ADVANCED VOICE BASED BLIND STICK WITH VOICE ANNOUNCEMENT OF OBSTACLE DISTANCE & IMAGE IDENTIFICATION LEARNING

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ABSTRACT

Living in a world of touch-button life, there are millions of blind people in this world who always need some help; this makes them feel low. These visually impaired people find it challenging to travel outside their homes independently. The Smart Blind Stick that we build can support the blind community by providing a better and simpler way of life by moving independently. So, the idea is simple, unlike the traditional stick, they need to carry a smart blind stick, which will help them to some extent by avoiding the obstacles around their way while walking or going out, which may be caused by accident. The stick will be having sensors and cameras to find the objects and give feedback alert messages to the user to avoid unnecessary accidents. The stick is very similar to those of the traditional, but it can save them from accidents as well as save their lives. The stick consists of raspberry pi, camera, and an earphone/speaker. For further processing of data camera is attached to the raspberry pi. The algorithm running in raspberry pi determines the distance from the obstacle that it informs the user by triggering the buzzer and by illustrating the environment through the camera's captured image. The camera is used for object recognition, and the image obtained through the camera will be captioned and presented to the user in the form of audio. This audio will tell what that image is and what should be done if it is an obstacle; thus, working as a virtual eye for blind people.

Keyword: - raspberry pi, camera, smart blind stick, captioned

1. INTRODUCTION

1.1 Introduction

An embedded system can be defined as a computing device that does a specific focused job. Appliances such as the air-conditioner, VCD player, DVD player, printer, fax machine, mobile phone etc. are examples of embedded systems. Each of these appliances will have a processor and special hardware to meet the specific requirement of the application along with the embedded software that is executed by the processor for meeting that specific requirement. The embedded software is also called “firm ware”. The desktop/laptop computer is a general-purpose computer. You can use it for a variety of applications such as playing games, word processing, accounting, software development and so on. In contrast, the software in the embedded systems is always fixed listed below: Embedded systems do a very specific task, they cannot be programmed to do different things. Embedded systems have very limited resources, particularly the memory. Generally, they do not have secondary storage

devices such as the CDROM or the floppy disk. Embedded systems have to work against some deadlines. A specific job has to be completed within a specific time. In some embedded systems, called real-time systems, the deadlines are stringent. Missing a deadline may cause a catastrophe-loss of life or damage to property. Embedded systems are constrained for power. As many embedded systems operate through a battery, the power consumption has to be very low. Some embedded systems have to operate in extreme environmental conditions such as very high temperatures and humidity.

1.2 Application Areas

Nearly 99 percent of the processors manufactured end up in embedded systems. The embedded system market is one of the highest growth areas as these systems are used in very market segment- consumer electronics, office automation, industrial automation, biomedical engineering, wireless communication.

Data communication, telecommunications, transportation, military and so on.

1.2.1 Consumer appliances: At home we use a number of embedded systems which include digital camera, digital diary, DVD player, electronic toys, microwave oven, remote controls for TV and air-conditioner, VCO player, video game consoles, video recorders etc. Today's high-tech car has about 20 embedded systems for transmission control, engine spark control, air-conditioning, navigation etc. Even wristwatches are now becoming embedded systems. The palmtops are powerful embedded systems using which we can carry out many general- purpose tasks such as playing games and word processing.

1.2.2 Office automation: The office automation products using embedded systems are copying machine, fax machine, key telephone, modem, printer, scanner etc.

1.2.3 Industrial automation: Today a lot of industries use embedded systems for process control. These include pharmaceutical, cement, sugar, oil exploration, nuclear energy, electricity generation and transmission. The embedded systems for industrial use are designed to carry out specific tasks such as monitoring the temperature, pressure, humidity, voltage, current etc., and then take appropriate action based on the monitored levels to control

other devices or to send information to a centralized monitoring station. In hazardous industrial environment, where human presence has to be avoided, robots are used, which are programmed to do specific jobs. The robots are now becoming very powerful and carry out many interesting and complicated tasks such as hardware assembly.

1.2.4 Medical electronics: Almost every medical equipment in the hospital is an embedded system. These equipment's include diagnostic aids such as ECG, EEG, blood pressure measuring devices, X-ray scanners; equipment used in blood analysis, radiation, colonoscopy, endoscopy etc. Developments in medical electronics have paved way for more accurate diagnosis of diseases.

