**Journal of Advanced Research in Technology and Management Sciences**
**Volume: 01 Issue: 03 ISSN: 2582-3078 November 2019**
**Available online at: http://www.jartms.org**

# Providing Security for Home Appliances by IoT

Mrs.S.Venkata lakshmi[1], C.Govardhan[2]
Assistant professor,
CSE Department,
KMM Instituteof Technology and Science,
Mail: sibbalalakshmi@gmail.com,gvardhanc@gmail.com
Contacts: 9398876311, 7989920984

**Abstract:**

With increasing rate of crime, protecting our loved ones and our belongings has become important. Such situations can be solved by exploiting the latest functionalities that current ability makes it easier to automate the process of security. Automation of security can be achieved by designing an application on Roseberry Pi through various sensors such IR and Gas sensors for detection of any intruder and harmful gases in the house, upon detection an SMS will be sent to the owner of the house through GSM. The loads like lights and fan will be ON.

The home automation system differs from other system by allowing the user to operate the system from anywhere around the world through internet connection. In this paper we present a Home Automation system(HAS) using Raspberry PI that employs the integration of cloud networking, wireless communication, security etc., to provide the user with remote control of various lights, fans, and appliances within their home and storing the data in the cloud. The system will automatically change on the basis of sensors' data. This system is designed to be low cost and expandable allowing a variety of devices to be controlled .It connects all the devices through GPIO pins and is known as the heart of the entire system.

***Key words:*** *Sensors, Rospberry Pi, Switch, IR, GPIO, GSM.*

## INTRODUCTION:

### A.Overview:

Homes of the 21st century will become more and more self controlled and automated due to the comfort it provides, especially when employed in a private home. A home automation system is a means that allow users to control electric appliances of varying kind.

Many existing, well-established home automation systems are based on wired communication. This does not pose a problem until the system is planned well in advance and installed during the physical construction of the building. But for already existing buildings the implementation cost goes very high.

In contrast, Wireless systems can be of great help for automation systems. With the advancement of wireless technologies such as Wi-Fi, cloud networks in the recent past, wireless systems are used every day and everywhere.

**B. Advantages of Home automation systems:**

In recent years, wireless systems like Wi-Fi have become more and more common in home networking. Also in home and building automation systems, the use of wireless technologies gives several advantages that could not be achieved using a wired network only.

1) Reduced installation costs: First and foremost, installation costs are significantly reduced since no cabling is necessary. Wired solutions require cabling, where material as well as the professional laying of cables (e.g. into walls) is expensive.

2) System scalability and easy extension: Deploying a wireless network is especially advantageous when, due to new or changed requirements, extension of the network is necessary. In contrast to wired installations, In which cabling extension is tedious. This makes wireless installations a seminal investment.

3) Aesthetical benefits: Apart from covering a larger area, this attribute helps to full aesthetical requirements as well. Examples include representative buildings with all-glass architecture and historical buildings where design or conservatory reasons do not allow laying of cables.

4) Integration of mobile devices: With wireless networks, associating mobile devices such as PDAs and Smart phones with the automation system becomes possible everywhere and at any time, as a device's exact physical location is no longer crucial for a connection (as long as the device is in reach of the network). For all these reasons, wireless technology is not only an attractive choice in renovation and refurbishment, but also for new installations.

## RASPBERRY PI

We have raspberry pi which act as a main controller of our system and small in size, is an open source and its flexible platform for experimentation. Since it is an open source, changes can be made to it as and when required. The raspberry pi runs on raspbian OS and is program using python 2.7.6, One can install various different type of software's for different purposes. We have used model B of raspberry pi which uses system on chip (Soc) BCM2835. It comes with 512 MB of RAM memory and does not have storage drive but uses SD card for booting and long term process, external storage devices can be added through the USB port, which includes an ARM11microcontroller having clock frequency of 700 MHz fig. 2 shows the raspberry pi model B board. It is also connected to an USB camera which is used as a spy camera. First initialize the commands for the camera. Once tested in the command line the following code will capture an image and store it successfully. The sensors that have a digital output are directly connected to the board leaving them to provide the necessary data without any delay. All sensors are directly connected to the raspberry pi.

