switches are on, the sensors will work at full range; else they will work at their half range).

The IR sensors are utilized to recognize a snag other than (right and left) and before the visually impaired at a separation somewhere in the range of 10 and 150 cm.

The essential instruments in electronic IR control are scaled down hand stick and head cap. These instruments have IR sensors on it. These sensors speak to the visually impaired eyes so its position is critical to give right choice that relies upon their yield.

Small scale hand stick contains IR sensor with a separation go from 10 to 150 cm. This range can be controlled by the PIC microcontroller, so it very well may be worked at half range (75 cm) by means of open switch catch.

What makes the sensor ideal is its little weight which is about 65 gm, likewise it offers legitimate insurance for the sensor through thin straightforward layer of pla

stic. The head cap is the second instrument in the proposed visually impaired electronic direction framework. The cap gives the framework the capacity to examine regions morally justified and left half of the visually impaired by means of two sensors settled on it. The two sensors can work either on their full range 150 cm or their half range (75 cm) as indicated by what is best by the client who can control it through switches.

Hypothesis of IR Sensor Operation. The new IR sensors utilize a created methodology that not just gives question recognition at a more drawn out range, yet in addition offers a scope of data. These new spaces give a vastly improved insusceptibility to encompassing lighting conditions as a result of the new strategy for extending. These new spaces utilize a little direct CCD exhibit and triangulation to compute the separation and nearness of articles in the field of vision. A beat of infrared light is discharged by the producer. This light goes over the explicit region, on the off chance that there is no snags in it, the light. Never reflects, and the outcome demonstrates no protest, however on the off chance that there is an impediment in their way, the light hits it, and it will be reflected. This activity makes a triangle between the reflection point, the producer, and the identifier as appeared in Figure 4. Triangle points differ dependent on the separation of the question. The getting some portion of these new identifiers is in actuality an accuracy focal point that transmits the reflected light onto diverse parts of the encased straight CCD exhibit as indicated by the edge of the triangle portrayed already. The CCD cluster can decide at what point the reflected light returned at, and accordingly, it can compute the separation to the protest. This new strategy for extending nearly dodges the impedance from encompassing light and offers astonishing in contrast to the shade of question being recognized. The infrared light is conveyed from a transmitter to the question in front, by going through a consolidate focal point, so the light power is centered around a specific point. Refraction happens once the light hits the surface of the question. Some portion of the refracted light will be sent back to the recipient end, in which another focal point will join these lights and decide the purpose of effect. The light will at that point be passed on to a variety of phototransistors. The situation in which the light falls can be utilized to figure the separation from the transmitter to the

A gem oscillator is an electronic oscillator circuit that utilizes the mechanical reverberation of a vibrating precious stone of piezoelectric material to make an electrical flag with an exact recurrence.

### **3.2 Other Circuit Components**

The electrical components which were used to build the circuit is named as follows:

- PIC16F72 controller
- PIC programmer.
- programming cable
- 12V adaptor or DC battery
- HC-SR04 ultrasonic module
- 16\*2 LCD
- Pot – 10k
- Electrolytic capacitor – 10uF, 16V
- Resistor – 10k
- 12 MHz crystal
- 33pf capacitors -2
- connecting wires

## CHAPTER 04

### CIRCUIT DESIGN OF SMART BLIND STICK

## 4.1 Circuit Principle

Generally, the distance can be measured exploitation pulse echo and phase measuring technique. Here, the space may be measured using pulse echo method. The noiseless module transmits a pulse to the thing, then receives echo signal from the thing and produces signal whose period of time is proportional to the space of the thing. The mechanism of the noiseless device is similar to the RADAR (Radio detection and ranging). The circuit board contains each the transmitter and also the receiver module integrated at intervals it. The transmitter sends the signal by modulation and once reflection of the sound from the obstacle the receiver electronic equipment receives the signal and will reception. A LCD is connected to point the beginning and the closing of the device.

