IOT BASED HOME AUTOMATION WITH FEEDBACK SYSTEM AND HIGH SECURITY USING RASPBERRY PI 3

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ABSTRACT

Automation or automatic control means the use of various control systems for operating equipment. Internet of Things is automation of the home, housework or household devices. In the future, the entire world will be connected together virtually. The proposed system includes the house hold devices like fan, light can be controlled through it and to ensure that they are turned on /off at the home and also implement sensor like LDR and IR which act as a feedback and helps us to be aware of our remote end devices. The proposed system actually giving additional high end security where the camera with PIR sensor is placed inside the house. This will take image of the burgler who breaks into the house with the help of USB camera and this image will be sent to the email and a buzzer will alert the neighbours.

Keyword: -*feedback system, PIR, LDR*

1. INTRODUCTION

This paper is used to mainly describe the home automation based on IOT. Today the technology is getting improved and used for the ease in our day to day life. The life is getting automated for the simplicity, security, saving electricity and time. In this, home automation is the major things to automate the home appliances. Home automation can be done without human efforts. It provides convenience, comfort, security and saves energy.

Home automation using IoT plays a very vital role in modern era because of its flexibility in using at different places. IoT is the ability of embedded things to sense communicate with other devices to create a network of physical objects. In the normal man's view, it rightly as "Uniting things using Internet". Focus of this technology is to control the household equipment's like lamps, fan, door, etc. automatically. In hazardous condition, it is useful for old aged and handicapped persons. This project explains about controlling and accessing the devices from the remote network also providing high end security using the Internet of Things technology thereby connecting the world virtually by switch on and off the devices like the motor, fan, lamp using the cloud connector named aREST. By create a dashboard with the desired buttons and interface for controlling the devices through aREST. In the past few years, technology has in a grown at high speed. Also human lives have become much more dependent on electronic devices and appliances. It has thus led to the idea of developing a home automation system.

In the previous system, people can move around and switch on the light/fan from anywhere in their house but they have to work within the local network. We need to manually switch on the mechanical switches to turn on a particular devices. So the distance is limited within the premises. The idea of automation through remote network is not used in the existing system and also high end security is not possible.

In the proposed system, it able to control the devices from anywhere in the world using the IOT technology cloud connector named aREST framework. This acts as an intermediate cloud connector between the devices on one end and the controller (laptop/mobile) on the other end. The main purpose of this system is to incorporate the IoT technology through automation. In the future, the entire world will be connected together virtually. We are actually giving additional high end security where the camera with motion sensor is placed inside the house. This will take image of the burgler who breaks into the house and this image will be sent to the email and a buzzer will alert the neighbours and this can used for future investigations for the police department.

Our implementation of this project is analyzed by the following steps the appliances like fan and light is connected to a two channel relay which acts as a electrical switch and the feedback system is enable to ensure whether the fan and light are operating at the base location. The feedback system which includes LDR for light and vibration sensor for fan and for security PIR sensor is used to detect the unauthorized person entering into the base location. If the PIR sensor goes high, the images is capture by using USB camera and send to the target user. Simultaneously, buzzer alert is made at the base location.

This paper significantly improves the security than the previous work. Specifically in the case (i) improve the energy efficiency of the house hold devices (ii) Reduces human labor (iii) 24/7 monitoring of the house and high security system (iv) Remote access of the devices from anywhere in the world (v) Manual handling of the devices is reduced making the devices to work on their own smartly.

The paper is organized as follows. Section II reviews the concept and work that needs to be understood before moving in-depth of the project. Section III introduces our approach, together with the considered application scenarios. It describes how the entire internal process works. The results of our experimental evaluation are presented in Sec. IV, and conclusions are drawn in Sec. V.

2. RELATED WORK

In this section we review the various concepts and approaches that are dealt in this system to get the clear perspective. As far as we know, no previous work is used to determine some of the advances is used here.

2.1 FEEDBACK SYSTEM

The feedback system is enable to ensure whether the fan and light are operating at the base location. The feedback system which includes LDR for light and vibration sensor for fan and for security PIR sensor is used to detect the unauthorized person entering into the base location. If the PIR sensor goes high, the images is capture by using USB camera and send to the target user. Simultaneously, buzzer alert is made at the base location.

3. PROPOSED SYSTEM

3.1 Raspberry pi 3

The features of raspberry pi 3 are as follows CPU: Quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz, GPU: 400MHz Video Core IV multimedia. : 1GB LPDDR2-900 SDRAM (i.e. 900MHz).USB ports: 4.Video outputs: HDMI, composite video (PAL and NTSC) via 3.5 mm jack. Network: 10/100Mbps Ethernet and 802.11n Wireless LAN. Peripherals: 17 GPIO plus specific functions, and HAT ID bus. Bluetooth: 4.1. Power source: 5 V via Micro USB or GPIO header. Size: 85.60mm × 56.5mm. Weight: 45g (1.6 oz).40 pin extended GPIO.CSI camera port for connecting the Raspberry Pi camera. DSI display port for connecting the Raspberry Pi touch screen display.

