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A Modern Technique Enabling Object Parameter Tracking and Monitoring Systems

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ABSTRACT: It is known that the technological advancements are increasing at a faster pace. But the utilization of technologies in various sectors are very low. We know that the blind people find it very difficult to locate an object inside their home. They are always dependent on another human for any kind of help.So in this paper we propose a system which uses image processing technique to detect the object. The object name is indicated using commands by the user.The detected object is indicated using vibration motors.

I. INTRODUCTION

In this paper we are going to discuss about the difficulties faced by the visually impaired and blind people to navigate in the public places and even within the house.So far they have dependent on a another human being or trained dog or different canes for their navigation. The disadvantage of the canes is that it only provides obstacle detection , it does not provide object recognition .The existing system provides obstacle detection and indication system using Voice commands. Also if the people are deaf, this is not at all useful. But the locating of an object is not performed. The system can be used while travelling but not able to operate inside home. So we propose a system where we can locate an object's direction. The direction is indicated using vibration motors. The object name is indicated using commands by the user.

II. PROPOSED SYSTEM

The system here consists of a USB camera for detecting the object using Image segmentation process. When a user gives a command through voice to identify the object with the help of sound card (FOR BLIND PEOPLE). After receiving the command from the user then the soundcard modules gives the data to the microcontroller. Then the controller is automatically triggers the camera to capture the image. And switch (FOR BOTH BLIND, DEAF AND DUMB PEOPLE. Once pressed, then image is captured by the USB camera. Once the object is performed, image processing is performed to know the whereabouts of the object in the image. The vibrators are connected to the driver circuit. The driver circuit operates the motor vibration and a through ear phone the people can hear the voice when its identified the required object. The command to the driver circuit is provided by the raspberry pi.

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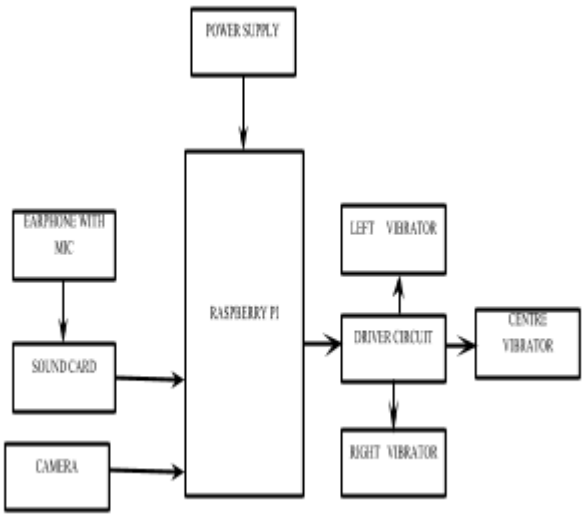


1II.HARDWARE REQUIREMENT

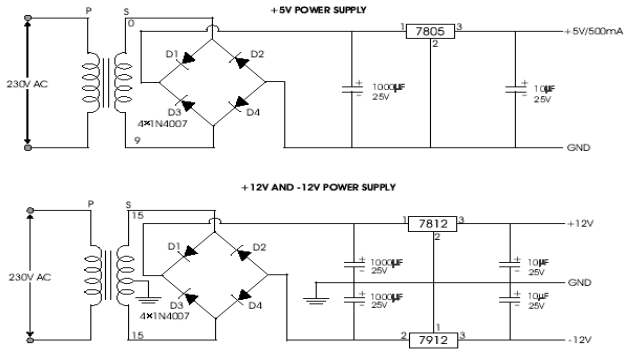
A) Power Supply:

1. Transformer

The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op–amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output..

2. Bridge rectifier

When four diodes are connected as shown in figure, the circuit is called as bridge rectifier. The input to the circuit is applied to the diagonally opposite corners of the network, and the output is taken from the remaining two corners. Let us assume that the transformer is working properly and there is a positive potential, at point A and a negative potential at point B. the positive potential at point A will forward bias D3 and reverse bias D4. The negative potential at point B will forward bias D1 and reverse D2. At this time D3 and D1 are forward biased and will allow current flow to pass through them; D4 and D2 are reverse biased and will block current flow.



The path for current flow is from point B through D1, up through RL, through D3, through the secondary of the transformer back to point B. this path is indicated by the solid arrows. Waveforms (1) and (2) can be observed across D1 and D3.One-half cycle later the polarity across the secondary of the transformer reverse, forward biasing D2 and D4 and reverse biasing D1 and D3.Current flow will now be from point A through D4, up through RL, through D2, through the secondary of T1, and back to point A. This path is indicated by the broken arrows. Waveforms (3) and (4)

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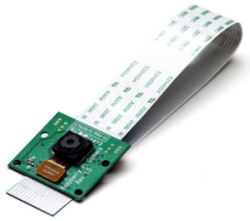
can be observed across D2 and D4. The current flow through RL is always in the same direction. In flowing through RL this current develops a voltage corresponding to that shown waveform (5). Since current flows through the load (RL) during both half cycles of the applied voltage, this bridge rectifier is a full-wave rectifier.One advantage of a bridge rectifier over a conventional full-wave rectifier is that with a given transformer the bridge rectifier produces a voltage output that is nearly twice that of the conventional full-wave circuit.