## 4.2 Circuit Diagram:

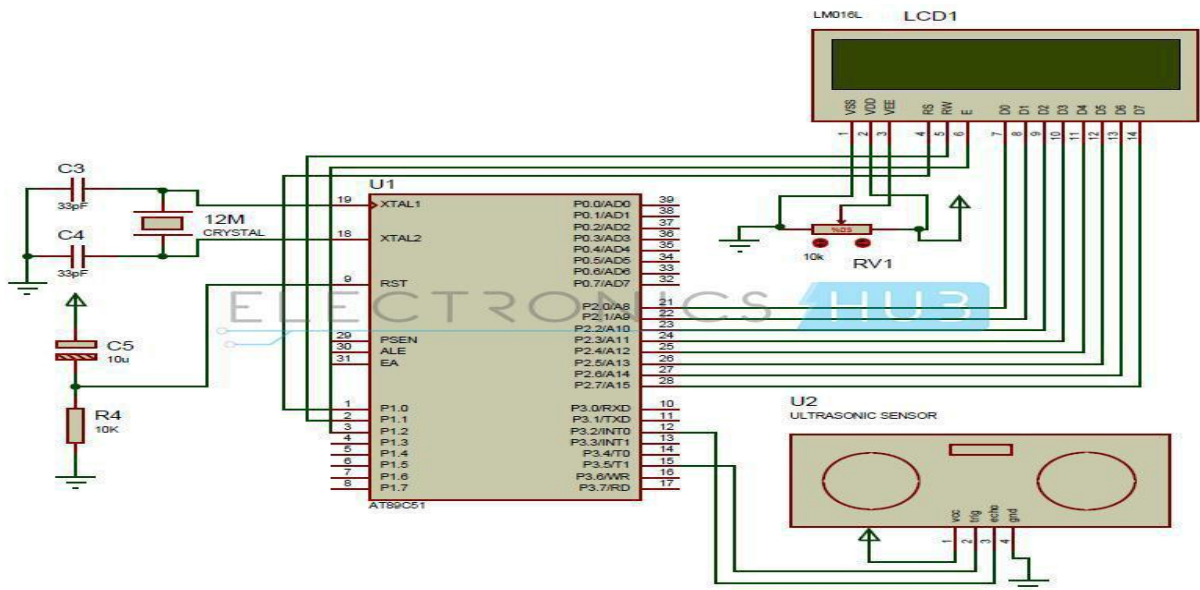


Figure: 4.1 Circuit Diagram of the System

### 4.3 Block Diagram

The block diagram of safety stick for blind people contains Power Provide, quartz Oscillator, Reset Circuit, and inaudible & Buzzer as shown in Fig.1

The AT89S52 may be a low-power, high-superior CMOS 8-bit microcontroller with 8K bytes of in-system programmable nonvolatile storage. The device is factory Made practice 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 programmer. 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.

