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Hand Gesture Recognition and Voice Conversion System using IoT

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Abstract - *In our country around 2.8% of people dumb (who are not able to speak). They can communicate only through their hand gestures and expressions. Here we proposed a new technique which has a speaker(artificial mouth) for dumb people which acts as a mediator to convey the messages to others. Some peoples can easily understand their motions or gestures but most of us cannot able to understand their way of conveying the message. In order to overcome this situation the artificial mouth is introduced for the dumb peoples. This system is based on Image Processing Technique. According to dumb people, for every motion they have a meaning. So that each action is related or assigned to a hand gesture and kept in a data base. In the real time the database is fed into a microcontroller and the camera is fixed in front of them. For every action the motion sensors get accelerated and give the signal to the microcontroller. Once the motion senses the motion microcontroller matches the gesture with the database and produces the speech signal. The output of the system is using the speaker. The system also includes the concept of IoT so that they can communicate withothersanytimeanywhere(i.e) the messages are sent to a friend or someone through mail, and also the user in remote location (friend or someone) can also send a message to the user using a webpage(IoT). With the use of Hand gesture they can control the home appliances (like light, fan, … etc)*

Key Words: Hand gesture, IoT, Raspberry pi, Image processing

1. INTRODUCTION

About nine billion people at intervals the planet unit of measurement are dumb. The communication between a dumb and hearing person poses to be an important disadvantage compared to communication between blind and ancient visual people.

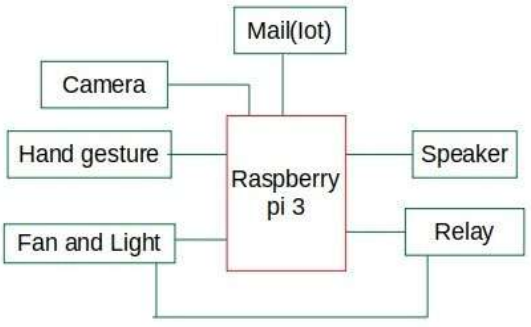
A dumb Communication interpreter is a tool that interprets hand gesture to speech Gesture recognition is classed into pair of main categories vision based and detector based. The primary aim of this project is to introduce an issue that will efficiently translate language gestures to text and voice. The system consists of a house network (sensors and appliance actuators and camera to respect controller; raspberry pi microcontroller that communicates with a relay which is the user interface is used.

2. SOFTWARE AND COMPONENTS USED:

- Raspberry pi,
- Camera,
- Fan & Light ,
- Relay,
- Raspbian OS & Python IDE.

3. BLOCK DIAGRAM:

Fig -1: Block diagram of Hand Gesture



Recognition and voice conversion for dumb people.

4. SPECIFICATION OF COMPONENTS:

a)RASPBERRY PI 3:

Fig2: Raspberry pi 3

The Raspberry Pi 3 Model B features a quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz. This puts the Pi 3 roughly 50% faster than the Pi 2. Compared to the Pi 2, the RAM remains the same – 1GB of LPDDR2-900 SDRAM, and the graphics capabilities, provided by the VideoCore IV GPU, are the same as they ever were. As the leaked FCC docs will tell you, the Pi 3 now includes on-board 802.11n WiFi and Bluetooth 4.0. WiFi, wireless keyboards, and wireless mice now work out of the box.

It doesn't have SATA or USB C or a PCIe connector. The goal of the Raspberry Pi foundation has always been to produce an inexpensive computer for everyone, and adding these ports would only drive up the price. Instead of pleasing the power users, the Pi Foundation has done their best to please anyone. Like the Raspberry Pi 2 from late last year, the Raspberry Pi 3 features a new CPU, a Broadcom BCM2837 quad-core 64-bit ARM Cortex A53 running at 1.2 GHz.

