PRIVATE EYE FOR VISUALLY IMPAIRED PEOPLE USING IOT

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Abstract—The Internet of Things (IoT) allows devices to interact with those in several positions at the same time. Visual impairment is regarded as the most sufferable disability in the world.Visual ability helps people to interact with the world easily which makes their daily chores comfortable.The obstacles they tackle in their day to day life can be more challenging than the other people without visual imapairment technology have bloomed to the peak to cherish the lives of poor sighted people . Visually impaired people face hurdles such as slipping somewhere, direction guidance, and minor accidents due to improper sensing. The current technology for assisting visually impaired people uses navigation and guidance in real-time using canned networks and virtual cameras which is more complex and also provides intimation through vibration alone, whereas the new method uses a PIR sensor used for detection along with the voice command, and MEMS for assisting the caretakers like if blind people stumble somewhere an alert message is sent along with their GPS location, and IOT is used for storing information. Thus the model is initiated by giving inputs to the sensor such as objects and humans. It helps to detect the obstacle at a certain range with a voice indication where it is used for endless usage without any interruption. The visually impaired are properly guided without any mishaps. In the working flow, it is assumed to have an accuracy of 91%. This system is assumed to outperform and has a higher percentage at the rate of 8%.

Keywords: Ultrasonic sensor, PIR sensor, MEMS Accelerometer, ESP 32.

1. INTRODUCTION

Nowadays everyone's dream is to live smart and at ease with technology, and as a wish, people are contributing towards the evolution of new technology in their day-to-day lives. To get comfort, people are moving towards advanced smart gadgets to save time and to enhance their way of living in all the ways from wake-up time to bedtime. Consequently, smart gadgets demand is also increasing day by day to adopt a simple way of living. In order, IoT and AI demand is also raising abruptly worldwide, and new inventions are also existing in the market to compete with it. IoT is basically connecting objects with the internet to communicate (Exchange of Information).

In this paper, to upgrade the life of visually impaired people we got a solution to make the private eye for visually impaired people. This can uplift the standard of blind people which is helpful to be in advance of the day. The aim of this research is to make an easy approach to their daily needs. The purpose of the private eye is to find obstacles and help them when they are in need. IoT helps in navigation and guidance in real-time using the cloud.

The kit plays a significant role, especially for the visually impaired, and satisfies the requirements. The user can see the obstacles such as improper detection of human beings, objects, etc. The system was built using sensors like MEMS accelerometers, PIR sensors, and ultrasonic sensors. Some of the system's functions are object detection, Human detection through voice command, and alerting the caretakers when they stumble somewhere. This precisely helps them without any complications.

The studies tell us that the private eye includes detection and alerting notifications. It includes passive Infrared (PIR) sensors for detecting whether or not someone is in front of it. You will require cloud storage for storing the information that helps in alerting the caretakers. You can operate on your own without others' guidance. The private eye is helpful overall. The visually impaired gain help from this kind of socialization.

The researchers brought up the topic to satisfy the visually impaired desires. But they didn't grow up well. After intensive research and practices the continuous system to detect objects for the blind are evolved against obstacles and hazards faced. The tool's term in this system is ETA, which are abbreviated as Electronic Travel Aid. The focused scope of this system is to develop an embedded reliable automated assistive device for the visually impaired.

The organized sensor are used to navigate the visually impaired move safely in a precautioned manner. The study hypothesis used a system for allotting obstacles in the path and moving with accidents. Hardware devices such as talking blind products, and identifying obstacles are smart and helped in daily life. The assistive canned robots and sticks are utilized for aiding the visually impaired by navigating safely and quickly. the system is equipped with encoders, and a servo motor to determine its relative motion. It is also controlled by a built-in computer which has high relativity. The obstacles and guidance are equipped with many ultrasonic sensors.

The guided network with comforting tracking and the help of an ultrasonic proximity sensor and GPS model helps blind people walk fearlessly in the external environment. Thus the system helps in better assessment and forecasted view of the visually impaired effectively. The device is made easy to use by the sensors implicated which derive the proper way with good proximity.

2. LITERATURE REVIEW

[1] U. Paweł Marzec; Andrzej Kos designed navigation for blind people using IR Sensors which help in tracking various items. Infrared sensors alone measure the area travelled between blind people and obstacles. The main objective of the solution is to enable visually impaired people to work in good architecture. The usage of IR sensors enables for tracking in a precise manner. The different techniques involved are positioning systems that utilize the results of the system.