1.2.5 Computer networking: Computer networking products such as bridges, routers, Integrated Services Digital Networks (ISDN), Asynchronous Transfer Mode (ATM), X.25 and frame relay switches are embedded systems which implement the necessary data communication protocols. For example, a router interconnects two networks. The two networks may be running different protocol stacks. The router's function is to obtain the data packets from incoming pores, analyze the packets and send them towards the destination after doing necessary protocol conversion. Most networking equipment's, other than the end systems (desktop computers) we use to access the networks, are embedded systems.

1.2.6 Telecommunications: In the field of telecommunications, the embedded systems can be categorized as subscriber terminals and network equipment. The subscriber terminals such as key telephones, ISDN phones, terminal adapters, web cameras are embedded systems. The network equipment includes multiplexers, multiple access systems, Packet Assemblers Dissemblers (PADs), sate11ite modems etc. IP phone, IP gateway, IP gatekeeper etc. are the latest embedded systems that provide very low-cost voice communication over the Internet.

1.2.7 Wireless technologies: Advances in mobile communications are paving way for many interesting applications using embedded systems. The mobile phone is one of the marvels of the last decade of the 20'h century. It is a very powerful embedded system that provides voice communication while we are on the move. The Personal Digital Assistants and the palmtops can now be used to access multimedia services over the Internet. Mobile communication infrastructure such as base station controllers,

mobile switching centers are also powerful embedded systems.

1.2.8 Security: Security of persons and information has always been a major issue. We need to protect our homes and offices; and also, the information we transmit and store. Developing embedded systems for security applications is one of the most lucrative businesses nowadays. Security devices at homes, offices, airports etc. for authentication and verification are embedded systems. Encryption devices are nearly 99 per cent of the processors that are manufactured end up in~ embedded systems. Embedded systems find applications in. every industrial segment- consumer electronics, transportation, avionics, biomedical engineering, manufacturing, process control and industrial automation, data communication, telecommunication, defense, security etc. Used to encrypt the data/voice being transmitted on communication links such as telephone lines. Biometric systems using fingerprint

and face recognition are now being extensively used for user authentication in banking applications as well as for access control in high security buildings.

1.3 Insemination: Testing and measurement are the fundamental requirements in all scientific and engineering activities. The measuring equipment we use in laboratories to measure parameters such as weight, temperature, pressure, humidity, voltage, current etc. are all embedded systems. Test equipment such as oscilloscope, spectrum analyzer, logic analyzer, protocol analyzer, radio communication test set etc. are embedded systems built around powerful processors. Thank to miniaturization, the test and measuring equipment are now becoming portable facilitating easy testing and measurement in the field by field-personnel.

1.4 Finance: Financial dealing through cash and cheques are now slowly paving way for transactions using smart cards and ATM (Automatic Teller Machine, also expanded as Any Time Money) machines. Smart card, of the size of a credit card, has a small micro-controller and memory; and it interacts with the smart card reader! ATM machine and acts as an electronic wallet. Smart card technology has the capability of ushering in a cashless society. Well, the list goes on. It is no exaggeration to say that eyes wherever you go, you can see, or at least feel, the work of an embedded system!

1.5 Overview of Embedded System Architecture

Every embedded system consists of custom-built hardware built around a Central Processing Unit (CPU). This hardware also contains memory chips onto which the software is loaded. The software residing on the memory chip is also called the 'firm ware'. The embedded system architecture can be represented as a layered architecture as shown in Fig.

The operating system runs above the hardware, and the application software runs above the operating system. The same architecture is applicable to any computer including a desktop computer. However, there are significant differences. It is not compulsory to have an operating system in every embedded system. For small appliances such as remote-control units, air conditioners, toys etc., there is no need for an operating system and you can write only the software specific to that application.

For applications involving complex processing, it is advisable to have an operating system. In such a case, you need to integrate the application software with the operating system and then transfer the entire software on to the

memory chip. Once the software is transferred to the memory chip, the software will continue to run for a long time you don't need to reload new software.

Now, let us see the details of the various building blocks of the hardware of an embedded system. As shown in Fig. the building blocks are;

- Central Processing Unit (CPU)
- Memory (Read-only Memory and Random Access Memory)
- Input Devices
- Output devices
- Communication interfaces

• Application-specific circuitry

1.5.1 Central Processing Unit (CPU):

The Central Processing Unit (processor, in short) can be any of the following: microcontroller, microprocessor or Digital Signal Processor (DSP). A micro-controller is a low-cost processor. Its main attraction is that on the chip itself, there will be many other components such as memory, serial communication interface, analog-to digital converter etc. So, for small applications, a micro-controller is the best choice as the number of external components required will be very less. On the other hand, microprocessors are more powerful, but you need to use many external components with them. D5P is used mainly for applications in which signal processing is involved such as audio and video processing.

