

INTELLIGENT HOME MONITORING USING IOT FOR PHYSICALLY CHALLENGED

M. Karthik Narayanan¹, D. Nivetha², V. Mahalakshmi³, Ms. K. Arthi⁴

^{1,2,3}Student, Department of ECE, Valliammai Engineering College, Tamilnadu, India.

⁴Asst. Professor, Department of ECE, Valliammai Engineering College, Tamilnadu, India.

ABSTRACT:- In the advancement of technologies controlling and monitoring electrical appliances using laptop, computer with the help of internet connection is possible. So it gives a more space at a home, university and industrial controlling electrical appliances anywhere in the world. By using Internet of Things and voice control technology we can control many devices such as light, power plug, Fan, computer, security system and etc. It reduces human efforts and power efficiency. The main objective of internet of things and voice control technology is used to help specially challenged people and old age people to control electrical appliances and security purpose. IOT & VCT is very useful for these people in crucial situations. There are two ways to access these process WIFI connectivity (or) it is connected to a router. This process is done in low cost & controlling many devices in a simple circuit. A smart home needs to be human-centric, where it tries to fulfil human needs. Low cost sensors and wireless networking is enabling novel ways in which homeowners can interact with their smart homes. It Provides simplicity, security, and to save electricity and time. The system should have both equipment and programming set up. It can be achieved through sensors and raspberry pi as processing unit.

Keywords:- VCT, Physically Challenged, Wi-Fi Connectivity, Raspberry pi, IoT.

1. INTRODUCTION

The Internet of Things (IOT & VCT) and voice control technology(VCT) is the network of physical objects devices, vehicles, buildings and other items embedded with electronics software sensors, and network connectivity that enables these objects to collect and exchange data. The IOT & VCT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit; when IOT & VCT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart environment grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Experts estimate that the IOT & VCT will consist of almost 50 billion objects by 2020 IOT & VCT devices can be used to monitor and control the

mechanical, electrical and electronic systems used in various types of buildings in home automation.

2. PROPOSED SYSTEM

The various layers in IOT & VCT architecture of the designed system including the various technologies used in the prototype. The system consists of a computer server with a internet connection, a modem connecting the server to the external network, a Arduino microcontroller with a hardwired application connected to the devices. The prototype system supports two-level devices that only need to be switched on or off. Proposes an intelligent home system based on Internet of things technology. The proposed system is more cost effective, easy and simple. Raspberry pi 3 is the main component of this system along with sensors listed below:

- Voice control technology – Bluetooth module.
- Motion detection – PIR sensor.
- Gas leakage detection – MQ2 sensor.

