

## Portable Camera-based Product Label Reading and Voice Based Home Automation Using Raspberry Pi

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### **Abstract:**

The project aims at designing a system for blind persons to recognize the hand held objects or products. In this project, we design and develop a system to find products or objects with voice announcements and also device switching using voice announcements. The portable system which captures the image of the object placed in front of the camera the presence of object was detected. These details were verified using Raspberry Pi processor for authentication. The Raspberry Pi processor system alerts the blind person through voice messages.

### **Keywords:**

Raspberry pi, USB camera, relay, Mic, Ear phone.

### **1. Introduction:**

Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. This project makes use of an onboard computer, which is commonly termed as Raspberry Pi processor. It acts as heart of the project. This onboard computer can efficiently communicate with the output and input modules which are being used. The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage.

The device which is able to perform the task is a Raspberry Pi processor. When any object is placed in front of the USB camera passes by the system, the image of the object is captured using camera. The image of the object details are fed as input to the Raspberry Pi processor. The Processor takes responsibility to check the object name details and announces for the blind person. To perform this task, Raspberry Pi processor is programmed using embedded 'Linux'.

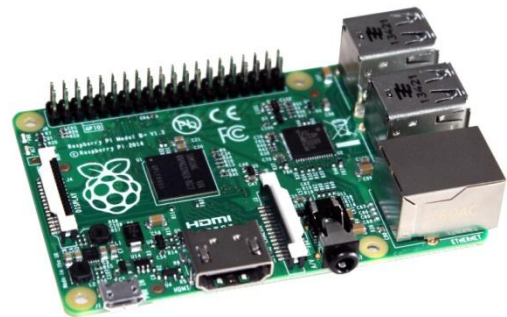
### **2. LITERATURE SURVEY:**

In [1] discusses an intelligent system. Physically invisible people experience difficulty and inconvenience using computers through a keyboard and mouse. The purpose of this system is to provide a way the blind people population can easily control many functions of a computer via speech. When blind people speak, the audio voice input is sent to the speech Browser .solenoid plated are very useful to convert this web search into braille. Many applications running on this purpose but not all the applications able to fulfil over it and this system has better aspects in future for normal people as well as blind people. This application is firstly embedded on raspberry pi and Qt creator is the software which is being useful to interface this GUI with the hardware connected to Pi. [2] Presents a Navigation System for blind people to navigate safely and quickly, in the system obstacle detection and recognition is done through ultrasonic sensors and USB camera. The proposed system detects the obstacles up to 300 cm via ultrasonic sensors and sends feedback in the form of beep sound via earphone to inform the person about the obstacle.

USB webcam is connected with Raspberry Pi Embedded board which captures the image of the obstacle, which is used for finding the properties of the obstacle (Human Being). Human presence is identified with the help of human face detection algorithm written in Open CV. The constraints coming while running the algorithm on Embedded System are limited memory and processing time and speed to achieve the real time image processing requirements. The algorithm is implemented in Open CV, which runs on Debian based Linux environment

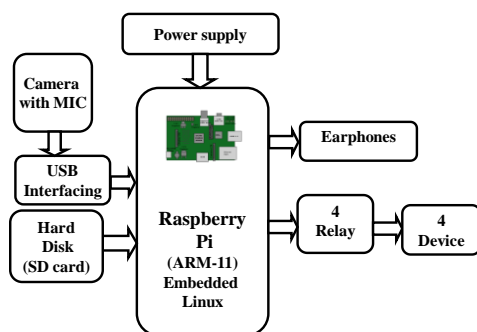
The brief introduction of different modules used in this project is discussed below:

### Raspberry pi processor (ARM-11):



### 3. IMPLEMENTATION:

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From the above figure, we can see that the device which is able to perform the task is a Raspberry Pi processor. Here camera and mic are interfaced as the inputs to the raspberry pi and device switching is done through the voice with the help of relays and the portable system which captures the image of the object placed in front of the camera the presence of object was detected. These details were verified using Raspberry Pi processor for authentication. The Raspberry Pi processor system alerts the blind person through voice messages.

### 4. RELATED WORK:

This system consists of ARM-11 micro processor which is the main controlling part of the system. The camera will capture the images which are placed in front of the camera and it fed to the raspberry pi and also device switching using voice announcements.

The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor (The firmware includes a number of "Turbo" modes so that the user can attempt over clocking, up to 1 GHz, without affecting the warranty), VideoCore IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage

### Web Camera:



A webcam is a video camera that feeds its image in real time to a computer or computer network. Unlike an IP camera (which uses a direct connection using ethernet or Wi-Fi), a webcam is generally connected by a USB cable, FireWire cable, or similar cable. Their most popular use is the establishment of video links, permitting computers to act as videophones or videoconference stations.

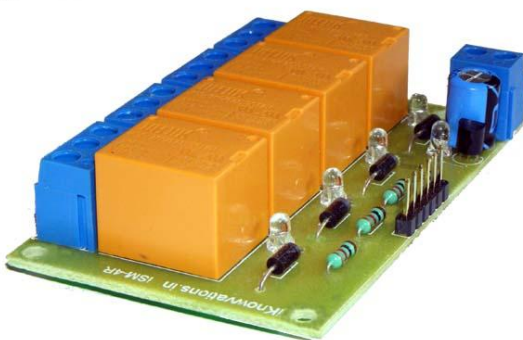
The common use as a video camera for the World Wide Web gave the webcam its name. Other popular uses include security surveillance, computer vision, video broadcasting, and for recording social videos.

**MIC:**



Microphones are used in many applications such as telephones, hearing aids, public address systems for concert halls and public events, motion picture production, live and recorded audio engineering, two-way radios, megaphones, radio and television broadcasting, and in computers for recording voice, speech recognition, VoIP, and for non-acoustic purposes such as ultrasonic checking or knock sensors. Most microphones today use electromagnetic induction (dynamic microphones), capacitance change (condenser microphones) or piezoelectricity (piezoelectric microphones) to produce an electrical signal from air pressure variations. Microphones typically need to be connected to a preamplifier before the signal can be recorded or reproduced.

**Relay:**



**Fig: Picture of 4 relay**

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism, but other operating principles are also used. Relays find applications where it is necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming in from one circuit and re-transmitting it to another. Relays found extensive use in telephone exchanges and early computers to perform logical operations. A type of relay that can handle the high power required to directly drive an electric motor is called a contractor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device triggered by light to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protection relays".

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