[2] Chaitali K. Lakde and Dr. Prakash S. Prasad. developed the navigation and orientation for visionless people are sustainably evolved in the development. The navigation is shown in public institutions, supermarkets, office buildings, homes, etc. Virtually impaired persons needed embedded features for navigation and detection. The development of such navigation systems has global positioning system references which show implications in sites and directions for the development.

[3] Sriraksha Nayak, Chandrakala C. B. proposed that the universe number of people with visionless ability suffer in professional and educational aspects. The users can orate a command to perform a task. The orated command will be analyzed and converted by a speech recognition engine which is then converted to perform suitable actions. The available and designed app is implemented to support various language-based people. the device hopes to provide decide functionality and guided audio instructions.

[4] T. M. N. Vamsi; G. Kalyan Chakravarthi; T. Pratibha was the one who developed that person with visual ailments overgo struggles with separation in their environment . the study mostly focuses on semantic information and current scenes such as color, and object description. The wearable embedded system aims to interpret semantics information for to visually impaired based on the embedded module approach and deep learning scheme.

[5] Mukesh Prasad Agrawal; Atma Ram Gupta generated the smart stick for assisting blind people an ingenious stick made for visionless people to improve navigation. The smart stick helps in detecting obstacles and identifying the world around. It captures vivid visual images of the world from an personal aspect. The stick helps in the conventional way to guide and evacuate their obstacle on the way.

[6] Arnesh Sen; Kaustav Sen; Jayoti Das built an ability to live without being dominated or by an action sequel and independency is a hurdle for the visually impaired. The ultrasonic stick helps in locomotion and navigation aids with the property of an ultrasonic proximity sensor and a GPS module and the properties of ultrasound. The availabilitryof the system provides utilization in a more versatile and reliable way.

3. PROPOSED WORK

A. INTERNET OF THINGS

Figure 1 is the Internet of things (IoT) is a executive feature to connect interrelatedly various sensor,software and various technologies .The main aspect of the iot is connect and exchange data over internet connection the focused goal is to sophistically use it from household to tech giants industries

Figure 3.1.IOT

B. ULTRASONIC SENSOR

For this experiment, we have used the ultrasonic sensor (Figure2) Ultrasonic sensor emits accelerated waves, and measures the time of accelerated pulse reaches the object and returns to the emitter.

Figure 3.2 ultrasonic sensor

C. ESP32

For this experiment, we have used the ultrasonic sensor (Figure 3) ESP32 is a network of minimal expenditure and power generation system with interrelated wifi compatibility and Bluetooth facility.

Figure 3.3 ESP32

D. PIR SENSOR

(Figure 4) represents PIR is a PYROELECTRIC (“Passive”) INFRARED SENSOR. It is based on IR technology, Self accesable module, maximum sensitivity, extensive reliability, widely used in various auto-sensing electrical equipment, especially for battery-powered controlled products.

Figure 3.4 PIR sensor

D.MEMS ACCELEROMETER

MEMS accelerometer is used where the linear motion is accesed in the system network. It is used to measure the vibration motion and shock , an accelerometer (Figure 5) is a meter that measures fixed action Accelerometers are useful for tracking movements in systems or for connected applications.

Figure 3.5 MEMS ACCELEROMETER

4. WORKING AND METHODOLOGY

The connections to the private eye are made with components such as a PIR sensor, and ultrasonic sensor. MEMS sensor predominantly works with IoT and cloud services. In this private eye, the main aspect of the device is to detect the obstacle with the help of the sensors attached to the board. On detection of the obstacle the system works as follows: By connecting the PIR sensor with the system its aspect is to detect the obstacle and sense of objects. Whereas the ultrasonic sensor senses the area travelled by the user and the object. MEMS sensor is used to alert the caretakers of the user when they stumble on their hardship. Voice ic is installed to give the commands. the software which is embedded in the device is Arduino ide which basically works on the commands to set the address and verify it. The process on Arduino ide works as a boot loader, page memory. The memory is located at the point of 0x700. The main working of the system said the address and update address. The Arduino UNO can be boosted by a USB connection or with an outdoor power. The power source is selected automatically.

