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Home Automation System using IOT

Prathamesh S. Ringe[1], Prof. Abhijit Desai[2]
[1, 2]*Bharati Vidyapeeth Institute Of Management & Information Technology, Mumbai University, Maharashtra, India.*

Abstract: The main aim of the paper is to develop a system that will provide remote control of home appliances. This system is dealing with all the home appliances automatically through remote control using internet. It's main purpose is to save the consumption of electricity and human energy. This system is made with the help of controller and raspberry pi. The different home appliances are connected to raspberry pi and sensor, which is connected by wireless network. With the development of automation technology, life has become comfortable and easier in all aspects. In today's scenario, Automatic systems have been ruling over manual system. Nowadays, Internet of things is rapidly growing network, which is used right from industrial machine to consumer goods that can share information and complete tasks while you are busy with other activities. By using Home Automation system (HAS), we can control various home functions and features automatically through computer or mobile devices through internet.

I. INTRODUCTION

A home automation system is a system where all the users can control various home appliances automatically. All home automation system which exists is based on wired communication. It will not create 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. As compared to wired system, Wireless systems can be of great help for automation systems. Wireless systems are used every day andeverywhere, with the development of wireless technology such as Wi-Fi, cloud network etc.

Home appliances can be handled and controlled by using micro-controller or computer technology. Automation is rapidly growing system because it's easy and comfortable, also provide security and efficiency. In this system, a sensor plays an important role of sensing the status of appliances and updating to web server. Even if a user is at a considerable long distance from his house, the user can obtain control and change the status of appliances i.e. this piece of research work will narrate approach of controlling home appliances through web server.

II. SCOPE OF THEPROJECT

This project work is complete on its own in remotely and automatically switching on and off of any electrical appliance not limited to household appliances, and sends a feedback message indicating the new present state of the appliance. It does not implement control of multiple appliances or automatic detection of faults in the controlled appliance.

III. PROPOSEDWORK

This system is mainly concerned withthe automatic control of light or any other home appliances using internet. It is meant to save the electric power and human energy. This project is made with the help of controller and raspberry pi. The various appliances connected to the microcontroller and sensor is connected using wireless network. withadvancement of Automation technology, life is getting simpler and easier in all aspects.

In today's world Automatic systems are being preferred over manual system. With the rapid increase in the number of users of internet over the past decade has made Internet a part and parcel of life, and IoT is the latest and emerging internet technology. Internet of things is a growing network of everyday object-from industrial machine to consumer goods that can share information and complete tasks while you are busy with other activities. Wireless Home Automation system(WHAS) using IoT is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. The home automation system differs from other system by allowing the user to operate the system from anywhere around the world through internet connection.

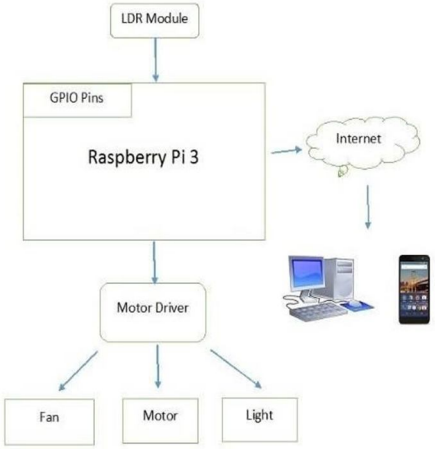


Fig1. System Architecture

This project aims at developing a Home Automation System prototype which mainly focuses on monitoring and controlling household appliances through the Internet. The system consists of two main parts: A hardware interface module and a software communication module.

The Hardware interface module consists of Raspberry pi, Wifi module and relays. The central device is the raspberry pi that connects to the Wifi module and receives orders to monitor and control the appliances. The communication between the application and raspberry pi is handled by the server, thus managing the users and the appliances. The software communication module uses an Front end, which serves as an interface to the user to communicate with the raspberry pi. It presents a list of devices with which the user can interact.

The system offers switching functionalities to control the appliances connected to the system, which includes Lights, Fans, Air-conditioners and various other appliances connected to the system. In India, the alternating current supplied to our homes is of 230V. Raspberry pi is not capable of withstanding such high Voltages. Thus, Relays are used to convert this high voltage to low voltage i.e. less than 5V. The relay switches have capability to carry a maximum load of 10A at240V.

To enable connectivity with the raspberry pi,Wi-Fi module is used. It provides Internet connectivity, which allows Internet access and control from the application effectively and efficiently. The application isauser friendly interface, which enables the user to view the status of applications at home and control it as per his/herrequirement.

A. Raspberry pi

Raspberry pi is a single board microcontroller, for building digital devices and interactive objects that can sense and gather information from the physical world. The python language can be used for programming.

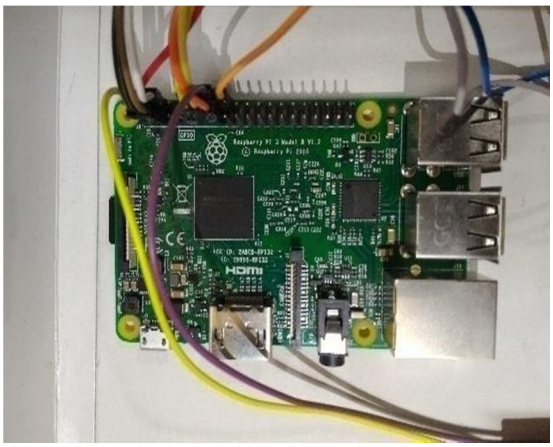


Fig 2. Raspberry pi

B. Wi-Fi Module

Wifi Module is used to enable connectivity with the Internet.