2.1 PROJECT FEATURES

1. Low cost.
2. High speed networking.
3. Low power consumption.
4. Light weight network.
5. secured system.

BLOCK DIAGRAM

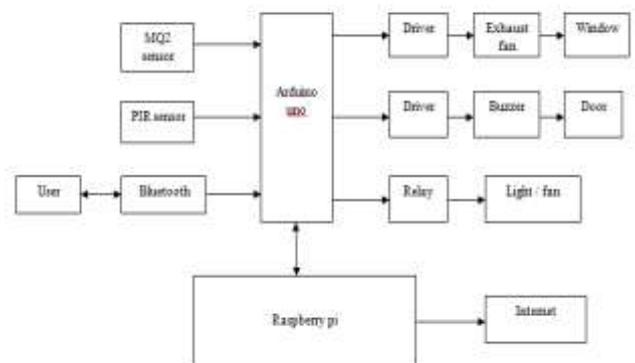


Fig.1. Block diagram

FLOW CHART

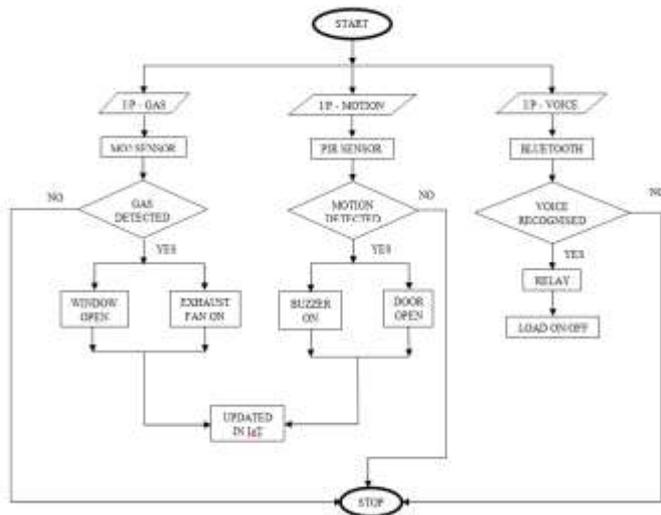


Fig.2.Flow chart

3. HARDWARE DESCRIPTION

3.1 RASPBERRY PI

RASPBERRY PI platform is most used after ADUINO. Although overall applications of PI are less it is most preferred when developing advanced applications. Also the RASPBERRY PI is an open source platform where one can get a lot of related information so you can customize the system depending on the need.

Technical features of raspberry pi:

1. The dimensions of raspberry pi are: 85.6mm x 56mm.
2. It has Camera Serial Interface (CSI) and Display Serial Interface (DSI) ports.
3. It has a Micro USB power port giving a power supply of 2 Amperes.
4. It has a GPIO header having about 40 pins.
5. Audio/Video Jack, HDMI.
6. It has 4 USB 2.0 ports & 10/100 Mbps Ethernet ports.
7. A slot for Micro SD card – 512MB RAM.
8. Video Core Four GPU supports up to a resolution of 1920 x 1200.



Fig.3.Raspberry Pi B+ board

3.2 ARDUINO MICROCONTROLLER

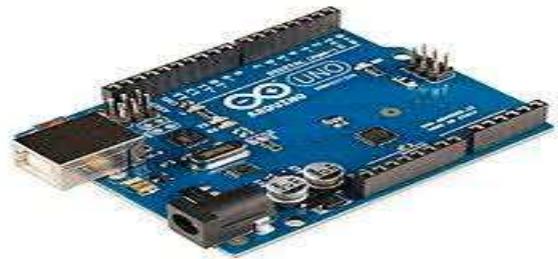


Fig.4. Arduino Uno board

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. Here it is used to connect the sensors and to interface with Raspberry Pi board.

3.3 VOICE CONTROL TECHNOLOGY

All actions are controlled through voice commands that are sent from a mobile application developed for Android operating system. It can record and in time switch or after a certain period to turn off the device or open the device.

BLUETOOTH MODULE

HC-05 Default Settings

1. Default Bluetooth Name: "HC-05"
2. Default Password: 1234 or 0000
3. Default Communication: Slave
4. Default Mode: Data Mode
5. Data Mode Baud Rate: 9600, 8, N, 1
6. Command Mode Baud Rate: 38400, 8, N, 1
7. Default firmware: LINVOR

HC-05 FC-114



Fig.5. HC-05 FC-114

HC-05 Technical Specifications

1. Serial Bluetooth module for Arduino and other microcontrollers
2. Operating Voltage: 4V to 6V (Typically +5V)
3. Operating Current: 30mA
4. Range: <100m
5. Works with Serial communication (USART) and TTL compatible
6. Follows IEEE 802.15.1 standardized protocol
7. Uses Frequency-Hopping Spread spectrum (FHSS)
8. Can operate in Master, Slave or Master/Slave mode
9. Can be easily interfaced with Laptop or Mobile phones with Bluetooth
10. Supported baud rate:
9600,19200,38400,57600,115200,230400,460800.

3.4 MOTION RECOGNITION MODULE

PIR motion sensor is used to detect the motion, especially the motion of any human being, whenever he or she comes in the range of the sensor. These sensors consume very less power and are available at very low price. They are small and very easy to use. They are most commonly used in the appliances and various gadgets used in home different or at business places. They are known with names like PIR, Pyroelectric, Passive infrared or IR motion sensors. Pyroelectric sensors are the sensors which are used to detect different levels of infrared radiation.



