VIT-AP UNIVERSITY

PROJECT TITLE: THIRD EYE

Engineering clinics

Project Report- submission

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Abstract

Third eye is advancement with the assistance of the multidiscipline subjects like software engineering, hardware designing and which encourages the visually impaired individuals to explore with speed and certainty by recognizing the object and person close-by deterrents utilizing the assistance of ultrasonic waves and inform them with a beep sound and audio assistance. The influenced ones have been utilizing the convention white stick for a long time which in spite of the fact that being powerful, still has a considerable measure of weakness. This will be wearable innovations for the blinds.

Arduino based third eye or extra vision for blind people have a project which include both hardware and the software work and it helps the person to recognize the object by the help of ultrasonic waves which comes from ultrasonic sensor with a vibration which is generated by the buzzer. This Project is influenced by the Stick which is used by the blind people while walking for long term carry the stick is measure issue for weak people. So, this is the wearable invention for the weak and blind people they don't need to carrying anything in hand while walking they should only wear our invention and used to get walking easily. The Arduino is a software device which include. coding as a software function and Ultrasonic sensor, buzzer, Battery and more things as a hardware function, Ultrasonic sensor has a work to recognize the object near them and providing the signal via buzzer to the user which help the person to reach properly at their destination. Main Term: Arduino Uno module, Vibration, Ultrasonic sense.

Paeng Min-wook, 28, has developed a robotic eyeball he has dubbed "The Third Eye", which obsessive mobile phone users can strap to their foreheads so they can browse injury-free on the go. "This is the look of future mankind with three eyes," Paeng, a postgraduate in innovation design engineering at the Royal College of Art and Imperial College, told Reuters as he demonstrated use of The Third Eye around Seoul.

Paeng's invention uses a gyro sensor to measure the oblique angle of the user's neck and an ultrasonic sensor to calculate the distance between the robotic eye and any obstacles. Both sensors are linked to an open-source single-board microcontroller, with battery pack.

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Introduction

An Arduino-based "third eye" for the blind is an innovative assistive technology designed to enhance the mobility and independence of individuals with visual impairments. Inspired by the concept of a "third eye" that provides additional perception beyond human senses, this system utilizes a combination of sensors, microcontrollers, and feedback mechanisms to help users navigate their surroundings more confidently and safely.

This technology aims to address the challenges that blind individuals face in perceiving and interacting with their environment, empowering them to move around with greater ease. By leveraging Arduino, an open-source electronics platform known for its versatility and accessibility, developers can create a customizable and cost-effective solution tailored to the specific needs of visually impaired users.

The core features of an Arduino-based third eye typically include:

Obstacle Detection: Utilizing ultrasonic or infrared sensors, the system can detect obstacles in the user's path and provide real-time feedback to help them avoid collisions. This is particularly useful for avoiding objects at head or waist height.

spatial awareness: Sensors integrated into the system can provide information about the distance between the user and nearby objects, aiding in spatial awareness and object localization.

Portability: Depending on the design, the device can be made lightweight and compact, ensuring that users can comfortably wear or carry it during daily activities.

Education and Exploration: Beyond navigation, an Arduino-based third eye can serve as an educational tool, introducing blind users to concepts in electronics, programming, and technology.

The introduction of an Arduino-based third eye holds the potential to significantly enhance the quality of life for blind individuals by providing them with a greater sense of autonomy, safety, and control over their movements. By combining the power of Arduino's open-source platform with thoughtful design and user-centered development, this assistive technology can contribute to a more inclusive and accessible world for everyone

BackGround

The background of an Arduino-based "third eye" for the blind encompasses the technological, societal, and humanitarian factors that have driven its development. This assistive technology has emerged as a response to the challenges faced by visually impaired individuals, aiming to empower them with increased mobility, independence, and access to the world around them. Here is an overview of the background of Arduino-based third eyes for the blind:

Challenges Faced by the Blind: Blind individuals encounter numerous obstacles in their daily lives, ranging from navigating unfamiliar environments to detecting obstacles in their path. These challenges can lead to reduced mobility, social isolation, and a lack of access to information.