1.5.2 Memory:

The memory is categorized as Random Access 11emory (RAM) and Read Only Memory (ROM). The contents of the RAM will be erased if power is switched off to the chip, whereas ROM retains the contents even if the power is switched off. So, the firmware is stored in the ROM. When power is switched on, the processor reads the ROM; the program is program is executed.

1.5.3 Input devices:

Unlike the desktops, the input devices to an embedded system have very limited capability. There will be no keyboard or a mouse, and hence interacting with the embedded system is no easy task. Many embedded systems will have a small keypad-you press one key to give

a specific command. A keypad may be used to input only the digits. Many embedded systems used in process control do not have any input device for user interaction; they take inputs from sensors or transducers 1'fnd produce electrical signals that are in turn fed to other systems.

1.5.4 Output devices:

The output devices of the embedded systems also have very limited capability. Some embedded systems will have a few Light Emitting Diodes (LEDs) to indicate the health status of the system modules, or for visual indication of alarms. A small Liquid Crystal Display (LCD) may also be used to display some important parameters.

1.5.5 Communication interfaces:

The embedded systems may need to, interact with other embedded systems at they may have to transmit data to a desktop. To facilitate this, the embedded systems are provided with one or a few communication interfaces such as RS232, RS422, RS485, Universal Serial Bus (USB), IEEE 1394, Ethernet etc.

1.5.6 Application-specific circuitry:

Sensors, transducers, special processing and control circuitry may be required fat an embedded system, depending on its application. This circuitry interacts with the processor to carry out the necessary work. The entire hardware has to be given power supply either through the 230 volts main supply or through a battery. The hardware has to design in such a way that the power consumption is minimized.

2. LITERATURE SURVEY AND RELATED WORK

2.1 LITERATURE REVIEW

A term paper is based on the method of writing proof. This is often a ponder that gives archives on the subject at hand. In order to introduce the Shrewd Adhere for the outwardly disabled utilizing Raspberry Pi, we ought to go through all the enlightening for it. This segment presents the thought about. Brief investigation and ponders were conducted to get it different issues related

to this extent, counting savvy electronic gadgets for the outwardly disabled, investigate, vision, real-time help utilizing Raspberry Pi units and other sensors or modules.

A survey is made among the blind people finding difficulties is detecting obstacles during walking in the street. For through development of the device smart stick for blind using Raspberry pi, we need to go through each and every technical aspect related to it.

It develops a system that helps the blind people to move independently.

Research on the outwardly impeded proceeds and it has been found that it is difficult to see deterrents whereas strolling on the road. Our uncommon ventures are for the dazzle who cannot walk autonomously in new places. The most purpose of our extension is to form a framework that makes a difference outwardly disabled individuals move freely. Shrewd Adhere frameworks for the dazzle more often than not consist of three parts to assist individuals explore more rationally and autonomously, recognizing impediments and threats in their environment, giving data to move cleared out and right, and giving enlightening whereas driving.

The paper "Voice operated outdoor navigation system for visually impaired persons" In this extent, rather than a white bar, they utilize a high-speed ARM processor. Utilize the sound directly to educate the outwardly impeded. Be that as it may, the framework still has restrictions. When the client moves the joystick forward.In case identifies an issue, the yield of the recipient is activated and this altar is taken note by the microprosessor as the yield of the recipient acts as an input to the microprosessor The adhereer performs an individual distinguishing proof of the item and gives criticism to the client by vibrating or setting an arrangement.

3.proposed work

In blind stick early detection and treatment of the leading causes of blindness such as cataract are important in reducing the prevalence of blindness and vision impairment .It is possible to make this peoples life much easy, this is designed to help blind people in their world using the sence of hearing. The people may be injured if the obstacle is big enough or dangerous. Thus, a design as been developed to assist the blind and provide them a clear path. The most common is the electronics Travel aids (ETA),these devices are usually equipped with navigation and obstacle identification technology. Blind stick is an innovative stick designed for visually disabled people for improved navigation

