

# Face Recognition Smart Glasses for Visually Challenged Persons

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**Abstract:** These “Smart Glasses” are designed to help the blind and partially sighted people. Using Smart Glasses, blind and visually impaired people can detect and recognize tools around them, with the help of headset attached to the glasses. Our Moto is to make an intelligent system for blind people, which transfers different actions to detect objects and the scene transfer to the brain. To do this, we use a device that performs like the human brain called "NODE MCU" that analyzes the images and identifies the surrounding objects. A voice message sent to an earphone placed on the ear of that person to help them find various items easily and independently, also saves time and efforts. It is a small device to detect the object and create images and scenes in the mind with the help of the sensors. This smart glasses project has an in-built sensor that sends ultrasonic waves in the direction of person's movement, scanning at a maximum distance of 5-6 meters of 30°. This may solve some of the major problems facing blind people today. Finally, the sound of each person in the database is called, and a message is sent to tell the blind about the person in front of them.

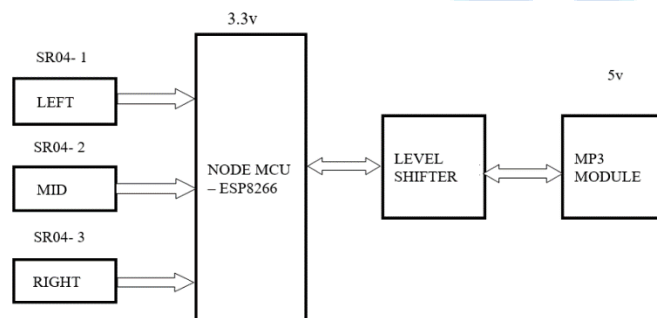
**Keywords:** Face Recognition, Smart Glasses, NODE MCU, Sensors.

## 1. Introduction

In our lives, there are many people who are suffering from different diseases or handicap. According to NCBI (1986), 1.5% of the population in Saudi Arabia is blind and another 7.8% have vision difficulties. These people need some help to make their life easier and better. The goal of “Smart Glasses” is to assist blind people and people who have vision problems by introducing a smart and new technology that makes them able to discover the object. This project presents a new design of assistive smart glasses for visually impaired persons. The target is to help in multiple daily tasks mistreatment the advantage of wearable style format. The sensors are used to detect any person or any object. The projected technique for the blind aims at increasing prospects to people with vision loss to attain their full potential. The main object of the project is to design and implement a real time object recognition using blind glass. EXISTING SYSTEM The role of blind assistance is promoting a wide range of challenges in computer vision, including mapping and navigation. In this paper, two ultrasonic sensor placed on blind person's glasses to provide the necessary information

about the surrounding environment. One IR sensor is used to detect the human radiation in the environment. Obtaining objects are used to find objects in the real world from the image of the world such as faces, bicycles, chairs, doors, or tables that are common in blind squares. Buzzer and vibration motor is used to alert the person when sensors detect any object in front of them. We are using NODE MCU microcontroller for this project. The proposed method for the blind aims at expanding possibilities to people with vision loss to achieve their full potential. The test results reveal the performance of the proposed activity approximately in real-time.

## Block Diagram



## 2. Literature Survey

1. Vocsal vision for visually impaired [The International Journal Of Issn: 2319 – 1813 Isbn: 2319 – 1805 Engineering And Science(Ijes)-01-07, 2013, Shrilekha Banger , Preetam Narkhede Rajashree Parajape.]

The project is a vision workshop designed to help the blind with independent thinking. Its operating construct is predicated on ‘image to sound’ conversion. The viewer takes a picture in front of the blind user. This image is then uploaded to MATLAB for processing. The intuit process processes the captured image and enhances the important vision data. The image used is then compared to a database based on a microcontroller. The information used is then presented as a standard acoustic signal system and transmitted to the blind user using a set of earphones. Color information from the interested objects evaluated to determine the color of the object. The color output is informed to the blind user through headphones. 2. Object Detection Combining Recognition and Segmentation [Fudan

University, Shanghai, PRC, yfshen@fudan.edu.cn University of Pennsylvania, 3330 Walnut Street, Philadelphia, PA 19104 Liming Wang<sup>1</sup>, Jianbo Shi<sup>2</sup>, Gang Song<sup>2</sup>, and I-fan Shen.] We create an acquisition method that combines top-level visibility with bottom-to-top image segmentation. There square two measures main steps during this method: a hypothesis generation step and a verification step. In the next step of the top-down hypothesis, we create an improved Shape Context feature, which is more robust to adapt to the flexibility and complexity of the background. Improved Shape Context is used to produce a collection of object inserts and figure ground masks, with high memory and low accuracy. In the verification step, we first calculate a set of possible segments that are consistent with the concept of a top-down item, and then propose a False Positive Pruning (FPP) process to exclude false profits. We exploit the fact that false positives are not compatible with any image classification that occurs. Tests show that this simple framework is capable of achieving both high memory and high accuracy with a few examples of good training and that this approach can be made into lists of multiple classes of objects.

