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HOME AUTOMATION USING RASPBERRY PI AND ARDUINO UNO WITH RASPBIAN

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Abstract— In present time Internet of Things(IoT) is most popular, many technologies are made by engineers and many inventions are in process for make human life easy. one of them is home automation, this system converts normal home to into smart home and improve security of the house. Using this technology remote operations can be carried out from anywhere. Many technologies are used for home automation, one of the simplest technique is control and monitor of the home equipment's by Raspberry Pi and Arduino, limitless equipment can be controlled by this arrangement. Data transfer between Arduino and Raspberry Pi can be done by I2C communication. Command is send from android app to Raspberry Pi using by the internet cloud service. Set of appliances is controlled by Raspberry Pi and Arduino. Many Android/iOS app are used for controlling Raspberry Pi and Arduino, BLYNK app is available on play store for controlling Raspberry Pi and Arduino. We can do on-off operation by using mobile app and also monitor and control Temperature, Brightness of light, etc.

Keywords— Remote Controlling, Sensing, Monitoring, Security Alert, Automatic Switching

I. INTRODUCTION

In present time home automation system is popular for time saving and easy operation. Home automation system can be built with Raspberry Pi and Arduino, that is capable of operating home equipment's manually as well as control automatically. Raspberry Pi is a cheap and small size computer with powerful features, Arduino UNO is a microcontroller board provide Digital and Analog I/O pins. Raspberry Pi and Arduino communicates with each other using serial communication. Arduino IDE software is used for programming of Arduino. Raspberry Pi can operate on its own Raspbian operating system and also can operate on other third-party operating system like Windows 10 IOT Core, Noobs, Ubuntu Mate etc. one of the any system systems can be install in 4GB SD card in some simple steps without any charges. SD card insert on raspberry pi and run installed system. Raspberry Pi as a main device which will give commands to Arduino UNO board and collect information about device status and another sensor status. Raspberry Pi and Arduino communicates with each other using I2C communication. Raspbian operating system has inbuilt Python, JavaScript and another programme. JavaScript programming is used for equipment control from various mobile app.

II. PROBLEM SUMMARY

Now a day, to perform switching, people need to go to switch board. However, in many cases as we know most of the people feel laziness especially for performing switching. Moreover, the people staying at far away distance goes to their respective home switch board twice or thrice in an hour and hence they become irritated for switching on and off the devices.

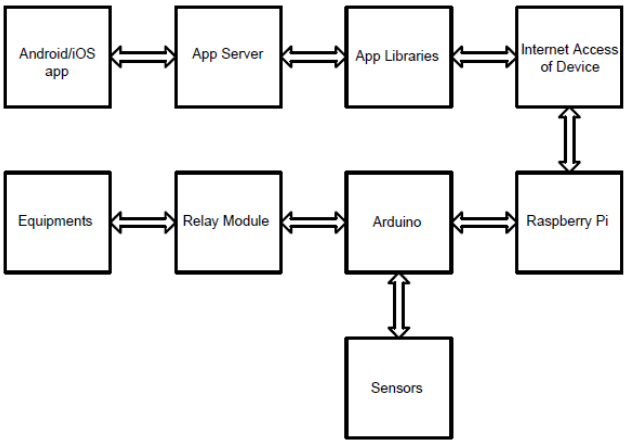
This has provided the details of how to control power to mains electrical devices without making any physical connections to the mains electricity components. There are still some safety factors that need to be considered, but it's much safer than say installing your own relay directly onto a mains power lead.

Hence by designing a Home Automation which can be controlled through internet the above problems can be solved. Therefore, using Raspberry Pi 3 and Arduino and various software, we can achieve the same.

III. CONSTRUCTION

Useful Components:

1) Raspberry Pi
2) Arduino
3) Relay Modules
4) Different Sensors
5) Smartphone
6) Connecting Wires



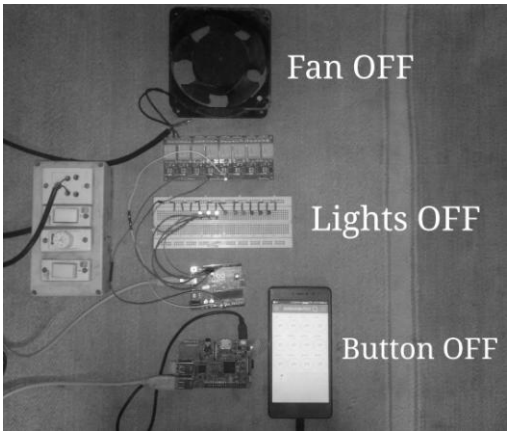
(Fig. 1)
Block Diagram

From smartphone app's virtual buttons on/off command can send into the raspberry pi. First on/off command going into the app server and then gone into the raspberry pi. The app library is installed in raspberry pi. Raspberry pi send command in Arduino and Arduino send it to relay and sensors. Relay module used for control equipment and sensor used for measuring and detection of physical quantities.

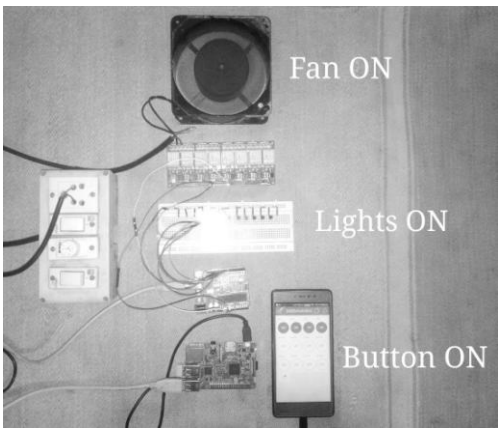
IV. WORKING

A Raspberry Pi 3 will serve as a master device. For each room, want to automate, an Arduino UNO is needed. Arduino UNO will act as a secondary controller, which takes command from the Raspberry Pi 3 and operates specific device. Here, Raspberry Pi 2 and all Arduino UNOs are connected on a I2C bus. All Arduino UNOs act as slaves. Each Arduino UNO have unique I2C slave address on the bus.

Raspberry Pi requests for the sensor data collected by Arduino UNO. The Arduino UNO will connect with the devices and sensors. Each room have multiple controllable devices (i.e. Light(s), Fan, Wall Socket(s), etc.), one Passive IR (to detect human presence in the room), one temperature sensor (LM35 to collect room temperature) and LDR (to detect light intensity near room window).



(Fig. 2)
When Circuit Off



(Fig. 3)
When Circuit On

V. ADVANTAGES

- Remote operations can be carried out from anywhere.
- No time restriction since experiments are available 24 hours a day, 7 days a week. Overcoming problems with time consumption for many people.
- Safe and secure operation of equipment without danger of user's time consumption.
- Remote operations can be shared between family members as for example in smartphone application initiative.

VI. DISADVANTAGES

- Internet connection is required.

VII. FUTURE SCOPE

Raspbian operating system is launched by official raspberry pi, Raspbian comes pre-installed with plenty of software for education, programming and general use. It has Python, Scratch, Sonic Pi, Java, Mathematical and more. So, for programming view Raspbian is best system. In this semester we will study programming of raspberry pi and will complete it. Raspberry PI is a credit card sized on-board computer and it can be connected to internet, so by some changes and adding in program we can view internet tv, play gaming, Browsing, Video Calling, timed operation with RTC chip and do much more using raspberry pi.

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