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IOT BASED ADVANCED BIFOCALS FOR VISUALLY IMPAIRED & BLIND PEOPLE USING ROBOT VISION

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ABSTRACT:

The paper presented lays out a project focused on making the Visually impaired, live independently as an individual. The Project presents an IOT BASED ADVANCED BIFOCALS FOR VISUALLY IMPAIRED &BLIND PEOPLE USING ROBOT VISION to using image recognition algorithm developed with enhanced facility. The model consists of PIXY2 camera, ARDUINO DUE, IR Sensor, GPS tracker, OCR camera and an android mobile app. All components fitted in the glass with the help of surface mount technology(SMT). The PIXY2 camera is placed on the lens, which detects the objects using PixyMON software. The detected objects are sent to an android app via the Arduino board. The mobile app consist of TEXT-TO-SPEECH facility which converts the text sent by the Arduino to voice which is being received by any type of speaker used by the user. The OCR camera read the text to convey user via an android app. In addition to this, GPS tracking system helps to find and send the current location to the guardian of the user. The IR sensor helps in detecting ridges and pits in case of steps, road pits etc and guides them to know objects in front of them without even touching them.

This project describes the structure and functionalities of The Bifocals giving total independence to the visually impaired & blind people to move on their own and thus increasing their Confidence.

KEYWORDS:

IMAGE RECOGNITION, INTERNET OF THINGS, PIXY2 CAMERA, PIXYMON, ARDUINO DUE, GPS IR SENSOR AND OCR CAMERA.

INTRODUCTION

Blindness is a condition which affects millions of people around the world and it makes a great impact on every aspects of a person's life. Blind people cannot move on with their life without any human guidance, which is impossible at every circumstances of life .China and India together accounts for 49% of the world's total visually impaired and blind people in just 37% of the global population. Hence it is compulsory to develop new technologies and improve existing projects based on blindness.

In this project pixy2 camera acts as an eye and the speaker which is connected to the app developed ,works like a human support to the blind people which make them to move comfortably .Implementation involves technology on smart glass using microcontroller based board.

EXSISTING SYSTEM:

At present there is a wearable device designed to assist people with visual impairments or blindness. The device consists of a small camera on the frame of a pair of eyeglass, which captures images of the user's surroundings. The images are then processed using the ORA technology(object recognition algorithms). Which recognizes and identifies text, objects, and faces of the people who were stored in the form of string.

The processed information is then converted into audio feedback and relayed to the user through a small speaker or a bone-conduction earpiece. The user can control the device using a handheld control unit or a simple gesture-based interface, which allows switching between different readings modes, adjusting the volume and the audio output and saving or share captured images.

In addition to reading text and recognizing objects, also has several other features, including facial recognition, color detection, and barcode scanning .These features allow users to identify people, products, and colors, and read the information contained in barcodes.

Though the current technologies have various features there are few drawbacks which include:

- High-time consumption
- Requires external kit
- Does not capture images automatically
- Does not have all the requirements in a single

device (for example a camera can recognize objects and text but does not contain a GPS tracking system in the same device).

MATERIALS AND METHODS FOR PROPOSED SYSTEM

1. Arduino Due
2. Pixy2camera
3. PixyMON
4. Bluetooth
5. IR sensor
6. GPS
7. Mobile app
8. 8.Headphones
9. OCR camera

In this work, an automated image-capturing system is developed with the help of a microcontroller board and the mobile app developed. since it works automatically the time consumption is less than the existing system. Compared to the existing technology it is budget-friendly as all the requirements are done in a single device. The Pixy 2 camera automatically captures the objects around the user and processes them which helps to identify the objects. This technology is very helpful to the blind people. The OCR camera read the text to convert the user via an android app. Since no external kit is required it is easy to handle. All the above connects are connected using Surface Mount Technology (SMT) which reduces the space consumption. More over there are two mode read mode and object recognizing mode which done by the touch sensor (controlled by the app).

ARDUINO BOARD:

This microcontroller board based on the atmel SAM3*8E ARM Cortex-M3 CPU. The features are Processor-AtmelSAM3*8E ARM Cortex-M3 CPU Operating voltage -3.3V, Input voltage-7-12V, Input voltage (max limit)-6-20V, Digital I/o pins-54(including 12 PWM outputs), analog input pins-12, analog output pins-2(DAC), total DC output current on all I/O lines-130mA, DC Current for 3.3V pin-800mA, DC Current for 5V pin-800mA, flash memory-512KB, SRAM-96KB(64 KB accessed directly by the CPU,32 KB accessed through the DMA controller), clock speed-84MHz, I2c-2interfaces, SPI -3 interfaces, UART-4 interfaces, power consumption-130mA typical when running at full speed. it capable of handling complex tasks. Arduino is an open-source electronic board.

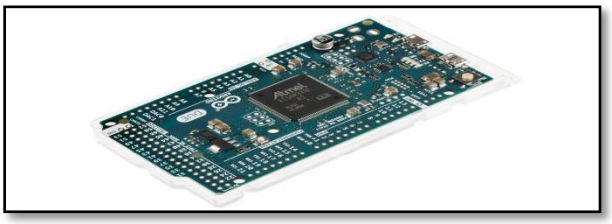


FIG-1-ARDUINO DUE

PIXY2 CAMERA:

The pixy is a fast vision sensor for DIY robotics and similar applications. The pixy2 algorithm can recognize intersections in just 60 frames per second ,so it is faster than other cameras Pixy2 will detect an object that's as object as small as 4*1 pixels in the image.