### 3. Microsoft COCO Common Objects in Context

[Tsun-Yi Lin, Michael Maire, Serge Belongie, Lubomir Bourdev, Ross Girshick, James Hays, Pietro Perona, Deva Ramanan, C. Lawrence Zitnick, Piotr Dollár (Submitted on 1 May 2014 (v1), last revised 21 Feb 2015 (this version, v3))]

We are introducing a new database for the purpose of advancing the art of object recognition by placing the object recognition object in the context of a broader understanding of the field of understanding. This is achieved by collecting images of complex everyday scenes that contain elements common to their natural context. Objects are labeled using the separation of each model to assist in the precise location of the area. Our dataset contains photos of 91 objects types that would be easily recognizable by a 4-year-old. With 2.5 million label cases in 328k images, our data processing is based on the mass engagement of a crowded employee using new user methods for class acquisition, class recognition and model segmentation. We present a detailed statistical analysis of the data set in comparison with PASCAL, Image Net, and SUN. Finally, we provide an analysis of the basic performance of the connecting box and the results of obtaining segmentation using the Disability Parts Model.

### 3. Purpose Of The Project

This project proposes to create a portable system to assist blind and partially sighted users in the above-mentioned forms of social media. Using face recognition technology, the app will target classmates and colleagues by anonymously announcing their names over wireless phones or in Braille. Most schools will be able to accommodate people with visual impairments instead of opening special schools. Next year Prince Mohammad bin Fahd University (PMU) will welcome blind people to study. The team would like to start using "Smart Glasses" for the first time in this opportunity and help

students improve their quality of education without help and be able to learn as a normal person.

### Internet of Things

Internet of Things (IoT) defines a network of physical objects "objects" - embedded in sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and applications via the Internet. These devices range from standard household appliances to high-end industrial tools. With more than 7 billion connected IoT devices today, experts expect this number to grow to 10 billion by 2020 and 22 billion by 2025.

### Why Is Internet of Things (IoT) so important?

Over the past few years, IoT has become one in every of the foremost necessary technologies of the twenty first century. currently that we are able to connect everyday objects—kitchen appliances, cars, thermostats, baby monitors—to the net via embedded devices, seamless communication is feasible between individuals, processes, and things.

By suggests that of cheap computing, the cloud, big data, analytics, and mobile technologies, physical things will share and collect information with borderline human intervention. during this hyperconnected world, digital systems will record, monitor, and alter every interaction between connected things. The physical world meets the digital world—and they get together.

### 4. Ultrasonic Sensor

At its core, the HC-SR04 inaudible distance sensing element consists of 2 inaudible transducers. The one acts as a transmitter that converts electrical signal into forty kHz inaudible sound pulses. The receiver listens for the transmitted pulses. If it receives them it produces associate output pulse whose breadth are often accustomed confirm the space the heartbeat traveled As easy as pie!

The sensing element is little, straightforward to use in associate artificial intelligence project and offers wonderful non-contact vary detection between two cm to four hundred cm (that's regarding an in. to thirteen feet) with an accuracy of 3mm. Since it operates on five volts, it are often hooked on to associate Arduino or the other 5V logic microcontrollers.

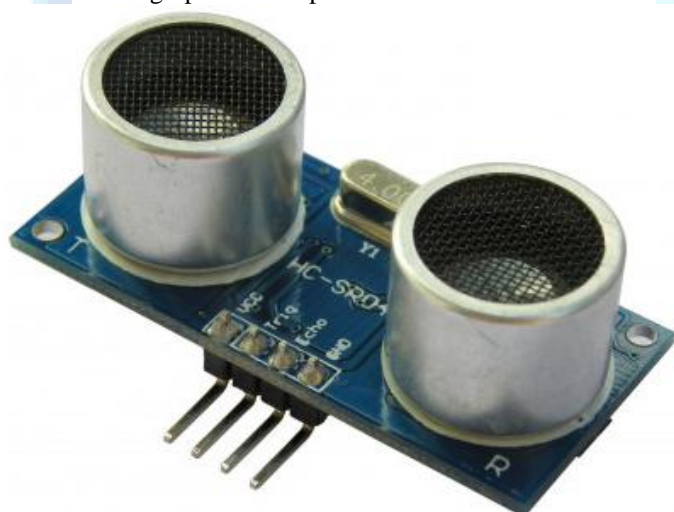
Here are complete specifications:

Operating Voltage	DC 5V
Operating Current	15Ma
Operating Frequency	40KHz
Max Range	4m
Min Range	2cm
Ranging Accuracy	3mm

Measuring Angle	15 degree
Trigger Input Signal	10µS TTL pulse
Dimension	45 x 20 x 15mm

**Features:**

- Sensor Type: Ultrasonic
- Output: Digital Sensor
- Voltage: 5VDC
- Detection distance: 2cm-400cm (0.02M - 4.0M)
- Static current: < 2mA
- Level output: high-5V
- High precision: up to 0.3cm



**The design of transducer can vary greatly depending on its use:**

Those used for diagnostic functions, for instance the range-finding applications listed on top of, are typically lower power than those used for the aim of adjusting the properties of the liquid medium, or targets immersed within the liquid medium, through chemical, biological or physical (e.g. erosive) effects. The latter category embody inaudible probes and inaudible baths, that apply inaudible energy to agitate particles, clean, erode, or disrupt biological cells, in an exceedingly big selection of materials. The inaudible sensing element (or transducer) works on identical principles as a radio detection and ranging system. AN inaudible sensing element will convert electricity into acoustic waves and the other way around. The sound wave signal is AN inaudible wave traveling at a frequency on top of eighteen kilocycle per second. The far-famed HC SR04

inaudible sensing element generates inaudible waves at forty kilocycle per second frequency. Typically, a microcontroller is employed for communication with AN inaudible sensing element. to start measurement the gap, the microcontroller sends a trigger signal to the inaudible sensing element. The duty cycle of this trigger signal is 10µS for the HC-SR04 inaudible sensing element. once triggered, the inaudible sensing element generates eight acoustic (ultrasonic) wave bursts and initiates a time counter. As presently because the mirrored (echo) signal is received, the timer stops. The output of the inaudible sensing element could be a high pulse with identical period because the time distinction between transmitted inaudible bursts and therefore the received echo signal.HC-SR04 inaudible (US) sensing element could be a four pin module, whose pin names are Vcc, Trigger, Echo and Ground severally. This sensing element could be a very talked-about sensing element utilized in several applications wherever measurement distance or sensing objects ar needed. The module has 2 eyes like comes within the front that forms the inaudible transmitter and Receiver. The device works with the easy high school formula that

$$\text{Distance} = \text{Speed} \times \text{Time}$$

**NODE MCU**

Node MCU may be a inexpensive open supply IoT platform. It at first enclosed computer code that runs on the ESP8266 Wi-Fi SoC from categorical if Systems, and hardware that was supported the ESP-12 module. Later, support for the ESP32 32-bit MCU was side

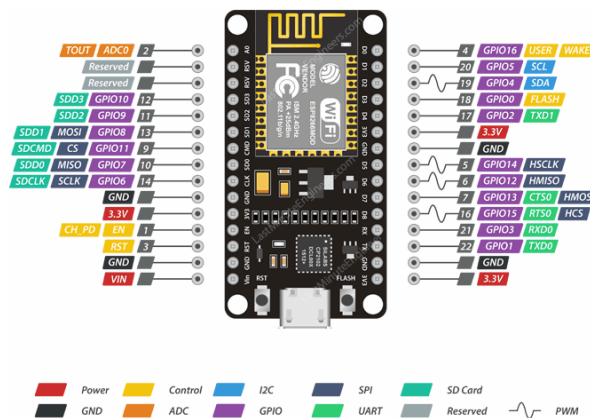
**CPU:** ESP8266 (LX106)

**Developer:** ESP8266 Open source Community

**Memory:** 128kBytes

**ESP8266 Node MCU Pinout**

The ESP8266 Node MCU has total 30 pins that interface it to the outside world. The connections are as follows:



For the sake of simplicity, we will make groups of pins with similar functionalities.

**Power** Pins There square measure four power pins viz. one

VIN pin & 3 three.3V pins. The VIN pin may be wont to directly offer the ESP8266 and its peripherals, if you have got a regulated 5V voltage supply. The 3.3V pins square measure the output of associate degree on-board transformer. These pins may be wont to offer power to external elements.