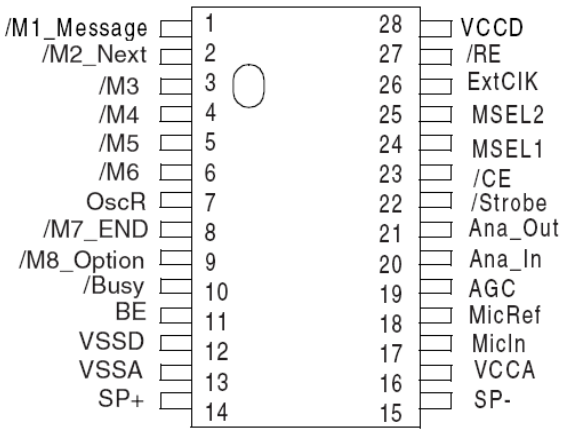

Figure 4.1Pin diagram

The above Figure 4.1 is the pin diagram. where there are various power pins connected. The power pins are VIN pins. this is used for the internal supply to the Arduino board when it is useful for an external power connectivity. The next pin is the 3V3 pin which is used for the volt supply generated by the onboard regulator. Then finally it is grounded with the GND pins.

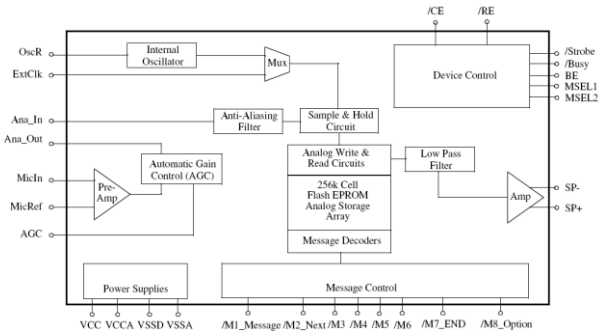

Figure 4.2. Block diagram

In a nutshell, the figure represents the block diagram which consists of various programming and automatic set and various compatible feature. The external flow in these control lines made up of AT mega 8U2 is connected to the reset lines of hundred nano farad capacitor where this sequence is asserted to reset the chip long enough.

Iot works as the main frame and the software system which shows all the data and showcased it to the server. This has various inclines to the connectivity and enabling data exchange.

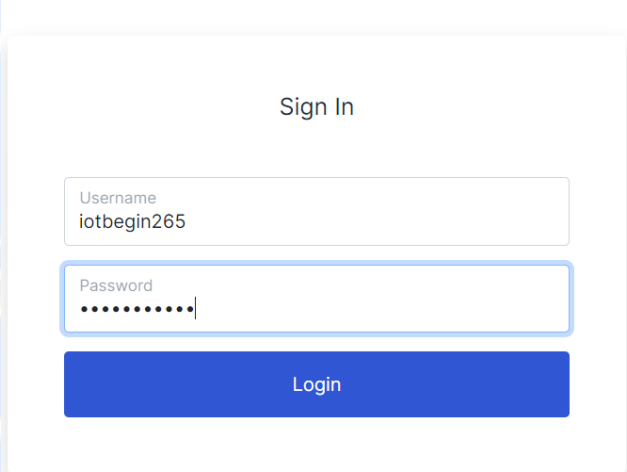

Figure 4.3. login page

As shown in figure 4.3 login page allows the user to login into the dashboard page.

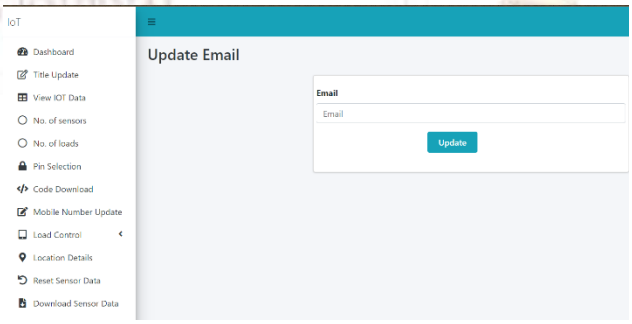

Figure 4.4 dashboard

As shown in figure 4.4 dashboard allows the user to explore their needs and doubts about the sensor.