Advances in Sensor Technology: The rapid advancements in sensor technology, such as ultrasonic and infrared sensors, have opened up new possibilities for creating devices that can augment human perception. These sensors can detect physical objects and distances, forming the basis for obstacle detection and navigation assistance.

In summary, the background of an Arduino-based third eye for the blind lies at the intersection of assistive technology, sensor technology, user-centered design, and the quest to address the specific challenges faced by visually impaired individuals in their daily lives. This concept represents an endeavor to provide a practical and innovative solution that enhances their autonomy, safety, and overall quality of life.

Problem definition

Visually impaired individuals encounter numerous challenges in their daily lives, particularly in navigating their surroundings and interacting with their environment. While traditional tools like canes and guide dogs provide essential assistance, they have limitations in offering comprehensive perception of obstacles, distances, and pathways. These limitations can lead to accidents, hindered independence, and reduced quality of life for the visually impaired community.

The problem at hand is the need for a more advanced and adaptable solution that enhances the mobility and autonomy of blind individuals by providing them with improved real-time awareness of their surroundings. This solution should overcome the shortcomings of existing aids and empower visually impaired individuals to navigate confidently and safely, enabling them to participate more fully in various activities and environments

Existing tools lack the ability to provide a comprehensive understanding of the environment, including obstacles at different heights and varying distances. Blind individuals need a technology that offers richer and more nuanced environmental perception. Real-Time Navigation Guidance: Current aids often lack the capacity to offer real-time, dynamic navigation assistance. There is a need for a system that can guide users in real-time, adapting to changing environments and aiding in route planning.

The problem statement revolves around the development of an Arduino-based "third eye" for the blind that addresses the aforementioned challenges. This solution should harness the power of sensors, microcontrollers, and user-centered design to empower visually impaired individuals with a comprehensive and real-time understanding of their environment, promoting independence, safety, and a higher quality of life.

Objectives

The objective of this project is **“The Third Eye”** is

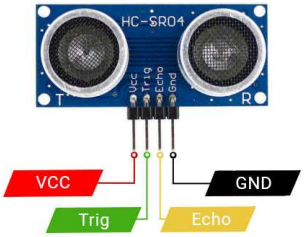
- To design a portable wearable device for the visually impaired and those who often must rely on others.
- To help the visually impaired people to move around from one place to another with confidence by knowing the nearby obstacles using the help of the wearable band, which produces the ultrasonic waves which notify them with buzz sounds or vibrations.
- To design the device with a portable, cost-efficient, easy-to-manage, an effective system with many more amazing properties and advantages is proposed to support the blind to detect the obstacles even in motion by using a motion PIR sensor.
- "As we cannot take our eyes off from smartphones, the extra eye will be needed in future."