**GND** is a ground pin of ESP8266 Node MCU development board

**I2C** Pins are accustomed attach all kinds of I2C sensors and peripherals in your project. each I2C Master and I2C Slave square measure supported. I2C interface practicality is complete programmatically, and therefore the clock frequency is a hundred rate at a most. It ought to be noted that I2C clock frequency ought to be beyond the slowest clock frequency of the slave device.

**GPIO Pins** ESP8266 Node MCU has seventeen GPIO pins which may be assigned to varied functions like I2C, I2S, UART, PWM IR remote, junction rectifier light-weight and Button programmatically. every digital enabled GPIO are often organized to internal pull-up or pull-down, or set to high ohmic resistance. once organized as AN input, it may be set to edge-trigger or level-trigger to come up with hardware interrupts.

**ADC Channel** The Node MCU is embedded with a 10-bit preciseness SAR ADC. the 2 functions may be enforced victimization ADC viz. Testing power provide voltage of VDD3P3 pin and testing input voltage of TOUT pin. However, they can not be enforced at constant time.

**UART** Pins ESP8266 Node MCU has two UART interfaces, i.e. UART0 and UART1, which give asynchronous communication (RS232 and RS485), and may communicate at up to four.5 Mbps. UART0 (TXD0, RXD0, RST0 & CTS0 pins) are often used for communication. It supports fluid management. However, UART1 (TXD1 pin) choices entirely info transmit signal thus, it's generally used for printing log.

**SPI Pins** ESP8266 options 2 SPIs (SPI and HSPI) in slave and master modes. These SPIs collectively support the following general SPI features: 4 timing modes of the SPI format transfer

- Up to 80 MHz and the divided clocks of 80 MHz
- Up to 64-Byte FIFO

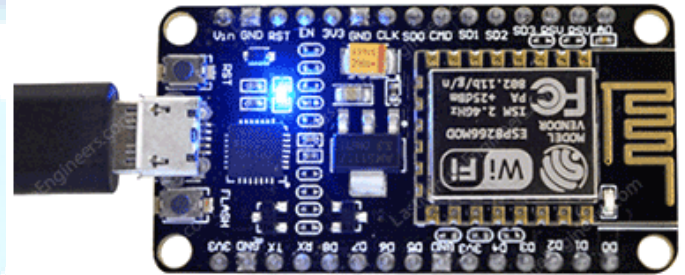
**SDIO Pins** ESP8266 options Secure Digital Input /Output Interface (SDIO) that is employed to directly interface SD cards. 4-bit twenty five rate SDIO v1.1 and 4-bit fifty rate SDIO v2.0 area unit supported.

**PWM Pins** The board consists of 4 channels of Pulse Width Modulation (PWM). The PWM output can be implemented programmatically and used for driving digital motors and

LEDs. PWM frequency vary is adjustable from 1000  $\mu$ s to 10000  $\mu$ s, i.e., almost in between 100 Hz and 1 kHz.

**Control Pins** are used to control ESP8266. These pins include Chip Enable pin (EN), Reset pin (RST) and WAKE pin.

- EN pin – The ESP8266 chip is enabled when EN pin is pulled HIGH. When pulled to LOW the chip start works at minimum power.
- RST pin – RST pin is used to reset the ESP8266 chip.
- WAKE pin – Wake pin is used to wake the chip from deep-sleep.



**Level Shifter**

A level shifter (level translator), in digital electronics, also called logic-level shifter or voltage level translation, is a region used to translate signals from one level of concept or domain to another, allowing communication between IC varies power requirements, such as TTL and CMOS. [1] [2] Modern systems use standard shifts to close domains between processors, logic, sensors and other regions. In recent years, three common logic levels have been 1.8V, 3.3V, and 5V, although high and low levels of these voltages have also been used.



**Jumper Wire**

A jumping wire (also referred to as a jumper wire, or jumper) is AN electrical twine, or a bunch of them with a cable, with a instrumentation or pin at every finish (or typically while not them merely "attached"), typically wont to connect components of a bread board or different sort or GPS receivers unremarkably used for sensible phones, navigation system, military etc. circuit, within or with different instrumentation or materials, while not the inclusion of fastening.