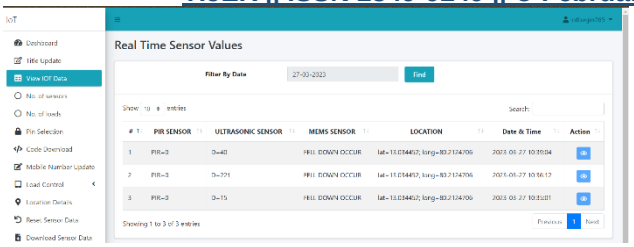

Figure 4.5 sensor value

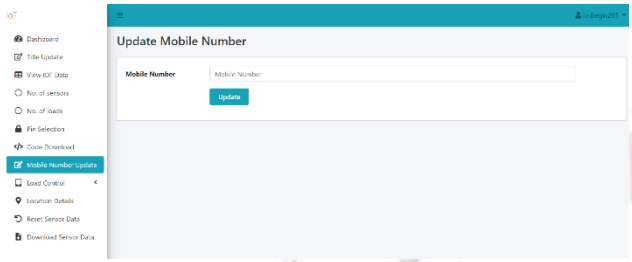

Figure 4.6 updating mobile number

As shown in figure 4.6 allows the user to update their mobile number in order to receive the alert message when the visually impaired gets stumbled somewhere.

5. SYSTEM ARCHITECTURE

As shown in the below figure, the system architecture is designed in a way the user interacted easily.

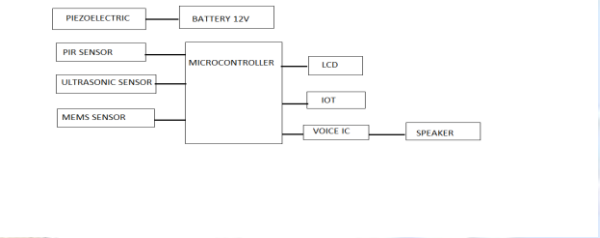

Figure 5.Architecture diagram

System architecture mainly comprises three parts, they are PIR sensor, ultrasonic sensor, and MEMS sensor. Primarily LCD shows details and voice IC is set up in a way to give the command. Piezoelectric acts as a backup to the battery. IoT helps in storing the information and specification in the software which adheres to the user's database and helps them efficiently during their hurdles.

By giving connections to the microcontroller using pins and activating it through the sensors the process is initiated and an alert is given to the concerned people.

6. MODULES

The hardware and software parts are embedded together to provide a private eye for visionless people. In that, some of the modules have played a vital role. They are as follows:

ESP32

For this experiment, we have used the ultrasonic sensor (Figure 3) ESP32 is a network of minimal expenditure and power generation system with interrelated wifi compatibility and Bluetooth facility.

PIR SENSOR

(Figure 4) represents PIR is a PYROELECTRIC ("Passive") INFRARED SENSOR It is based on IR technology, Self accesable module, maximum sensitivity, extensive reliability, widely used in various auto-sensing electrical equipment, especially for battery-powered controlled products.

Figure 6.1 PIR sensor

ULTRASONIC SENSOR

For this experiment, we have used the ultrasonic sensor (Figure2 For this experiment, we have used the ultrasonic sensor (Figure2) Ultrasonic sensor emits accelerated waves, and measures the time of accelerated pulse reaches the object and returns to the emitter.

Figure 6.2 ultrasonic sensor

MEMS ACCELEROMETER

Figure 6.3 MEMS accelerometer

MEMS accelerometer is used where the linear motion is accesed in the system network. It is used to measure the vibration motion and shock , an accelerometer (Figure 5) is a meter that measures fixed action Accelerometers are useful for tracking movements in systems or for connected applications.

INTERNET OF THINGS

IoT helps in navigation and guidance in real time using cloud

7. COMPONENTS

The components associated with this device help in the easy working of this setup. There are software and hardware modules associated with this device.

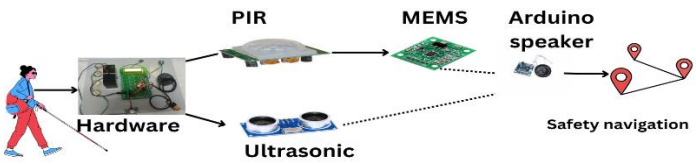

Figure 7 hardware and software guidance setup

Figure 7 depicts the components after execution when the obstacle gets detected or the obstacle near them. Let's see the working of all the components.

