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Smart Walking Stick for Visually Impaired

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ABSTRACT
The smart walking blind stick is a device that aids visually impaired individuals in recognizing objects and communicating information through voice and sound. This saves time and effort while also improving your comprehension of the environment. It also allows the sight handicapped to move from one location to another without the assistance of others. It can also be utilized in retirement homes where the elderly's everyday activities are hampered by poor vision. We hope that this article will assist folks who need to glance around and function. Artificial intelligence can now integrate capabilities like object recognition, which are computationally viable thanks to recent improvements. As a result, these functionalities will be used in your work. This article focuses on object detection and classification of images collected by a stick-mounted webcam, and how that data might be transferred to the computer user by voice or voice.

Keywords: *Ultrasonic sensor, Artificial intelligence, Object detection mechanism, Raspberry Pi, Microcontroller, Google glass.*

INTRODUCTION
Today, through technology, we can create devices that can make people's lives easier. The use of technology to assist the visually impaired is one of the most important areas of research to investigate, as vision is one of the most important sensations for functioning.

Safety: Today, through technology, we can create devices that make people's lives easier. The use of technology to assist the visually impaired is one of the most important research areas to investigate, as it is one of the most important sensations for vision to function.

Proposal: We proposed a white cane design based on artificial intelligence(AI).

Purpose:A device that can detect obstacles in various directions. This helps the user choose an unobstructed path. The correct route directions are given by voice / speech. Previously built blind sticks can detect obstacles that get in the way in front of the visually impaired, but they cannot know the size of the obstacle or the distance from it.

Direction: The direction of our research efforts is to keep blind friends informed of the dimensions and distance from the obstacles they are approaching. Based on this information, recommendations for directions to follow are provided. Intelligent blind sticks make the lives of blind friends easier and protect them.

The AI-based smart walking stick is an innovative stick designed for the visually impaired to improve navigation and make wise decisions about choosing an unobstructed path to reach

your destination. Useful for. In our search space, we use three ultrasonic sensors, front, left and right, to find the best path (no obstacles) for the visually impaired, and objects using a stick-mounted webcam. Includes a detection mechanism. There are obstacles.

PROPOSED METHODOLOGY

According to the Globe Health Organization (WHO), there are more than 1.3 billion visually impaired persons in the world, with more than 36 million of them in the United States. India is the world's second most populous country, with 30 percent of the world's visually impaired population. It was impossible to obtain all of the prerequisites while there were numerous campaigns underway to treat these patients. Due to the vast amount of data and simple calculations, it has become extremely significant in the age of artificial intelligence. Artificial intelligence has the potential to make these people's lives easier. The idea is to offer "secondary vision" until they have the necessary means to treat them. People who have untreatable blindness can utilise this to simplify their daily duties.

A. The Current System is Ineffective

As part of the Initiative Glass analytics and development project, Google Glass might be a portable laptop with an optical head mount shown by Associate in Nursing. Google's goal is to create computers that are ready for mainstream consumption. Google Glass shows information in a pleasant phone-like hands-free style that lets you interact with the web using voice commands. The glasses work with either a WiFi or Bluetooth connection and are totally self-contained. This means you can leave your phone at home and use WiFi wherever you want without losing your connection. It costs around $14,000, though, and most visually handicapped people in developing nations like India do not have access to it. The goal of this project is to develop a product that is both inexpensive and incorporates the most basic functionality. The establishment of a value-creating economic system is at the heart of this endeavour. A Raspberry Pi, a vibrator, a switch, an audio output device, a webcam, and a sensor are all included in the stick. The vibrator on the steering wheel vibrates with an alarm in text/voice format via headphones when the gadget is called. The project's main agenda item is to develop products with the lowest possible value. When someone wants to take notes, they are driven to their destination and voice communications are recognised using a Bluetooth-enabled audio device. The stick's infrared devices can detect holes and staircases (obstacles).