Fig.6. PIR sensor

The sensor in the motion is actually split into two halves. This is because we have to detect the change in the infrared radiation level in a particular area in which the sensor is deployed and not the normal infrared radiation. The two halves are then wired up such that if one half sees increase or decrease in the level of the radiation than the other half, then the output will swing up or down.

It outputs a digital signal of 5V whenever it detects a person in its range. Code is written in python which will print "No intruders 0" when there is no person in its range and it will print "Intruder detected 1" when the person comes in range of the sensor.

3.5 GAS LEAKAGE DETECTION MODULE



Fig.7. MQ2 sensor

MQ2 gas sensor can be used to detect the presence of LPG, Propane and Hydrogen, also could be used to detect Methane and other combustible steam, it is with low cost and suitable for different application. Sensor is sensitive to flammable gas and smoke. Smoke sensor is given 5 volt to power it. A potentiometer is provided to adjust the sensitivity. When smoke exist, an analog output is produced based on the concentration of smoke. The circuit has a heater. Power is given to heater by VCC and GND from power supply. The circuit has a variable resistor. The resistance across the pin depends on the smoke in air in the sensor. The resistance will be lowered if the content is more. And voltage is increased between the sensor and load resistor.

H - Pin

- Out of the two H pins, one pin is connected to supply and the other to ground

A - Pin

- The A pins and B pins are interchangeable. These pins will be tied to the Supply voltage.

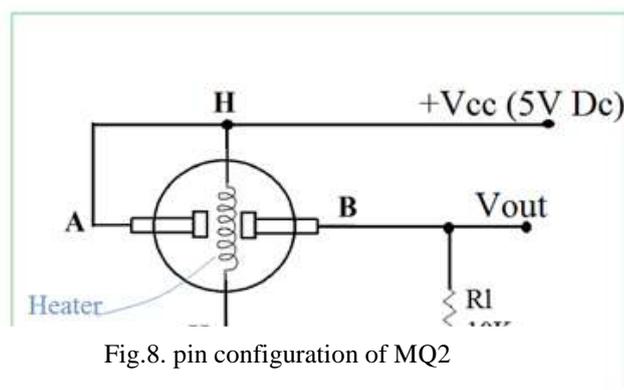


Fig.8. pin configuration of MQ2

Fig.8. pin configuration of MQ2

B-Pin

- The A pins and B pins are interchangeable. One pin will act as output while the other will be pulled to ground.

3.6 RELAY

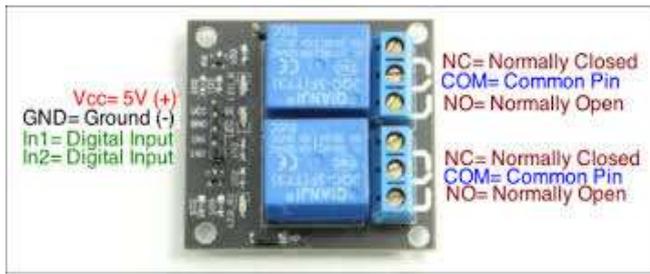


Fig.9. 2channel relay

The relays can be used to switch higher voltage and current loads than a microcontroller can traditionally accomplish. This module contains two relays that are electrically isolated from the controlling input.

The relay has two outputs.

Features:

- Powered from 5V.
- 2 channels.
- Can be used as normally open(NO) or normally closed(NC).
 - 1) When the IN1 or IN2 pin is connected to ground, NO will be open and NC will be closed.
 - 2) When IN1 or IN2 is not connected to ground the opposite occurs.
- Optically isolated inputs.

3.7 DRIVER

A Driver is an electrical circuit or other electronic component used to control another circuit or component, such as a high-power transistor, liquid crystal display(LCD), and numerous others. They are usually used to regulate current flowing through a circuit or to control other factors such as other components, some devices in the circuit.



Fig.10. motor driver l293d

3.8 SERVO MOTOR

A servo motor is a rotary actuator or linear actuator that allows a precise angular control on angular or linear position or velocity or acceleration. It consists of a suitable motor coupled to the sensor for position feedback.