Fig:1 Rospberry Pi board model A

Fig:2 Rospberry pi model B board

**Pros:**

1. Super powerful with lot of memory and processing capabilities. Expandable memory.
2. Linux based OS and now even Windows 10 can be run on top of it to make processing more user friendly.
3. A lot of GPIOs available and the more the GPIOs, the more sensors you can interface.
4. If you have experience with Linux, its very easy to get started with it, otherwise it will take some time to get the hang of it.
5. Python, C, C++, Ruby, Go and many more can be used to program the Pi exactly the way you can code any computer.
6. People have successfully used Pi to run Open CV , data mining algorithms etc and connected the results to various applications.
7. In terms of cost, better than an arduino with Ethernet shield.
8. Great on-line community and endless possibilities of what can be done using it.

Cons:
1. You need good knowledge of Linux systems to get things moving.
2. The processing power will be an overkill processing-wise for most of the applications since we will use it only to send data across.
3.Closedsource.
4.Power hungry.

## BLOCK DIAGRAM OF ROSPBERRY Pi

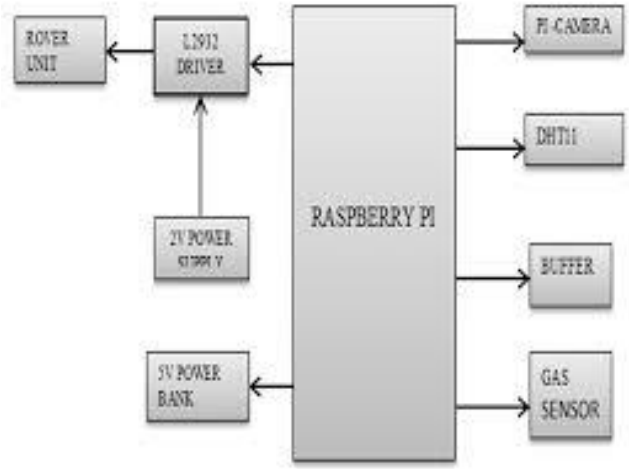


Fig 3.Rospberry Pi blockdiagram

## GSM COMMUNICATION

The Global System for Mobile communication is used to alert the user by sending and receiving the messages, which is controlled by AT command. Fig. 3 shows the GSM modem board. The dimension is small and reliable wireless module. It communicates with raspberry pi using RS232 serial interface. Dual frequency band operates on 900 MHz – 1800MHz. The security mechanism of GSM is implemented in three different elements. The SIM, GSM handset and GSM network The SIM (Subscriber Identity Module) contains the IMSI and The individual subscriber authentication key, the ciphering key generating algorithm, the authentication algorithm, as well as a PIN. The GSM handset contains the Ciphering algorithm.

The GSM network contains encryption algorithm. In order for the authentication and security mechanism to function, all three elements are required for the system. Also system controls the magnetic door lock using GSM by sending message to the raspberry pi. It is very likely that GSM will remain the only communication network technology to be adopted by each and every country of the world.

Fig:4 GSM board

## UART

The BCM2835 device has two UARTS. On mini UART and PL011 UART. This section describers the PL011 UART. For details of the mini UART see 2.2 Mini UART. The PL011 UART is a Universal Asynchronous Receiver/Transmitter. This is the ARM UART (PL011) implementation. The UART performs serial-to-parallel conversions on data characters received from an external peripheral device or modem, and parallel-to-serial conversion on the data characters received from the Advanced Peripheral Bus (APB).

## GPIO PADS

The GPIO connections on the BCM2835 package are sometimes referred to in the peripherals data sheet as "pads" — a semiconductor design term meaning 'chip connection to outside world'.