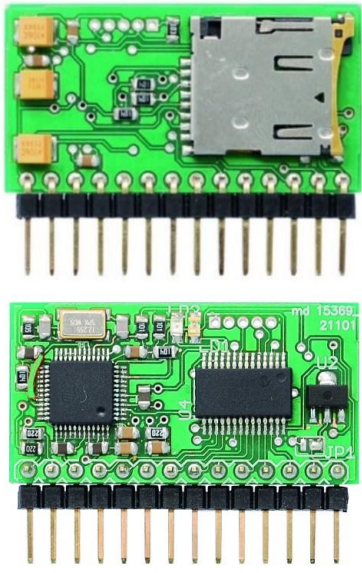


### MP3 Module

This embedded MP3 module is Associate in Nursing universal and compact circuit (37 metric linear unit x twenty seven mm) for enjoying MP3 audio files. The MP3 module may be utilized in embedded systems.

The MP3 files (up sixty five,536) area unit keep in an exceedingly small SDCard.

Controlling the module may well be done either by buttons and digital inputs or via TTL serial interfaces.



The MP3 module (developed by Luca Pascarella data at systems dot eu) is predicated on MP3 convertor VS1011 and a PIC24 and may play up to sixty five,536 songs or voice messages keep in an exceedingly microSD. every track will be elite via serial lines or by exploitation nine buttons or switches (64 mp3 files with dip switch). If you select the serial communication you have got to use a microcontroller, exploitation the nine digital lines you'll be able to management the player with logic signals from stations of assorted sorts, like tension-indicator lamps, relays, etc.. The module will be accustomed play voice messages in hawking machines, phonephone systems, within the automobile to tell the driving force of the vehicle's condition and environmental ones, in alarm systems, to help configuration and inform concerning events that occurred, and in several alternative areas nonetheless. The device supports small SD with capability up to sixteen GB and may be powered with a

voltage of three.3 Vdc or five Vdc selectable. The module features a single in-line single-connector positioned on one facet of the PCB, thus you'll be able to higher manage the house and mount it conjointly in upright position.

### 5. Embedded C Programming

Embedded C is one among the foremost widespread and most ordinarily used Programming Languages within the development of Embedded Systems. So, during this article, we are going to see a number of the fundamentals of Embedded program and therefore the Programming Structure of Embedded C. Embedded C is maybe the foremost widespread languages among Embedded Programmers for programming Embedded Systems. There are several widespread programming languages like Assembly, BASIC, C++, Python etc. that are typically used for developing Embedded Systems however Embedded C remains widespread thanks to its potency, less development time and movability. Before creating by removal in to the fundamentals of Embedded program, we are going to 1st take a glance at what associate Embedded System is and therefore the importance of programing language in Embedded Systems. associate Embedded System are often best represented as a system that has each the hardware and software system and is meant to try to to a selected task. an honest example for associate Embedded System, that several households have, may be a washer. we tend to use laundry machines virtually daily however wouldn't get the concept that it's associate embedded system consisting of a Processor (and different hardware as well) and software system. Before moving into to the small print of Embedded C programming language and basics of Embedded program, we are going to 1st observe the C programming language. The C programming language, developed by Dennis Ritchie within the late 60's and early 70's, is that the most well-liked and wide used programming language. The C programming language provided low level operation victimisation associate uncomplicated compiler (a software system that converts programs to machine code) and achieved economical mapping to machine directions. The C programing language became therefore widespread that it's utilized in a large vary of applications starting from Embedded Systems to Super Computers. Embedded C programming language, that is wide utilized in the event of Embedded Systems, is associate extension of program Language. The Embedded C programming language uses identical syntax and linguistics of the C programming language like main perform, declaration of information varieties, process variables, loops, functions, statements, etc. The extension in Embedded C from normal C programing language embrace I/O Hardware Addressing, mounted purpose arithmetic operations, accessing address areas, etc.

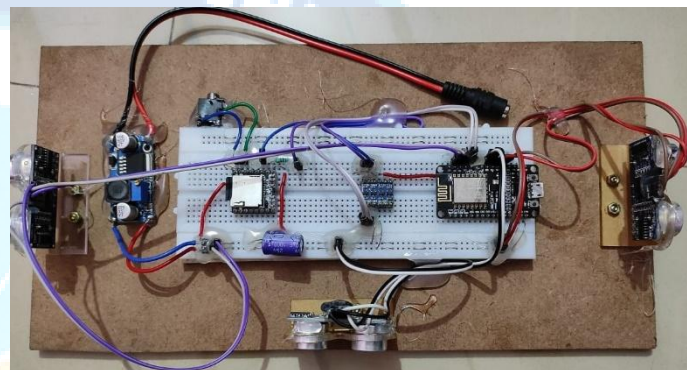
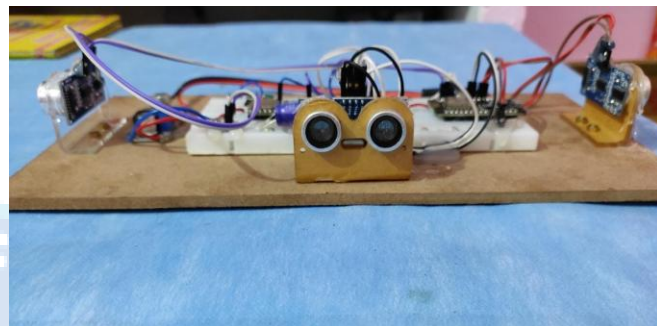
### Working