3.2 Infrared Sensor

An Infrared proximity photoelectric sensor has a set of transmitter and receiver i.e. an IR led and a photo diode. The detection range is about 3-80cm. The IR sensor operates at an input power of 5V. When the sensor detects an object it sends a trigger pulse, the trigger pulse remains active till the object is in its range
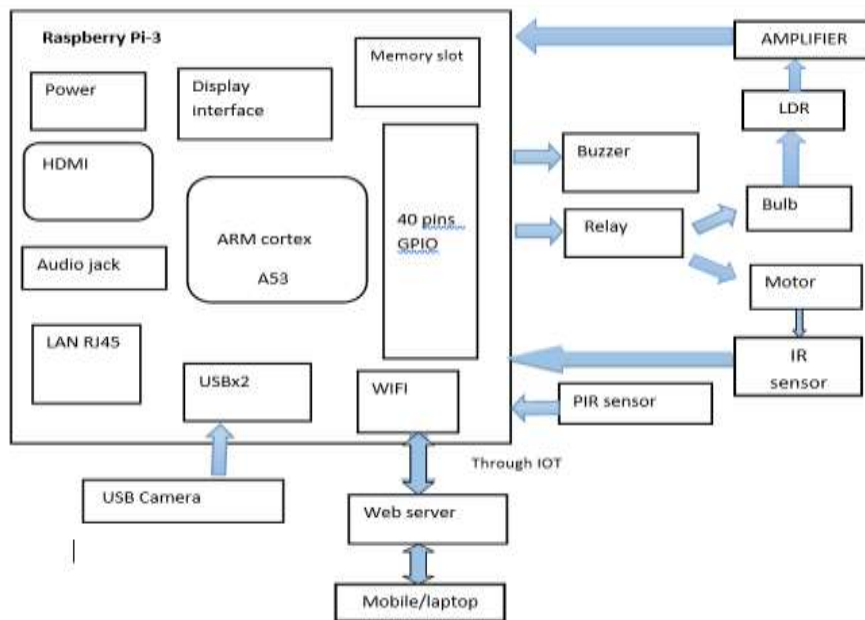
Fig -1: Block Diagram

3.3 PIR Sensor

In our project, PIR sensor is used to sense motion, they are used to detect if a person or object has moved in or out of the sensors range accordingly they send a trigger pulse. They are often referred to as PIR, Passive Infrared, Pyro electric, or IR motion sensors. PIRs are basically made of a Pyro electric sensor (which is shown in the figure 3.3 the round metal can with a rectangular crystal in the center), it can detect infrared radiation from people. Everything emits some low level radiation, and the hotter something is, the more radiation is emitted.

3.4 LDR

A photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance. The arrow indicates light falling on it. A light dependent resistor works on the principle of photo conductivity. Photo conductivity is an optical phenomenon in which the materials conductivity is increased when light is absorbed by the material. When light falls i.e. when the photons fall on the device, the electrons in the valence band of the semiconductor material are excited to the conduction band. These photons in the incident light should have energy greater than the band gap of the semiconductor material to make the electrons jump from the valence band to the conduction band. Hence when light having enough energy strikes on the device, more and more electrons are excited to the conduction band which results in large number of charge carriers. The result of this process is more and more current starts flowing through the device when the circuit is closed and hence it is said that the resistance of the device has been decreased. This is the most common working principle of LDR.
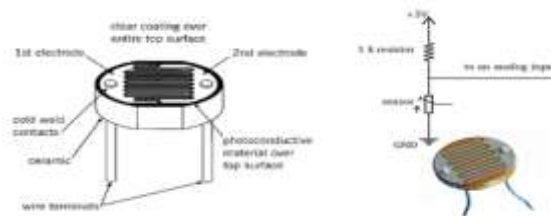

Fig -2:LDR

3.5 Two Channel Relay

Relay is an electrically controllable switch which is used in industrial controls, automobiles and home appliances, because of their relative simplicity, long life, and proven high reliability. In the proposed system we are using 8channel relay for switching and controlling the devices, having 8 independently controlled relays. The Control signals use +5V logic levels and is of TTL compatible.

Fig -3 : Two Channel Relay

4. EXPERIMENTAL EVALUATION

The evaluation is made from both the software and the hardware in our project. The IOI unit consist of several DC 6V relay switching circuit to control 240V output AC, but only two are used for the demonstration. The GPIO pins used to connect the Raspberry Pi to the IOI unit, and the pin were assigned. GUI resides on the raspberry pi. What we can observe here is the SSH connection, from client device such as android phone. The advantage of this is regardless of what the client device is, the GUI is always the same. This also true when this system been accessed from the internet. More than one client can access this system at any given time. Web camera used as monitoring device and can be placed at any desired point of location by the user. This added security and safety functionality to this system. Figure 4.4 show the camera web display. Web camera in this prototype is connected to the USB port of the Raspberry Pi.

Fig -4 Prototype of Raspberry Pi based Home Automation System

5. CONCLUSION

In this paper, The project demonstrate the possibility of implementing a system that will helps the elderly and also people with disability, and not just normal home owner. Furthermore it can also be used in the increasingly   popular Small-Office-Home-Office (SOHO) environment. When the user touches the icon from the GUI on their android Smartphone, lights and fans will switch ON and OFF uniformly and fan's speed can also be remotely controlled. For more reliable system for future use, several improvements could be introduced. Inclusion of infra-red (IR) transmitter which can support several different protocol, will enable the MCU to control appliances with IR or RF remote control, such as television, radio and air conditioner, which eliminates the need of carrying several different remote control around. Another function which could be added is the timer function. The timer can control the appliances time to 'ON' and 'OFF'. This will give expandable option to the consumer in controlling their home appliances. Furthermore, addition of sensors, magnetic door locks and alarms may enhance the function of this project even more. Finally, this project provides a flexible and customizable design and implementation for many application with low cost thus, not limited to home automation only. The proposed project provides security and various ways to control the devices in the house, it makes ones living comfortable and at the same time easily accessible through portable devices like mobile phones. It gives the administrator all the rights to decide which makes it reliable as it always asks before taking a decision, which helps when there are necessary decisions to be taken and they can be taken fast in case of an emergency.

6. REFERENCES

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