List of components

- Arduino UNO

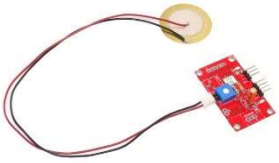
- Cap/Glasses

- Ultrasonic Sensor



- Battery

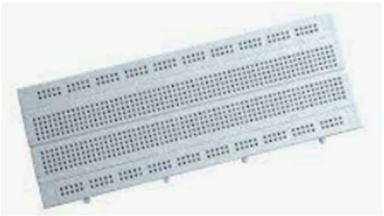
- Vibration Sensor



- Jumper wires

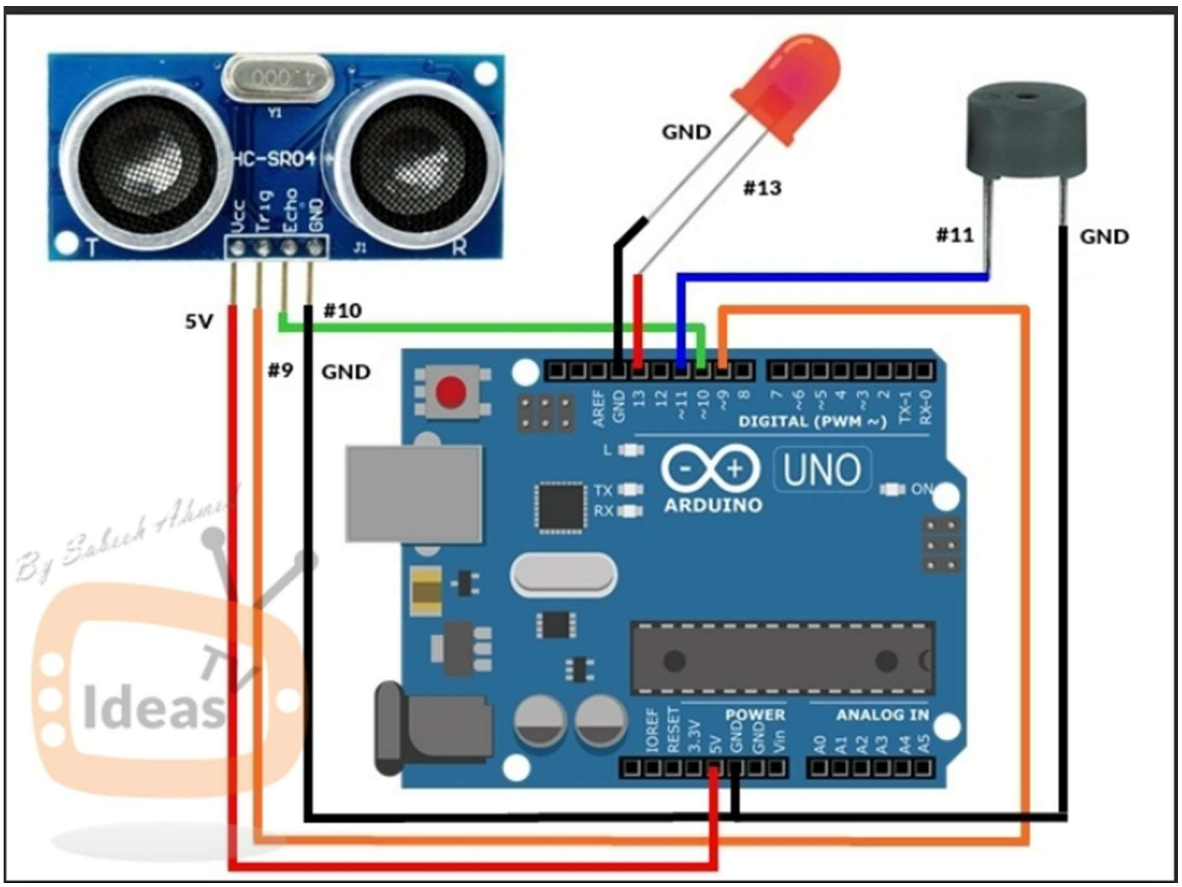
- Buzzer

- Bread Board



- LED

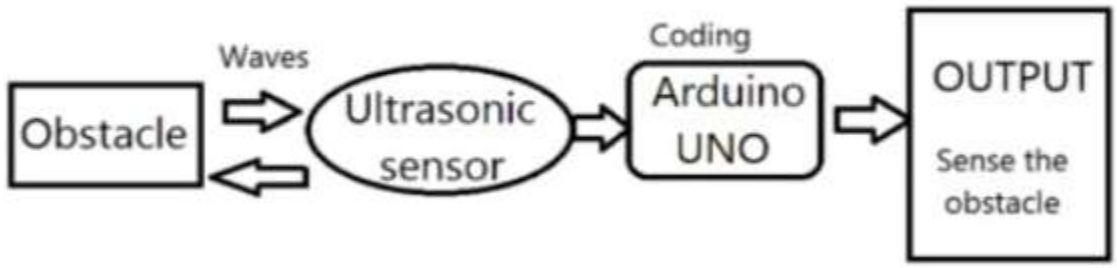
Circuit Diagram



Procedure

The procedure for building the laser security system project can be outlined as follows:

1. Gather the necessary components, including an Arduino board, ultrasonic sensors, a vibrator module, a buzzer, and other supporting components.
2. Connect the ultrasonic sensors to the Arduino board, ensuring that the transmitter and receiver pins are connected to separate digital pins.
3. Connect the buzzer to the Arduino board, ensuring that it is connected to a digital output pin.
4. Connect the vibrator module to the Arduino board, ensuring that the power and ground pins are connected to separate digital pins.
5. Now connect the Arduino Uno to battery.
6. Upload the provided code to the Arduino board using the Arduino IDE software.
7. Power on the system and test the ultrasonic sensor by interrupting in front of it.
8. Test the alarm system by verifying that the buzzer sounds and the vibrator module vibrates or not.
9. The device generates beep sound when any object comes in front of device holder person and as the distance of object is decreased the sound from the gadgets is increased and vibration is also started. Thus, the gadgets help to easy the detection process for the blind person which have no eyesight to see the obstacle coming around them.



10. Customize the code to suit the specific security needs of the user, such as changing the distance length.
11. Now you can place the system on any cap and enjoy the features of the third eye.
12. Monitor the system regularly to ensure that it is functioning properly and adjust the code or hardware as needed.

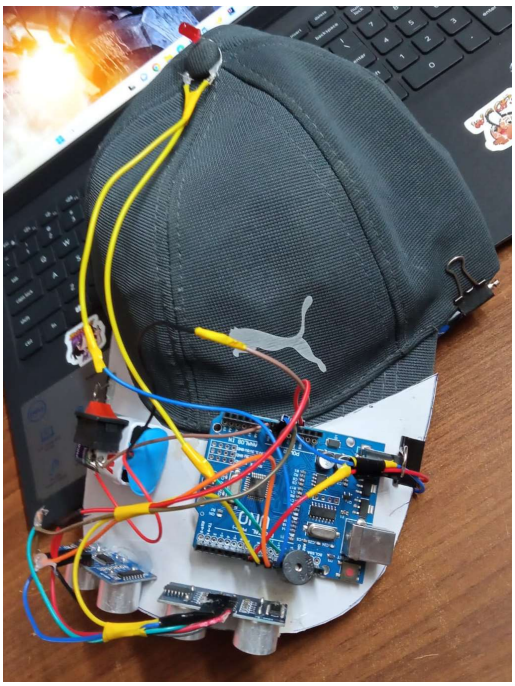
Results

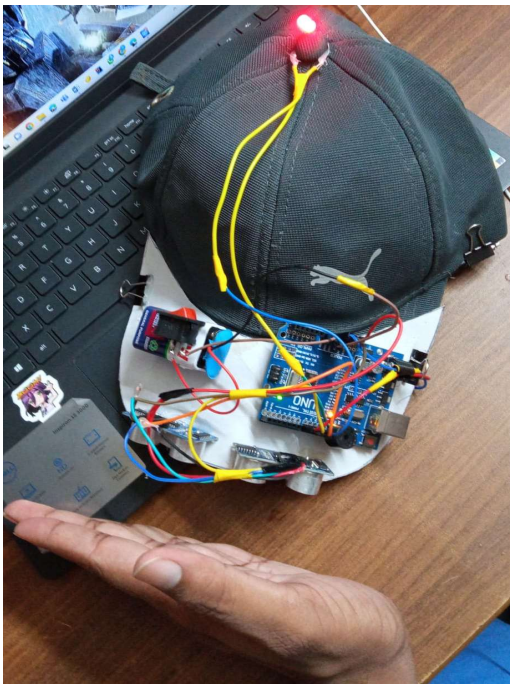
The results of an Arduino-based "third eye" for the blind can be evaluated based on its effectiveness in addressing the challenges faced by visually impaired individuals in navigation and environmental perception. These results encompass both the technical performance of the device and its impact on the users' daily lives.

With the improvement of the living standards of the people, we have become so materialistic that we have forgotten how the physically disabled people live a tough life. Eyes are responsible for observing and listen the outside environment; dysfunction of such prime sense organ severely affects the knowledge perceiving capability of the outside environment. Therefore, going around to places in such an environment is a very big challenge because blind people cannot depend on their own eyes and thus face many difficulties. This project will help them to overcome their obstacles.