In this project, we'll be creating a example of a sensible lense which will facilitate a unsighted person to acknowledge the thing before of him and find out about obstacles ahead. this

may be enabled by object detection and distance detection options. we'll use Embedded C programming language to try and do programming on the project. in step with the diagram that we have a tendency to shown higher than during which foremost supersonic device sight AN obstacles ahead victimisation supersonic waves. On sensing obstacles by supersonic device it passes this information to the microcontroller that is largely the guts of this project. The microcontroller then processes the received information and calculates if the obstacle is shut enough. If the obstacle isn't shut the circuit will nothing. If the microcontroller is shut enough, the microcontroller sends signal to a MP3 module that is connected to the telephone receiver. Through the telephone receiver the person can hear the instruction concerning the movement if the obstacle is detected close to by the person. tier shifter is connected in between microcontroller and MP3 module to handle the voltage fluctuations between them. this method has an additional advance feature integrated to assist the blind to seek out their glass if they forgot wherever they unbroken it, with the assistance of Bluetooth blind folks notice glass.

## 6. Result and Analysis

This paper has been with success developed and tested by the good glass epitome. The fresh designed glass is in line with human engineering science, since it's meant for adult users. Blind epitome glass is tested for varied obstacle heights and exterior door. good glass technology includes the employment of unhearable sensing element and voice module. The operate of voice module is to feed warning back. Here we have a tendency to use associate degree unhearable sensing element that alerts only 1 voice message once the space of the barrier in any movement is detected in fifty c.m. If we have a tendency to use a lot of sensors, the voice module warns by providing a lot of voice messages which will provide a lot of input and establish the obstacle in several c.m. The framework conferred is planned for sensible use and designed. The system will handle seven states which might challenge the blind. The device can reply to every state in line with a particular program within the Node MCU microcontroller that is coded and mounted. it's prompt that an easy, cheap, configurable, easy-to-handle electronic guidance device give effective assistance and facilitate for blind and visually impaired persons. The system is meant, place in situ, checked and confirmed. The system's period findings area unit encouraging; it rumored a ninety three per cent accuracy in distance detection. The results show that the program is powerful and exceptional in its ability to outline the supply and distance of the objects that the blind might encounter. It will search areas left, right, and ahead of the blind man no matter their height or size. people who took half within the check conjointly favored it. The unhearable sensing element was extensively wont to advance the independence of blind and visually impaired people in an exceedingly healthy and freelance manner. process to catch up on the quality pictures from the camera.



## 7. Conclusion and Future scope

It is value mentioning at now that the aim of this study that is that the style and implementation of a wise glass for the blind has been totally achieved. The good glass acts as a basic platform for the approaching generation of additional aiding devices to assist the visually impaired to navigate safely each indoor and outside. it's effective and reasonable. It ends up in sensible ends up in police work the obstacles on the trail of the user during a vary of 3 meters. this technique offers a affordable, reliable, portable, low power consumption and strong answer for navigation with obvious short latent period. although the system is hard-wired with sensors and alternative elements, it's light-weight in weight. more aspects of this technique may be improved via wireless property between the system elements, thus, increasing the vary of the supersonic detector and implementing a technology for determinative the speed of approaching obstacles. whereas developing such associate degree empowering answer, blind folks all told developing countries were on prime of our priorities. The device created during this work is capable of police work obstacles, finding misplaced blind good glass and hole detection. For future enhancements, additional powerful sensors may be integrated within the project to produce the detection of obstacles during a wider vary. Project can be increased by victimization alternative techniques like RFID for indoor navigation Camera to create it easier for the blind to acknowledge objects visaged him. The project can be developed intentionally a mobile application that determine blind his location and guide him to right method with facilitate of headphones.

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