3. IC Voltage regulators

Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustable set voltage. The regulators can be selected for operation with load currents from hundreds of milli amperes to tens of amperes, corresponding to power ratings from milli watts to tens of watts.A fixed three-terminal voltage regulator has an unregulated dc input voltage, Vi, applied to one input terminal, a regulated dc output voltage, Vo, from a second terminal, with the third terminal connected to ground. The series 78 regulators provide fixed positive regulated voltages from 5 to 24 volts. Similarly, the series 79 regulators provide fixed negative regulated voltages from 5 to 24 volts.



Raspberry pi camera

B) RASPBERRY PI CAMERA

Raspberry Pi Camera Module Mount – Acrylic is an adjustable mount setup for the Raspberry Pi camera. These are cut out of acrylic sheet. Raspberry Pi Camera Module Mount is a great accessory for Pi shutterbugs. The Pi camera can be attached using little screws; also the design allows multiple positions. Ultimately it gives you amount which aids to fix the camera in the desired position as well as provides protection for the camera board. The Raspberry Pi camera module can be used to take high-definition video, as well as stills photographs. It's easy to use for beginners, but has plenty to offer advanced users if you're looking to expand your knowledge.

C) WEB CAMERA

Active WebCam captures images up to 30 frames per second from any video device including USB cameras, Analog cameras connected to capture card, TV-boards, camcorders with FireWire (IEEE 1394) interface and from Network cameras.When the program detects motion in the monitored area, it can sound an alarm, e-mail you the captured images, and start broadcasting or record a video. The program has features to add text captions and image logos to theimages, to place a date/time stamp on each video frame, and to adjust the frame rate, picture size, and quality.

D) VIBRATION MOTOR

Vibration motor is a compact size coreless DC motor used to informs the users of receiving the signal by vibrating, no sound. vibratory motor is perfect for non-audible indicators. Use in any number of applications to indicate to the wearer when a status has changed. All moving parts are protected within the housing. With a 2- 3.6V operating range, these units shake crazily at 3V. Once anchored to a PCB or within a pocket, the unit vibrates softly but noticeably. This high quality unit comes with a 3M adhesive backing and reinforced connection wires. There are two basic types of vibration motor. An eccentric rotating mass vibration motor (ERM) uses a small unbalanced mass on a DC motor, when it rotates it creates a force that translates to vibrations. A linear resonant actuator (LRA) contains a small internal mass attached to a spring, which creates a force when driven.

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E) DRIVER CIRCUIT:

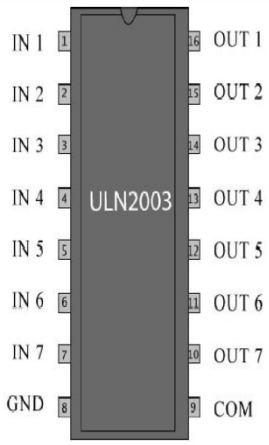
The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays. It consists of seven NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diode for switching inductive loads. The collector-current rating of a single Darlington pair is 500mA. The darlington pairs may be paralleled for higher current capability. Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED gas discharge), line drivers, and logic buffers.

The ULN2003 has a 2.7kW series base resistor for each Darlington pair for operation directly with TTL or 5V CMOS devices

PIN DESCRIPTION:

Pin Description:

Pin No	Function	Name
1	Input for 1st channel	Input 1
2	Input for 2nd channel	Input 2
3	Input for 3rd channel	Input 3
4	Input for 4th channel	Input 4
5	Input for 5th channel	Input 5
6	Input for 6th channel	Input 6
7	Input for 7th channel	Input 7
8	Ground (0V)	Ground
9	Common free wheeling diodes	Common
10	Output for 7th channel	Output 7
11	Output for 6th channel	Output 6
12	Output for 5th channel	Output 5
13	Output for 4th channel	Output 4
14	Output for 3rd channel	Output 3
15	Output for 2nd channel	Output 2
16	Output for 1st channel	Output 1



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The ULN2003 series input resistors selected for operation directly with 5 V TTL or CMOS. These devices will handle numerous interface needs particularly those beyond the capabilities of standard logic buffers. The ULN2003 have series input resistors for operation directly from 6V to 15V CMOS or PMOS logic outputs. The ULN2003 is the standard Darlington arrays.The outputs are capable of sinking 500mA and will withstand at least 50 V in the OFF state. Outputs may be paralleled for higher load current capability. The ULx2823A/LW and ULx2824A/LW will withstand 95 V in the OFF state.These Darlington arrays are furnished in 18-pin dual in-line plastic packages (suffix ‘A’) or 18-lead small-outline plastic packages (suffix ‘LW’). All devices are pinned with outputs opposite inputs to facilitate ease of circuit board layout. Prefix ‘ULN’ devices are rated for operation over the temperature range of -20’C to +85’C; prefix ‘ULQ’ devices are rated for operation to -40’C.