B. Methodology

The AI-based smart walking stick is an innovative stick designed for the visually impaired to improve navigation and help you make intelligent decisions about choosing paths that won't prevent you from reaching your destination. In our search space, we use three ultrasonic sensors, front, left and right, to find the best path (no obstacles) for the visually impaired, and objects using a stick-mounted webcam. Includes a detection mechanism. There are obstacles. These sensors use ultrasound to detect obstacles and direct the visually impaired in an unobstructed direction to reach their destination. Knowledge is captured by three sensors that use object recognition to detect the distance from the obstacle and confirm the size (dimensions) and distance of the obstacle to the user. This sensor / webcam feedback is compiled and sent to the visually impaired via audio / voice devices. This allows the user to make unobstructed decisions and choose a route. The stick is equipped with a Raspberry Pi, vibrator, switch, audio output device, webcam and sensor. When the device is called, the vibrator placed on the handle vibrates with the audio / speech provided to the user via the Bluetooth-based audio device after the object is detected in the frame provided by the

webcam. increase. Developing products to the lowest value is a major agenda item for the project. The Google Assistant is provided here as a Swish interface for voice and voice I / O.

C. Obstacle Detection

To detect obstacles while walking, we typically use ultrasonic sensors with object detection via a frame input by a webcam. These sensors are embedded in the stick, apart from the mounted webcams that are organized in several directions. The output of these sensors is processed by a microcontroller to provide the corresponding wave feedback. Relying solely on the output of the ultrasonic sensor does not provide information about the size and distance of obstacles. Activates the audio / sound module needed to communicate obstacles by voice.

D. Navigation

The basic plan here is to put the Google Assistant on the stick. This is a powerful tool for tracking and navigating in the best possible way. Users may be ready to use Bluetooth-enabled speakers to hear stereo sound instructions instructing them to move to a location.

E. Emergency alert

The system also includes the ability to contact a person with a disability or in an emergency, where coordinates and contact details are stored in case of an emergency. He can operate the switches provided for this purpose.

ALGORITHM OF PROPOSED METHODOLOGY

STEP 1: Start

STEP 2: Read out loud the GPIO pin.

STEP 3: Move to step 4 if pin 1 is high, step 7 if pin 2 is high, and step 10 if pin 3 is high, otherwise go to step 2.

STEP 4: Open the camera, take a picture, save it as "sample.jpeg," and then return to home / pie / webcam.

STEP 4:Convert the image to text using Python and save the output as "output1.txt".

STEP 5: Move output1.txt to an audio.txt file and do a text-to-audio conversion

STEP 6: advances to step 2 after generating audio output

STEP 7: In Python, measure ultrasonic distances and record the results as "output2.txt".

STEP 8: Copy the content from "output2.txt" to "audio.txt" and convert it to an audio file.

STEP 9: advances to step 2 after generating audio output

STEP 10: Open the webcam, take a picture, save it as "objsamp.jpeg," and then navigate to Home / Pie / Object.

STEP 11: In Python, perform object recognition and store the result as "output3.txt."

STEP 12: Convert the text from "output3.txt" to "audio.txt" by moving the content from "output3.txt" to "audio.txt."