BLOCK DIAGRAM

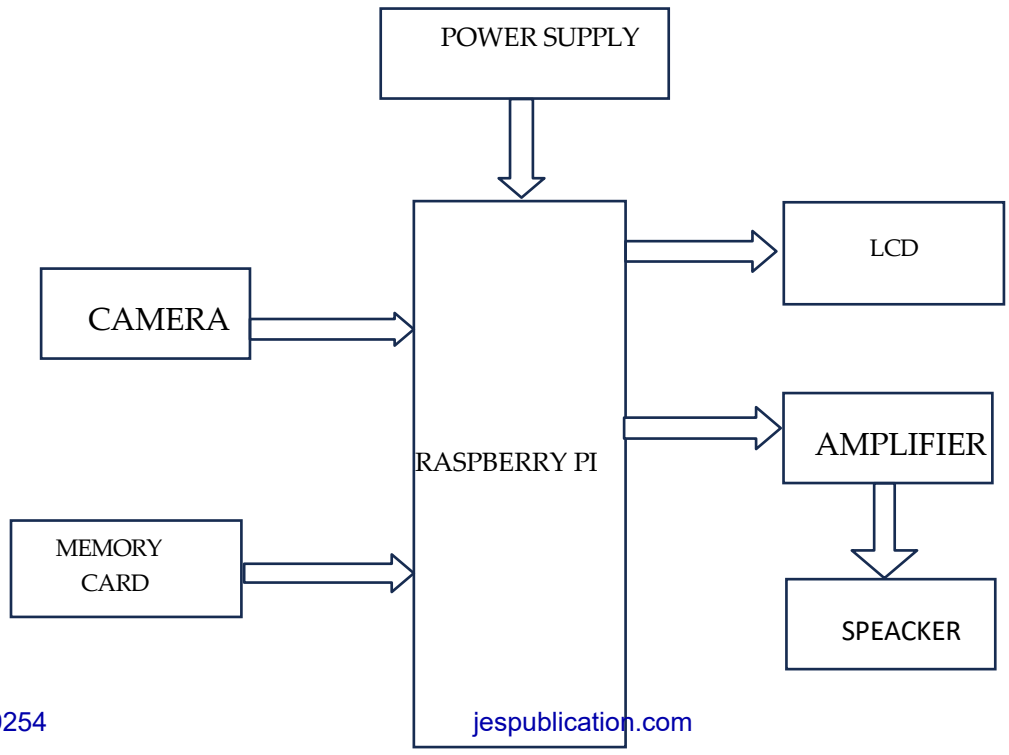

Fig.1 block diagram

Turn on the device using the power button or switch, the device initializes and performs self-tests to ensure all components are functioning correctly. When camera is activated to detect obstacle in the user's path. The camera is also actiated for image recognition. As the user moves, the sensors continuously scan the environment for obstacles. If an obstacle is detected, the device calculates the distance to the obstacle and generates a voice announcement to alert the user. For example, "obstacle detected. Distance:
1.5 to 2 meters ahead". Image identification is the camera captures images of the user's surroundings, and the image recognition system processes these image to identify objects. If a recognizable object is detected, the device announces it to the user. For example, "A chair is on your left." The voice commands user can interact with the device using the commands. They can ask for specific information, such as distance to the nearest obstacle or the identification of the objects in their surroundings.

The feedback and alerts device provides auditory feedback and alerts to guide the user safely through their environment. This may include directional instructions, warnings about upcoming obstacles, and notifications about identified objects. When the user is finished using the device, they can power it off to conserve battery life

4. RESULTS AND DISCUSSION SCREEN SHOTS

Webcam

Fig 2:-Typical low cost web cam

Fig 3:- Higher cost web cam

Webcam software enables users to record a video or stream the video on the Internet. As video streaming over the Internet requires much bandwidth, such streams usually use compressed formats. The maximum resolution of a webcam is also lower than most handheld video cameras, as higher resolutions would be reduced during transmission. The lower resolution enables webcams to be relatively inexpensive compared to most video cameras, but the effect is adequate for video chat sessions.

Hardware Setup

Fig 4: -complete prototype of the proposed model

5. CONCLUSION AND FUTURE SCOPE

5.1 CONCLUSION

This helps the blind person to move around freely and without any fear or guidance. Therefore, this increases their confidence to walk in

nonfamiliar environment. The smart stick act as a basic platform for the coming generation of more aiding devices to help the visually Impaired to be safer. It is effective and afford. The person with blindness to navigate through any place independently. The system also takes the measure to ensure their safety. We build can support the blind community by providing a better and simpler way of life by moving independently. It can be further improved to have more decision taking capabilities by employing varied types of sensors and thus could be used for different applications. The stick gives signal to the other person by buzzer sound or vibration when it detects the obstacles.

5.2 FUTURE SCOPE

Technology created reading machines, talking books, and computers that translate braille. Communications technologies were easier to invent and consequently were brought to market. Technologies available for blind navigation are insufficiently developed, adapted, marketed. GPS can help blind peoples to source and destination route information. GPS can help to find the shortest and best path as accordingly to google being map based map based on real time coordinates. GSM attachment can help in future for any intermediate causality help.

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