FIG -2-PIXY2 CAMERA

Pixy 2 will focus on objects as close as 5cm/2 inches away from the lens. The pixyMon software is used to teach pixy to recognize objects .Overall, the pixy2 camera and the pixyMon software provide a powerful and flexible platform for object detection and tracking with support for multiple objects and a wide range of application.

SMART CAMERA:

This camera is designed for reading the texts just by capturing the image high-speed text detection camera is the vision components VC Z series, which uses a line scan image sensor and can read the text at speeds of up to 4000charectors per second. Which makes the user more comfortable .Optical character Recognition (OCR) camera used to read the text and convey the word via an android app.

BLUETOOTH MODULE (HC-05):

Bluetooth is a short-range wireless communication standard that allows devices to communicate with each other over distances. Here the signal from the smart camera through the processor is collected by this Bluetooth Module using uart pin. This Bluetooth module transmit name of the object to an IASSIST app on a device which can then be sent to a speaker for playback. In fact, this is one of the common use cases of Bluetooth technology to wirelessly stream audio content from a device to a speaker or headphones.

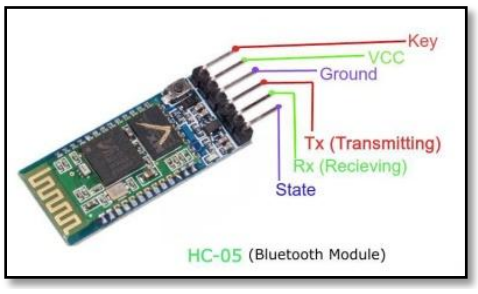


FIG-3-BLUETOOTH MODULE HC-05

IASSIST APP:

This app contains the feature works by using device's accelerometer to detect when the device has shaken and

then triggering the app to open. It comes run at dual platform of android and ios.

READ MODE:

This mode allows the Bluetooth module to transmit the voice message by the smart camera to the speaker(Based on the need of the user).This camera have 13 pixels

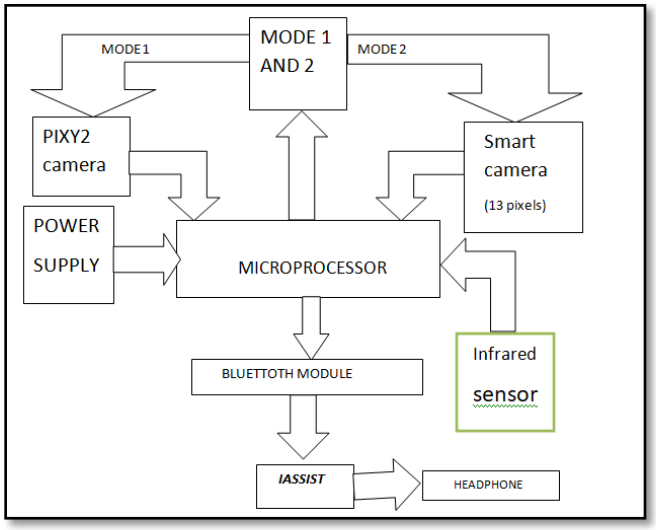
OBJECT DETECTION MODE:

In this mode, the processed object or image captured by the Pixy2 camera is sent to the Iassist app through the Arduino board. In this app there is a TTS system (Text-To-Speech System) which is used to convert the text transmitted by pixy2 via bluetooth to speech. The voice message by this app is then received by the user's speaker.

GPS system: The gps is enhanced in this glass to inform the wearer location to the caretaker.

IR sensor: This sensor set in front of the glass is used to convey the details of high footpaths, valley level to the wearer.

BLOCK DIAGRAM:



MODEL

This model consists arduino, GPS, IR sensor, Pixy2 camera, smart camera. It works power supply range between 0 to 12V.The mode is choose after the camera run further programmable activity. If mode 1-I the pixy2 camera recognize the objects details to convey the wearer with help of mobile app via headphone. If mode2-The smart camera read the text content to convey the wearer via mobile app. The user location can send the caretaker with the help of GPS system. The IR sensors detect the level of up-down of the roadways.

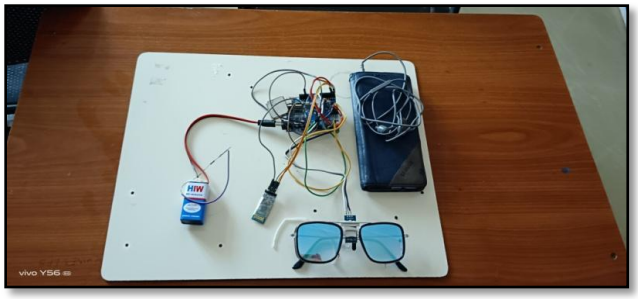


FIG-4- MODEL OF IOT BASED ADVANCED BIFOCALS FOR VISUALLY IMPAIRED AND BLIND PEOPLE.

RESULT

Thus monitoring and guiding the visually impaired or blind people to do their regular necessities can be done using this technology with less work and less time consumption as it is an advanced model.

CONCLUSION:

The proposed Iot based advanced bifocals for visually impaired and blind people assembled and tested successfully. In this model is advanced model. The incorporation of various sensors and components they can now accurately track movements, recognize the object, read text and many more comfort facilities makes them invaluable tools for making a clear and confidence move in the life of visually impaired and blind people. This project further has various impacts in education.

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