The presented system is designed and configured for the use of the blind and visually disabled people. This device is able to handle several states that the visually impaired people face. This device responds to the user in all the circumstances which is faced by the blind people with the help of the use of the Ultrasonic sensors and the Arduino Board.

When the obstacle or the object is in the way it will tell the user that: The obstacle is in his/her way with buzzer and vibrator and intimates to the person if they are in the way of user by glowing red led on top of the cap.





Conclusion

Thus, this project proposed the design and architecture of a new concept of Arduino based Virtual Eye for the blind people. A simple, cheap, efficient, easy to carry, configurable, easy to handle electronic guidance system with many more amazing properties and advantages is proposed to provide constructive assistant and support for the blind and visually impaired persons. The system will be efficient and unique in its capability in specifying the source and distance of the objects that may encounter the blind. It is able to scan and detect the obstacles in the areas like left, right, and in front of the blind person regardless of its height or depth.

With the proposed architecture, if constructed with at most accuracy, the blind will be able to move from one place to another without others help.

The project as a whole was successful in developing a more durable navigation technique apart from the existing ones. This was just a prototype of the original idea that had to be presented here. The project, if used on a wider scale and distributed to blind people, really has the ability to make an impact to the community.

In Conclusion, this Project has the capability and help Blind People Navigate without the need of expensive tech or Dog or Sticks a. This system can be paired with 4 other units and used as whole body kit for the Blind people by wearing one in hand, Two in Shoulders and Two on knees. Moreover, a Similar Project has been tested on Blind People and have generated Successful Positive Results. This Project can help transform Blind People's lives in Positive way.

Future scope

The wearable technology for blinds resolves the existing technical problems. Nowadays, there are many instruments and intelligent devices for visually impaired people for navigation. Still, most of them have specific issues with carrying, and the major drawbacks are those that need a lot of training to use. One of the main peculiarities of this innovation is that it is affordable for everyone. There are no such devices available in the market that can be worn like cloth and have such a low cost and simplicity. When used on a large scale, with improvements in the prototype, it will drastically benefit the community. The prototype device has the following features:

- It is a wearable technology for blinds.
- It uses ultrasonic waves to detect obstacles.
- It notifies the blocks/obstacle by vibrations and a buzzer sound.
- It notifies to the person on the other end with red light to slowdown/to get awareness on user

In the future, the prototype device will be developed into a complete model using a Arduino board. We plan to give this product to the National Association for the Blind (NBA) for authorization. Once it gets approved by the NBA, the device will be provided to blind the schools and homes related to blind people.

References

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Remarks

- The accuracy and reliability of sensors used in the system can vary. Inaccurate or inconsistent sensor readings could lead to false alarms or missed obstacles, potentially causing accidents.
- While Arduino-based systems can detect obstacles and provide basic navigation assistance, they may not fully capture the complexity of the environment. They might struggle with identifying intricate details or subtle variations in the surroundings that a human with sight would perceive.
- Typical disadvantages (Including the smart devices) it is difficult to transport and requires extensive training to use.
- Power source (Battery) need to replace after certain interval of time.

Code:

```
#define trigPin 9
#define echoPin 8
#define motor 7
#define buzzer 11
#define ledPin 10
 // Change this to the desired pin number for the LED
void setup()
{
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  pinMode(motor, OUTPUT);
  pinMode(buzzer, OUTPUT);
  pinMode(ledPin, OUTPUT); // Set the LED pin as an output
}

void loop()
{
  long duration, distance;

  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  duration = pulseIn(echoPin, HIGH);
  distance = (duration/2) / 29.1;

  if (distance < 70) // This is where checking the distance, you can change the value
  {
    digitalWrite(motor, HIGH); // When the distance is below 70cm
    digitalWrite(buzzer, HIGH);
    digitalWrite(ledPin, HIGH); // Turn on the LED
  }
  else
  {
    digitalWrite(motor, LOW); // When greater than or equal to 70cm
    digitalWrite(buzzer, LOW);
    digitalWrite(ledPin, LOW); // Turn off the LED
  }

  delay(500);
```