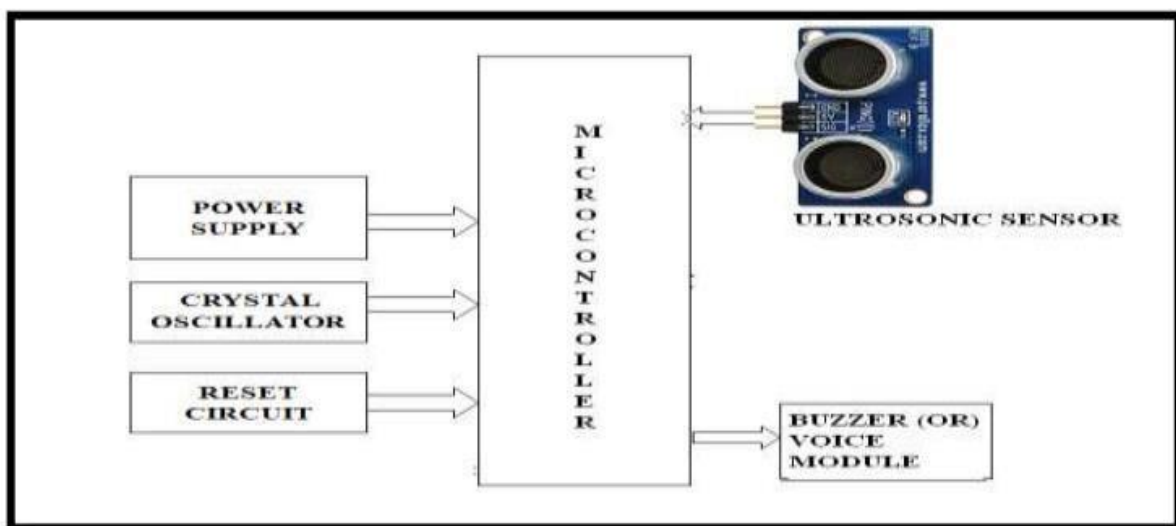


Figure 4.2 Block diagram

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 specified output. The operation of ultrasonic sensing element is as shown in Fig.2.

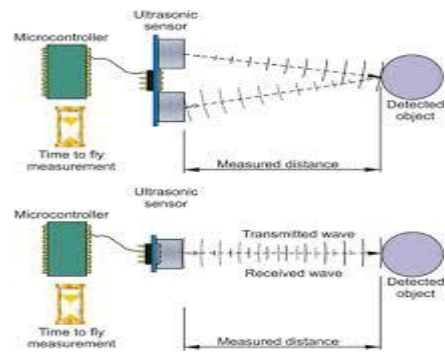


Figure 4.3 Ultrasound Distance Measurements

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 in 180 degree horizontal, it will activate the buzzer mechanically.

The Ultrasonic sensing element is as shown in Fig.4.3.



Figure 4.4: Ultrasound Sensor

Buzzer is an audio signaling device which may be mechanical, Electromechanical or piezoelectric. Typical uses of buzzers include alarm device, timers.



## RESET CIRCUIT

Reset is used for to put the microcontroller into a 'known' condition. This means the microcontroller can behave rather inaccurately under undesirable conditions. So as to continue its correct functioning it has to be reset, which all registers would be placed during a starting position.

Reset is not slowly used once microcontroller doesn't behave the manner way with it

To, however may be used once associated trying attempt out a tool as an interrupt in program

Execution, or to induce a microcontroller prepared once loading a program. So

As to stop from conveying 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 1 $\mu$ f to 10 $\mu$ f. This kind of resistor capacitor combination, gives the RC time Delay for the  $\mu$ c to reset.



Figure 4.4: Reset Circuit

## CRYSTAL CIRCUIT

Pins OSC1 & OSC2 are provided for connecting a resonant network to make generator. Typically a quartz crystal and capacitors are utilized. Here we have a tendency to be connecting two ceramic capacitors that are primarily used for filtering. In alternative words to present a pure square wave to the  $\mu\text{C}$  we have a tendency to be connecting the two capacitors. The fundamental rule for putting the crystal on the board is that it ought to be as near to the  $\mu\text{C}$  as attainable to avoid any interference in the clock.