STEP 13: advances to step 2 after generating audio output

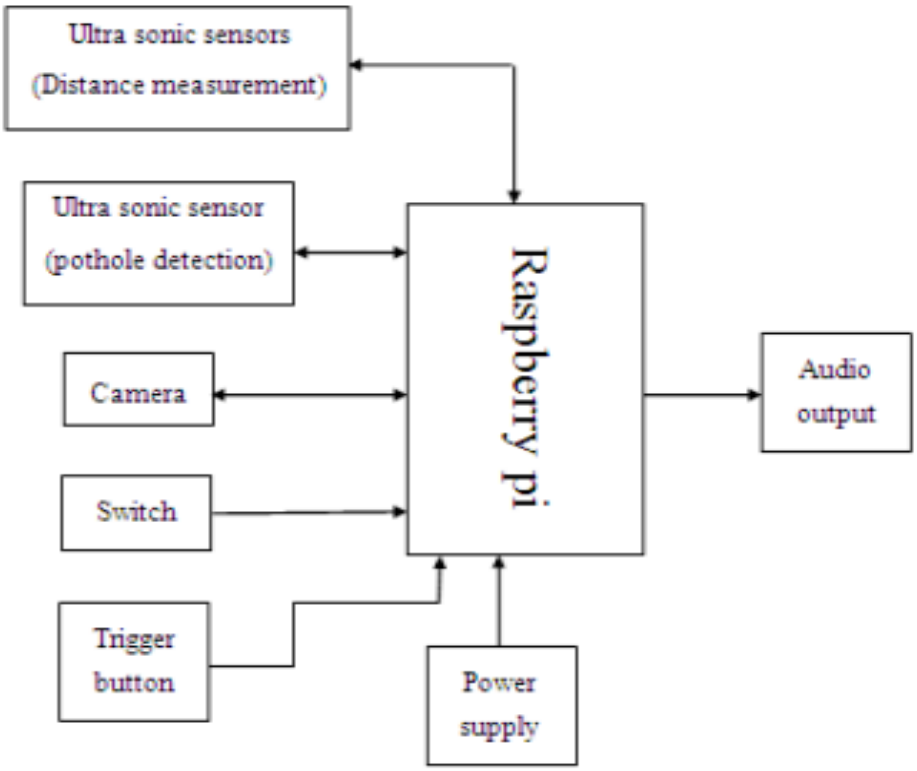

Fig.1. The Proposed Work's Block Diagram

The Raspberry Pi is seen in the block diagram above. GPIO pins are used to connect ultrasonic sensors, switch inputs, cameras, and other devices to the Raspberry Pi board.Now, we are going to discussing about few applications of Proposed work.

1) ***Face Detection:***Face recognition and people counting are two popular uses. Have you ever noticed how when you post a photo to Facebook, it knows your face? This is a simple object recognition programme that we see in our daily lives.
2) ***People Counting:*** Object detection can also be used to count people and is used to analyze store performance and visitor numbers at festivals. These are usually more difficult because people move away from the frame quickly (and people are not rigid). International Journal of Engineering Science and Computing, July 14154, 2017http://ijesc.org/
3) ***Vehicle Detection/Speed detection:*** If the object is a vehicle, such as a bicycle or car, object identification by tracking may be useful in determining the object's velocity. Object recognition can be used to determine the type of vessel entering the port (depending on shape, size, etc.). Some European countries are currently developing this ship recognition system.
4) ***Manufacturing Industry:***If the item is a vehicle, such as a bicycle or an automobile, tracking object recognition may be useful in determining the object's velocity. Object

recognition can help establish the sort of incoming ship (depending on shape, size, etc.). Several European countries are now working on developing this ship detecting system.

5) ***Online Images:*** Object recognition can also be used to classify photographs available on the internet. Object recognition is commonly used to filter out offensive images.
6) ***Security***:Object recognition will be able to detect scene anomalies such as bombs and explosives in the future (using quadcopters).

CONCLUSION

The movement of different objects in a video or image is detected using object autonomous tracking and detection. This system displays all 360 (degree symbol) results based on the smart wand's position. As a result, this system offers comprehensive assistance to the visually challenged community. Obstacles can be detected at long distances using ultrasonic sensors with large beam angles. Users may also detect barriers in the road using object recognition, which allows them to see the distance and dimensions of the obstructions. The major purpose of this technology is to function as a safe guardian for the visually handicapped, assisting them in noticing their surroundings.

FUTURE SCOPE

The movement of different objects in a video or image is detected using object autonomous tracking and detection. This system displays all 360 (degree symbol) results based on the smart wand's position. As a result, this system offers comprehensive assistance to the visually challenged community. Obstacles can be detected at long distances using ultrasonic sensors with large beam angles. Users may also detect barriers in the road using object recognition, which allows them to see the distance and dimensions of the obstructions. The major purpose of this technology is to function as a safe guardian for the visually handicapped, assisting them in noticing their surroundings. Computer vision research has long been focused on identifying interesting types of items in images. Object detection is useful in a variety of applications, including self-driving automobiles that recognize pedestrians, bicycles, traffic signals, and other vehicles, as well as security measures that detect intruders.Although much development has been made since the invention of computer vision more than 50 years ago, there is still potential for advancement. Improved response speed and accuracy for considerably more precise object detection. Adding GPS systems, building applications, and using facial recognition to detect persons in front of you are all things that will be done in the future. Including a GPS system will aid in determining the precise location of the visually impaired, assisting parents in locating the visually impaired, and providing great guides and the ability to specify destinations.

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