Fig.11. servo motor

3.9 VOLTAGE REGULATOR

IC 7805 is a 5V voltage regulator that restricts the output voltage to 5V output for various ranges of input voltage. It can provide a constant steady voltage flow of 5V for higher voltage input till the threshold limit of 35V.

4. SOFTWARE DESCRIPTION

4.1 RASPIAN OPERATING SYSTEM

The most suitable operating system which can be used with Raspberry Pi is the Raspian operating system. This is because it is a Linux based operating system, which is specially designed for the raspberry Pi. Raspian is an officially supported operating system by the Raspberry Pi foundation. Raspian can be downloaded from the official website of Raspberry Pi directly or by using NOOBS, which is an easy installer for Raspian. Debian with Raspberry pi Desktop is the Foundations operating system for PC and Mac.

Raspian can be installed on it in two ways:

1. Installing Raspian using NOOBS: NOOBS installer is especially developed for those who have never used a Linux based operating system before. NOOBS stands for New Out Of Box Software. Before installing NOOBS make sure you have formatted the SD card. Also, either your computer should have a built-in SD card reader or you have to use an external USB card reader. If you are using windows or MAC system, download the SD Formatter 4.0 for formatting the SD card. Download NOOBS from the official site of raspberry pi and extract the zip file into the SD card. Then remove the SD card and insert it inside the Raspberry Pi.

2. Directly installing the Raspian image: You can also install the Raspian operating system without using NOOBS. It is a much faster process. You just have to download the zip file of 'Raspian Stretch with Desktop' from the official website of Raspberry Pi. Alongside you also have to download a tool which copies the images into the SD card, like WinDiskManager. Download WinDiskManager and run it. Select the Raspian image which you unzipped in your computer or laptop. Select the SD card and then just write the image to it. Remove the SD card and insert it in the Raspberry Pi.

There are many other operating systems for Raspberry Pi like UBUNTU MATE, SANPPY UBUNTU CORE, WINDOWS 10IOT CORE and many other Linux based operating systems. These all software provides a platform for working and coding in python as the main programming language. These also support C, C++, JAVA, BASIC, Perl and Ruby.

SETTING UP THE RASPBERRY PI

1. Download the NOOBS operating system from official website of raspberry pi.
2. Before using the micro sd card, format it.
3. Write the image into the Micro SD card using WinDiskManager.
4. Insert the card into the slot made for Micro SD card for Raspberry Pi.
5. Connect the system with board using USB cable.
6. Booting process will start.
7. Command line interface will appear, enter the user name and password.
8. After entering the user name and password successfully, the board will be functioning & ready to be used.

4.2 ARDUINO IDE

Arduino IDE is an open source software that is mainly used for writing and compiling the code into the Arduino Module. The Arduino integrated development environment is a cross-platform application that is written in the programming language C,C++. It is used to write and upload programs to Arduino board.

UPLOAD TO AN ARDUINO

1. Connect your **Arduino** using the USB cable. The square end of the USB cable connects to your **Arduino** and the flat end connects to a USB port on your computer.
2. Choose Tools→Board→**Arduino Uno** to find your board in the **Arduino** menu.
3. Choose the correct serial port for your board.
4. Click the Upload button.

PROTEUS

The Proteus is electronic circuit design software which includes a schematic capture, simulation and PCB (Printed Circuit Board) Layout modules. The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. Proteus is simulation base software. By using this software Arduino can be simulate. We are going to simulate Arduino in Proteus.

1. Arduino IDE.
2. Proteus setup.
3. Proteus simulation.

SYSTEM OPERATION



5. CONCLUSIONS

In this paper, we have successfully proposed an advanced IOT based home automation system. It can be easily implemented and Making physically challenged people's life more comfortable. It providing an effective intelligent platform for people's home life and it could reduce the man power. This will be remotely accessible through portable devices like android phones. Based on the advantages of low cost, low power consumption and flexibility the system will have a certain development prospect.

In the future we will further improve the system structure. It is also possible to adapt other types of sensors in order to have a greater reach within the objectives of the proposed system. Several future applications like control of home air conditioning, on/off control of microwave oven etc.,

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