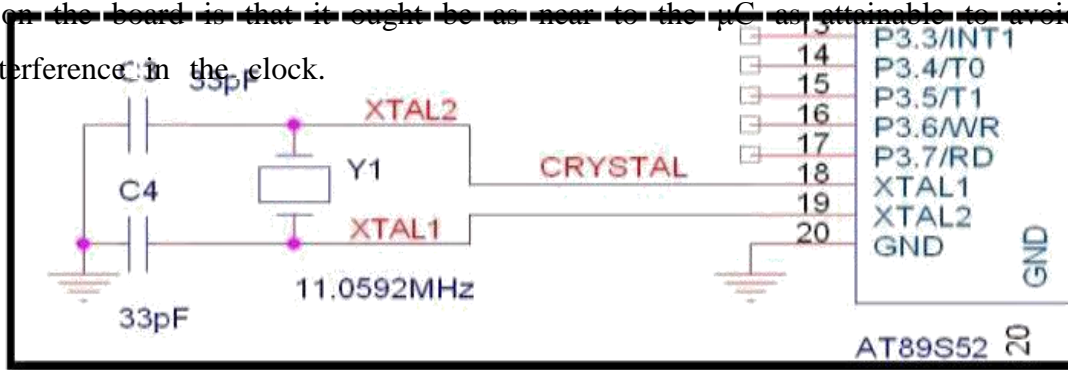


Figure 4.5:CRYSTAL CIRCUIT

## PCB LAYOUT

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

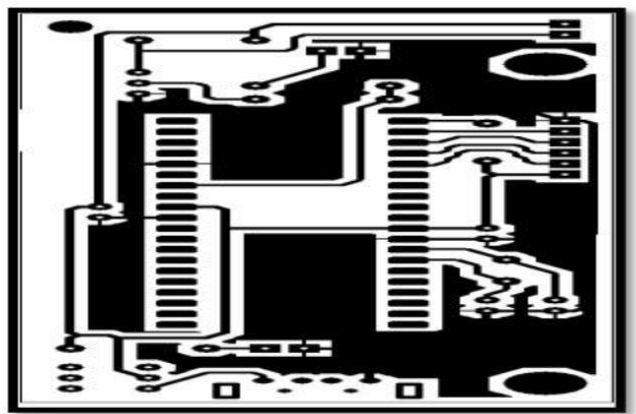


Figure 4.6: PCB Layout

#### 4.4 Circuit Design

The major elements in during this project are At89c51 microcontroller and noiseless module. The num sensing elements TRIGGER and ECHO pins are connected to the P3.5 and P3.2 severlly. LCD data pins are connected to the PORT2 of the controller and controller pins RS, RW, En are connected to the P1.0, P1.1 and P1.2 respectively. Here LCD (liquid crystal display) is used to display distance of the object. Pot RV1 is used to vary the contrast of the LCD. Power supply pins of controller and ultrasonic sensor are connected to the 5V DC.

#### Ultrasonic Module

Ultrasonic detection is most commonly used in industrial applications to detect hidden tracks, discontinuities in metals, composites, plastics, ceramics, and for water level detection. For this purpose the laws of physics which are indicating the propagation of sound waves through solid materials have been used since ultrasonic sensors using sound instead of light for detection. When an electrical pulse of high voltage is applied to the ultrasonic transducer it vibrates across a specific spectrum of frequencies and generates a burst of sound waves. Whenever any obstacle comes ahead of the ultrasonic sensor the sound waves will reflect back in the form of echo and generates an electric pulse. It calculates the time taken between sending sound waves and receiving echo. The echo patterns will be compared with the patterns of sound waves to determine detected signal's condition. HC-SR04 ultrasonic module is designed to measure the range of the object in the embedded projects. It offers excellent range detection with high accuracy and stable readings. The operation of the module is not affected by the sunlight or black material.

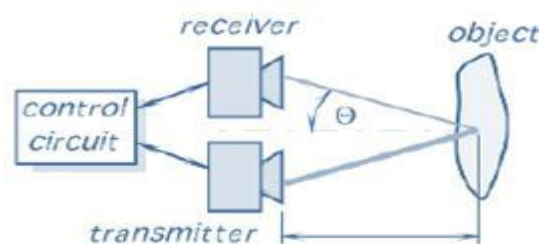


Figure 4.7: Transmitter and Receiver



Figure 4.8: Ultrasound sensor working principle

### Features:

1. resolution of this module 3mm
2. ranging distance is 2cm to 400cm
3. angle measurement is 30 degrees
4. trigger input pulse width is 10us
5. required current 15mA
6. Frequency 40 KHz
- 7.

### Pin Configuration:

1. **Vcc:** This pin is connected to the positive 5V DC
2. **Trigg:** The trigger signal is applied to the current pin for beginning the transmission. This signal should be high for 10us. Once a Sound trigger signal is applied, it generates 8 pulses of 40 KHz.

3. **Echo:** At this pin, module generates the signal whose time period is proportional to distance.
4. **GND:** This pin is connected to the ground.