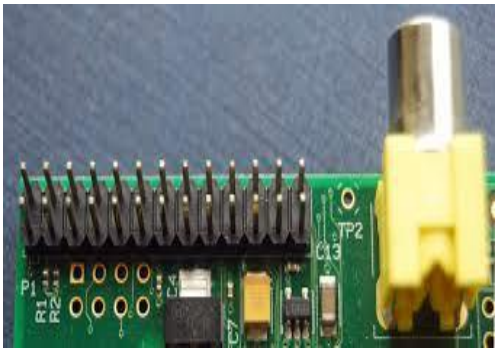


Fig:5. GPIO structure

These pins are a physical interface between the PI and outside world. At the simplest levels, they are the switches that can turn ON or OFF (input) or that the PI can turn ON or OFF (output). Out of the 26pins, 3pins have been used to control 3devices in this article which has been represented by 3LED's for testing the switching signal.

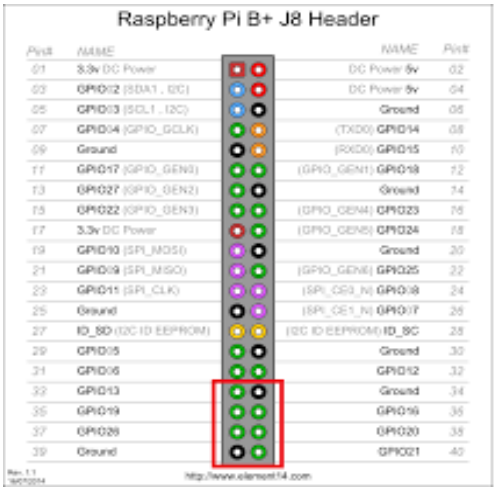


Fig:6 GPIO pin structure

IR sensors (Infrared sensor) are modules which detect the presence of objects before them. If the object is present it give 3.3V as output and if it is not present it gives 0 volt. This is made possible by using a pair of IR pair (transmitter and receiver), the transmitter (IR LED) will emit an IR ray which will get reflected if there is a object present before it. This IR ray will be received back by the receiver (Photodiode) and the output will be made high after amplified using an op-amp link LM358.

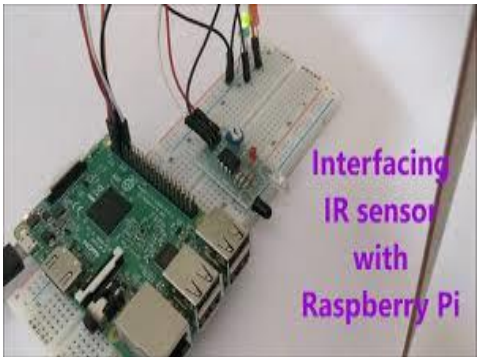


fig:7.IR Sensor Module

The IR Sensor used in this project is shown above. Like all IR sensor it has three pins which are 5V, Gnd and Out respectively. The module is powered by the 5V pin from Raspberry Pi and the out pin is connected to GPIO14 of Raspberry Pi. The potentiometer on top of the module can be used to adjust the range of the IR sensor.

## GAS sensor

Sensors are necessary to detect the components of the air. These are used e.g. in smoke detectors. However, instructions for using these gas sensors at the Raspberry Pi are rare, which is

why in this tutorial the general use of such MQ modules at the Raspberry Pi is shown. Thus, e.g. smoke detectors or air quality testers can be built.


Fig:8 GAS sensor

How to configure any MQ sensor and read it out with the Pi will be shown on the example of the Raspberry Pi gas sensor MQ2 in this tutorial. All other sensors (MQ3, MQ-135, etc.) can also be adapted with a few additional steps.