ESP 32

ESP32 is For this experiment, we have used the ultrasonic sensor (Figure 3) ESP32 is a network of minimal expenditure and power generation system with interrelated wifi compatibility and Bluetooth facility.

Figure 7.1 ESP 32

ULTRASONIC SENSOR

Ultrasonic sensors emit distance pulses, and by calculating the time of ultrasonic pulse reaches the object and back to the emitter.

Figure 7.2 Ultrasonic sensor

PIR SENSOR

PIR is a PYROELECTRIC ("Passive") INFRARED SENSOR.. It is based on IR technology, Self accesable module, maximum sensitivity, extensive reliability, widely used in various auto-sensing electrical equipment, especially for battery-powered controlled products.

Figure 7.3 PIR sensor

MEMS ACCELEROMETER

Acceleration is a measure of how quickly speed changes. Just as a speedometer is a meter that measures speed, an accelerometer is a meter that measures acceleration. Accelerometers are useful for sensing vibrations in systems or for orientation applications.

Figure 7.4 MEMS Accelerometers

IoT

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Internet of things (IoT) is a executive feature to connect interrelatedly various sensor,software and various technologies .The main aspect of the iot is connect and exchange data over internet connection the focused goal is to sophistically use it from household to tech giants industries

LCD

LCD is abbreviated as liquid crystal display which is a surface panel display which uses liquid crystals for its construction it is greatly used in portable games and device showcasting it is an passive matrix for displaying objects.

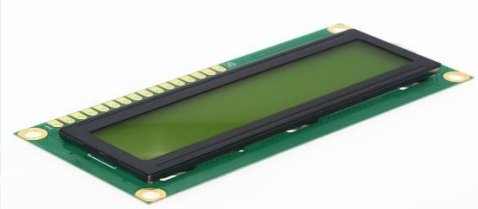

Figure 7.5 LCD

VOICE IC

The Voice input will be given through a microphone connected to the MICIN pin of the IC.

Figure 7.6 Voice IC

BATTERY:

A battery works on an electrolyte's oxidation and reduction reaction with metals.

Figure 7.7 battery

SPEAKER:

Speakers outshows the sound which is emitted by the device perfomance. The mechanical energy compresses air and generates into sound energy or sound pressure level (SPL).which shows the output as sound waves.

Figure 7.8 Speaker

8. RESULTS AND DISCUSSION

Finally, the results shown in Figure 7 were so satisfying after facing so many challenges, especially framing the sensor system. The system has worked efficiently with the attached sensors with maximum compatibility. The private eye for the visually impaired forecasts the people with stumbles and hardships on the way. It makes life cozy and easy in a smart pacing environment. This technology can be linked to various devices and wearables which can be easy for accommodation. This system can be even more upgraded and smarted with future technologies.

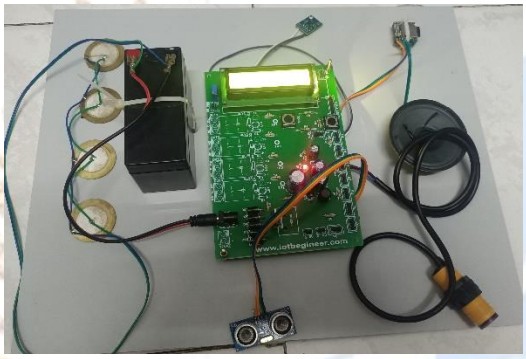

Figure 8.1 Final Output displaying all modules

Figure 8.2 alert message

By linking it to wearables and other gadgets this functionality can be enhanced. IoT and the cloud play a peculiar role in the system. The cloud acts as a facilitator in storing the database and the information and gives an alert notification to the caretakers and users when the visually impaired stumbles somewhere.

9. FUTURE WORK

From the perspective of the visually impaired the system which we have created implies a good futuristic development. The futuristic aspect of a system is smart shoes which can be inclusively adapted to all the wearables. This can be easily adapted by government technologies for public users who stumble with visual impairment. The device in a way can be upgraded even in the future easily.

10. CONCLUSION

In today's generation sensors have become an important tool in analyzing and predicting a circumstance. In the virtual eye for visually impaired people the sensor is vital to improving the satisfying the user requirement. Thus, we made a better model that could be accessed and evolved with better results and accuracy. This project is aimed at removing the hardships and maintaining a gentle approach that could improve the lives of virtually impaired people.

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