#### 4.5 Project Circuit Working Principle:

When HIGH pulse of 10us is applied to the TRIG pin, the supersonic module transmits 8 consecutive pulses of 40 KHz. once transmittal 8<sup>th</sup> pulse the ECHO pin of the detector becomes high. Once the module receives mirrored signal from the object, the ECHO pin becomes LOW. The time taken by the signal to depart and come to the detector is employed to seek out the vary of the article.

Distance in centimeters = (Time/58)

Object distance in inches = (time/148)

Distance may also be calculated victimization speed of the supersonic wave 340m/s



Figure 4.9: Top view of product

#### Operational Procedure:

1. At the start born the program to the microcontroller.
2. Currently offer the connections as per the circuit diagram.
3. Where are giving the connections ensure that Vcc of noiseless module i s connected to 5V DC.
4. Turn on the board supply.

5. Place the obstacle ahead the noiseless module, now you can observe the distance on LCD.
6. Switch off the board supply.

#### **4.6 Project Circuit Applications**

- Used to live the abstacle distance.
- This system utilized in automotive parking sensors and obstacle warn ing systems.

Used in persel observation robots.

#### **4.7 Limitations of the Circuit:**

- This system is not able to live longer distances.
- Has angle limitation. Only one hundred eighty degree view is enforced.
- Does not supply subtle advanced technologies.

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# CHAPTER 5

## SIMULATION

The project circuit has been implemented in Proteus Software. The microcontroller has been implemented with the following C programming code.

## 5.1 Code:

```
#include<16F73.h>
#fuses HS,NOWDT,PROTECT,PUT
#use delay(clock=16000000)
#include<flex2_lcd.c>
#use fast_io(B)

int8 check;
unsigned int16 i, distance;
void main()
{
    output_b(0);
    set_tris_b(2);
    lcd_init();
    setup_timer_1 (T1_INTERNAL | T1_DIV_BY_
2); set_timer1 (0);

    while (TRUE)
    {
        check =0;
        i =0;
        output_high(PIN_CO);
        delay_us(10);
        set_timer1(0);
        while (!input(PIN_C1) && (get_timer1() <1000
)); if (get_timer1())>990)
            check = 1;
        set_timer1(0);
        while (input (PIN_C1) && (i<25000);
        i = get_timer1();
        if (i>24990)
```



```

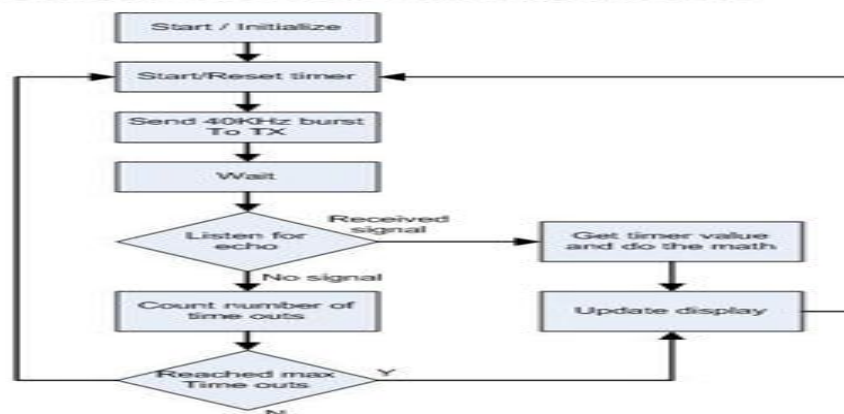
        check = 2;
while(!input(PIN_C1) && (get_timer1() <1000
)); if (get_timer1()>990)
    check =1;

set_timer1(0);
while (input(PIN_C1) && (i <25000))
    i =get_timer1(
); if (i>24990)
    check =2
; if (check =
= 1)
{
    lcd_gotoxy(3,2);
    lcd_putc("Time Out");
}
if check ==2) lcd_gotox
y(3,2); lcd_putc("Out o
f Range");
}
else
{
    distance =i/116;
    lcd_gotoxy(3,2);
    lcd_putc("IMRAN VI");
}
}
lcd_gotoxy(1,1);
printf(lcd_putc, "DISTANCE:%3Lu cm", distanc
e); delay_ms(100);
}