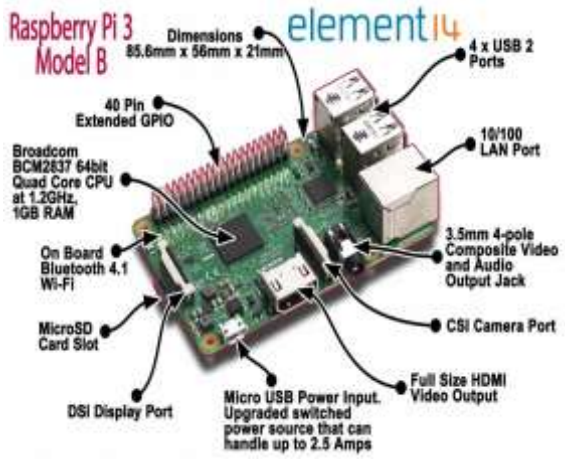


Fig3: Raspberry pi 3 blocks

The Raspberry Pi was always intended to run a variety of operating systems. From the stock Debian distribution to much more esoteric options, ranging from Windows 10 IOT to Plan 9. The usefulness of some of these operating systems is questionable, but it's not like more choice of OSes is bad. Two operating systems that don't get enough love on the Raspberry Pi are also two of the most common operating systems for ARM systems: Android and Chrome OS.

There are projects to bring these operating systems to the Pi 2, but they're not very mature and certainly not ready for mainstream use. The Pi 3 will change this. It's faster, but the update to the flagship Pi comes just a few weeks after the release of an experimental OpenGL driver. Graphics, by far, have been the one item holding back a proper Android system for the Pi, and Chrome OS will come to the Pi 3 in short order.

b) CAMERA

The images are actually stored as a several pixel, for every pixel in the sensor, the brightness data, represented by a number from 0 to 4095 for a 12-bit A/D converter, along with the coordinates of the location of the pixel, are stored in a file. Although the camera can record 12 bits or 4096 steps of brightness information, almost all output devices can only display 8 bits or 256 steps per color channel.

Fig4: Camera

The original 12-bit (2^{12} = 4096) input data must be converted to 8-bits (2^{8} = 256) for output. The indicated pixel has a brightness level of 252 in the red channel, 231 in the green channel, and 217 in the blue channel. Each color's brightness can range from 0 to 255, for 256 total steps in each color channel when it is displayed on a computer monitor, or output to a desktop printer. Zero indicates pure black, and 255 indicate pure white. 256 colors each of red, green and blue may not seem like a lot, but

actually it is a huge number because 256 x 256 x 256 = more then 16 million individual colors.

c) RELAY

Fig5: Relay

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits, the link is magnetic and mechanical.

5. WORKING:

Here we are using Raspberry pi 3.Many Hand Gestures are uploaded into Raspberry pi (data set).With the use of camera the gestures are monitored and sent to processor, then the processor checks it with the uploaded data set and sends the corresponding message to the speaker and a message through Mail (IoT).

Also with the use of Hand Gesture home appliances can be controlled (example: fan and light….).A web page or web link is shared to the user through which the user can send the message to the system which it converts into a audio and provides output at the speaker.

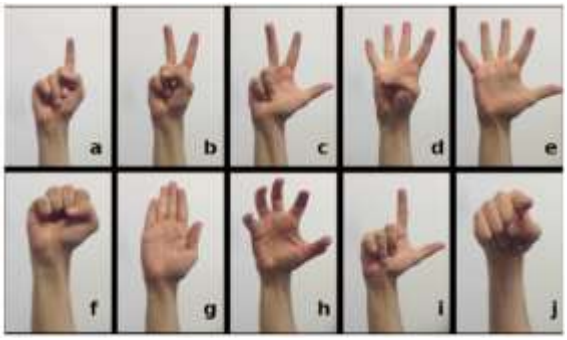


Fig6a: Examples of Hand Gestures

Fig6b: Examples of Hand Gestures

6. CONCLUSION:

This system helps the dumb people to communicate with others by converting the gestures into audio output and into a message through mail (Iot). It can also be controlled by using Infrared sensor in the mobile phones.

This system also helps people to control the home appliances with the use of hand gestures. It can also suitable for the patients by observing their condition and give the appropriate output. In future the gestures can be made as user friendly and added or modified by any other person.

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