**Accessories**

All MQ-X sensors return analogue signals, which we can not easily read at the Raspberry Pi. One possibility would be to use an Arduino, but we can also use an analog-to-digital converter (ADC), which can be read out via the I2C bus. In addition, we also need a logic level converter.
Analog-Digital Converter (8 Ports): US / UK
5V to 3.3V Logic Level Converter: US / UK
Breadboard: US / UK
Jumper wire: US / UK

These components are independent of the selected gas sensor. There are also many different sensors for the Raspberry Pi, which are already available for a few bucks and are suitable for different gases:
**MQ-2** (Methane, Butane, LPG, smoke): US / UK
**MQ-3** (Alcohol, Ethanol, smoke): US / UK
**MQ-4** (Methane, CNG Gas): US / UK
**MQ-5** (Natural gas, LPG): US / UK
**MQ-6** (LPG, butane gas): US / UK
**MQ-7** (Carbon Monoxide): US / UK
**MQ-8** (Hydrogen Gas): US / UK
**MQ-9** (Carbon Monoxide, flammable gasses): US / UK
**MQ-131** (Ozone): US / UK
**MQ-135** (Benzene, Alcohol, smoke): US / UK
**MQ-136** (Hydrogen Sulfide gas): US / UK
**MQ-137** (Ammonia): US / UK

**MQ-138** (Benzene, Toluene, Alcohol, Acetone, Propane, Formaldehyde gas): US / UK
**MQ-214** (Methane, Natural gas): US / UK
**MQ-216** (Natural gas, Coal gas): US / UK
**MQ-303A** (Alcohol, Ethanol, smoke): US / UK
**MQ-306A** (LPG, butane gas): US / UK
**MQ-307A** (Carbon Monoxide): US / UK
**MQ-309A** (Carbon Monoxide, flammable gasses): US / UK
**MG811** (Carbon Dioxide (CO2)): US / UK
**AQ-104** (air quality): US / UK
**AQ-2** (Flamable gasses, smoke): US / UK
**AQ-3** (Alcohol, Benzine): US / UK
**AQ-7** (Carbon Monoxide): US / UK
.

I recommend to use a sensor with a soldered PCB, because no further cabling and the use of resistors and capacitors is necessary.

Details on the individual Raspberry Pi gas sensors can also be found in the corresponding data sheets. Simply google the name of the sensor including "datasheet". There is also the voltage at which the sensor operates mentioned.If someone wants to build an alcohol tester or something similar, you should also be aware that these modules are not absolutely accurate and can not compete with a professional measurement.

**SD card**

An SD (Secure digital) card is a storage device that has many useful features depending on how and where it is used . I can add an SD card to a small device like a Mobile phone, to extend the storage space available for ringtones, texts, apps, music and other data.
It doesn't include a built in hard disk, but uses an SD card for booting and persistent storage. As the RPI as no internal storage are built in operating system it requires an SD card that is setup to boot the RPI.

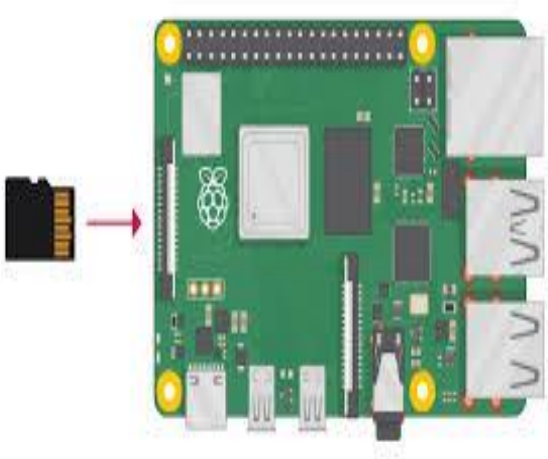

Fig:9.SD card slot for raspberry Pi

## CONCLUSION

In this highly developing era, where directly or indirectly, everything is dependent on computation and information technology, Rospberry PI provides to be smart, economic and efficient platform implementing the home automation. This paper provides application of home automation using Rospberry PI which can be easily implemented and used efficiently.

## REFERENCE

[1] B.Rajalingam, Dr. R.Priya "Review of Multimodality Medical Image Fusion Using Combined
Transform Techniques for Clinical Application" International Journal of Scientific Research in
Computer Science Applications and Management Studies, Volume 7, 2018, Issue 3
[2] B.Rajalingam, R.Priya "Multimodal Medical Image Fusion Using Various Hybrid Fusion Techniques
For clinical Treatment Analysis" Smart Construction Research, Volume 2 Issue 2, 2018, pp. 1-20