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F) SOUND SENSOR

The Sound sensor is a small board that combines a microphone and some processing circuitry. It provides not only an audio output, but also a binary indication of the presence of sound, and an analog representation of its amplitude. It detects sound from silence and outputs digital trigger signal. The digital signal can have an adjustable trigger level. LEDs indicate power and output signal. The sound sensor is able to measure noise levels in decibels (dB) at frequencies around 3-6 kHz where the human ear is most sensitive. It is a sensor whose mode of detection utilizes sound waves. It extracts a sound signal from a modulated signal, such as that of an FM transmission. The threshold-sensitivity can be adjusted on the sensor. It is highly sensitive and easy to use.

G) VOICE RECOGNITION BOARD

The voice recognition board is a completely assembled and easy to use programmable speech recognition circuit. The commands that you need can be programmed to recognize. It has 8 bit data out which can be interfaced with 16- bit PIC microcontroller. The audio input from the microphone can be given through the audio jack assembled in this board. The input command with their corresponding characters can be displayed in LCD. Speech samples are acquired by a Microphone on board. This board analyzes the analog signal received compares with the data stored in external RAM and finally outputs a corresponding 8 bit Data. This 8 bit data can be directly connected to a port of microcontroller for further action. The board requires 5v DC supply. A 12v adapter can be used as a power source, as the board has inbuilt 5v regulator with heat sink. This board requires initial configuration or training of words. During training process user trains the IC by speaking words into the microphone and assigning a particular value for that word.

IV. SOFTWARE REQUIRED

A) PYTHON

Python is a popular programming language. It was created in 1991 by Guido van Rossum.Python was designed to for readability, and has some similarities to the English language with influence from mathematics.Python uses new lines to complete a command, as opposed to other programming languages which often use semicolons or parentheses.Python relies on indentation, using whitespace, to define scope; such as the scope of loops, functions and classes. Other programming languages often use curly-brackets for this purpose.

B) RASPBIAN OS

This article is aimed at people who are new to the world of Raspberry Pi [Like me]. It gives an idea about what Raspberry Pi and Raspbian are and what are the uses of those. It also gives a simple guide to setup your first Pi and its OS, play around with a hello world program and set you on your path to build an army of Robots which will take over the world someday.Below are the ports on the Raspberry Pi board and some of their uses. The ports may also be used for other purposes than listed below.

USB	Mainly used for peripherals like Keyboard, mouse and a Wifi Adapter. A powered USB hub can be connected and be expanded
HDMI	This is the High Definition Multimedia Interface [HDMI] and is use to connect to a Display unit like TV or Monitor or sometimes a projector
Stereo Audio	Audio connections using a 3.5 mm jack
SD Card	SD card is used as a boot device and also persistent storage. More storage can be attached to the USB
Micro USB	The micro usb port is used for supplying power to the unit

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CSI Connector	CSI [Camera serial Interface] is used for connecting a camera to the unit
Ethernet	Used for connecting to a network using a network cable
DSI Connector	DSI [Digital serial Interface] is used for connecting a LCD to the unit

Setting Up Raspbian OS:
Let's first connect the board with all the necessary accessories to install and run an operating system.
Step 1: Take the Pi out of its anti static cover and place it on the non-metal table.
Step 2: Connect the display – Connect the HDMI cable to the HDMI port on the Pi and the other end of the HDMI cable to the HDMI port of the TV.
Step 3: Connect your Ethernet cable from the Router to the Ethernet port on the Pi
Step 4: Connect your USB mouse to one of the USB ports on the Pi
Step 5: Connect your USB Keyboard to the other USB port on the Pi
Step 6: Connect the micro USB charger to the Pi but don't connect it to the power supply yet
Step 7: Flash the SD Card with the Raspbian OS.

V.CONCLUSION

It is a simple electronic guidance system which is easy to handle for visually impaired and blind people.The user does not need any special previous training for using this system.The results show that it is very efficient for blind people to navigate on their own in the environment.The future enhancement in this system must focus on efficiency ,reducing the size and load of the system

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