```

## 5.2 Flow Chat

Ultrasonic distance mesurment



CHAPTER 6  
DISCUSSION

### 6.1. Cost Sheet:

No	Equipment	Quantity	Price
1	pic16F876 MICROCONTROLLER	1	200
2	CRYSTAL 16MH	1	5
3	LCD DISPLAY	1	160
4	CAPACITORS	4	20
5	RESISTOR	3	10
6	DIODE	1	12
7	TRANSFORMER ( 12-0-12 )	1	120
8	ULTRA SOUND SENSOR	1	120
8	WIRES	3	20
9	SAMPLE PCB AND MODEL BORD	1	1000
10	.7805 IC	1	10

## Discussion:

This paper has described the system and research mechanism which provides an immense help and support to blind persons. It is true that every organ of the body is very important and has its own and specific objectives. Similarly eye is also a very important organ of the body. Unfortunately, blind persons life is really colourless and is void of many happiest moments of life. The project will help the blind persons to detect the obstacles through the video processing mechanism by carrying just this small piece of stick (Smart obstacle detector). Ultimately; this research based project will result in serving the humanity which is indeed a greatest act.

With the proposed architecture, if constructed with at most accuracy, the blind people will be able to move from one place to another without others help. If such a system is developed, it 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. Cost effective is one of the important factors of this project. It is very much suitable for the developing countries. Tests have shown that this product is more suitable for its indoor applications. In today's market there are many electronic sticks available; but adding the additional features of assistive mobility with simple and low cost technology will definitely help in capturing a much large market in developing countries like India.

### 6.1 Advantages:

- No grip design has to be made
- Others need to be hold for a long time
- It can be used both indoor and outdoor

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### 6.2 Limitation of the Study

In the construction field, the usage of electronic measuring device is still not widely used yet. Due to the high cost of these equipments at market, an economic wa

y needs to think of in order to create an accurate measuring device with low cost . Nowadays, measuring distance is considered as problem in construction field or indoor measuring activities because this task is made by using measuring tape. The problem will occur when using measuring tape where we need at least 2

persons to measure between two distances. Besides, it is not have a perfect accuracy due to parallax and obstacle in their way.

Improvement had been done where some products have infrared light emitters and receivers to determine an object's distance. Other devices have laser-based systems which have improved accuracy and precision. Presently, the detection techniques of laser, radar, and infrared ray have been widely applied at the aspect of obstruction detection and distance measurement. Because of the expensive price, the distance measurement system of laser and radar is only set on the minority of instruments. For infrared sensor, the range of the distance that can be measured is very short with only a range of 4-30 cm.

Therefore, this project is necessary to do the process of measurement quickly and accurate without doing measurement manually, it also has the advantages to store measurement as many as 32 memories at one time.

### **6.3 Future Works:**

It will be real boon for the blind. The developed epitome provides smart leads to sleuthing obstacles paced at distance in front of the user. The solution developed may be moderate budget dirrection aid for the visually impaired. But minimizing price results compromises in performance. It is advised that the design be improved before commercial production. Some improvements that could be made are as follows:

- Increasing the vary of the inaudible sensing element and implementing a technology for determinative the speed of approaching obstacles.

- Synchronization with external memory to extend the amount of routes stored.
- Synchronization with varied navigation software applications package application on the internet so that new, un-programmed destinations can also be chosen.
- Provision for voice noise victimization speech recognition
- Response stick for different kinds of works can be tabulated
- Charger module included with an USB system
- Reduced size
- Reduced weight
- Improved weight balancing
- Ergonomic grip
- Improved angle adjustment mechanism
- Test needs to be done for moving objects
- Easily accessible controls
- combined ultrasonic and control circuit with reduced size

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