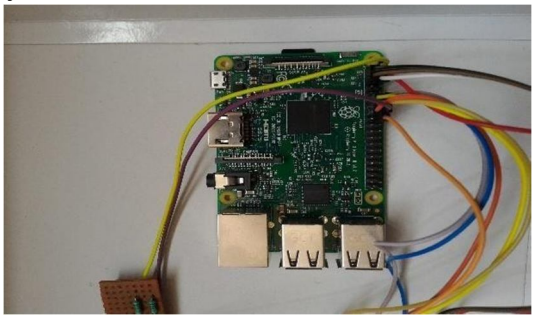
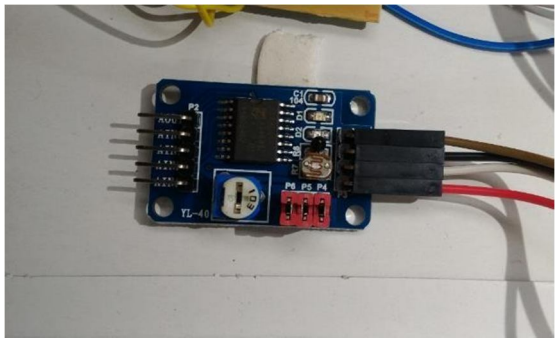


Fig 3.Wifi Module

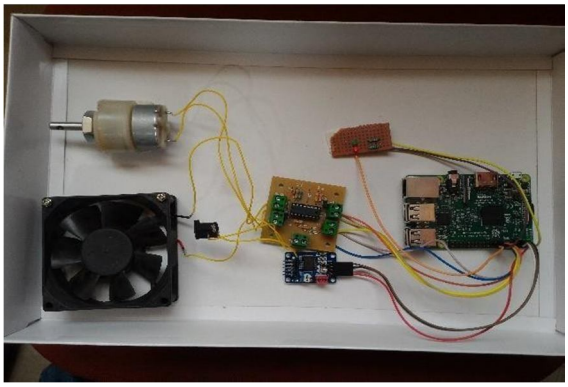
C. LDR

An LDR(Light Dependent Resistor) it is one type of resistor whose resistance depending upon on the amount of light falling on itssurface.



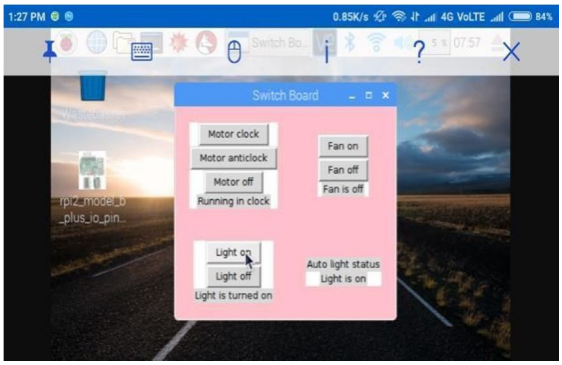
IV. IMPLEMENTION ANDANALYSIS

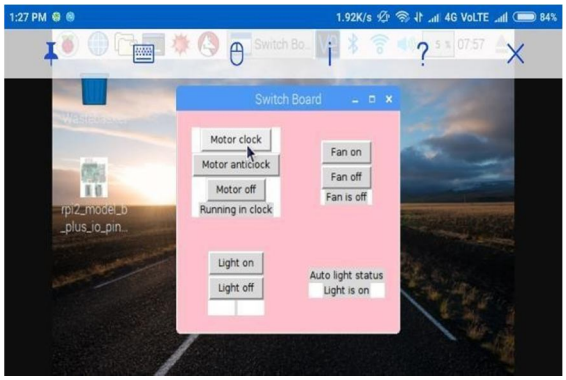
Proposed Home Automation System layout as mentioned the proposed home automation system consists of three main modules, the server, the hardware interface module, and the software package. The following figure (1),shows the proposed system layout. Secure Wi-Fi technology is used by server, and hardware interface module to communicate with each other. User may use the same technology to login to the server web based application. if server is connected to the internet, so remote users can access server web based application through the internet using compatible web browser.



The Home Automation System in which there will be one analog/digital sensor and three components namely Light, Fan, Motor. LDR sensor will be for sensing intensity, depending on values light is turn on and off. This sensor will detect light to give suitable output for Raspberry Pi. Digital sensors will give digital output whereas analog sensors will require analog to digital conversion. After detection phase the obtained output is fed to Raspberry Pi which is the important unit. It handles all turning onand off oflight.

And also one Motor Driver is connected to Raspberry Pi and Fan, Light and Motor is connected to it. All pins of Driver Motor and LDR module connected to GPIO pins mounted on Raspberry. I2C protocol is used to sharing sensor data between ADC module and Pi. After the receiving data from sensor processor will decide whether to turn on or off the light by providing somelimits.
Additionally, it can be used to facilitate direct connections between any two environments and (many-to-many) connections as implemented by the web services that support IOT. Thus, it enables people to monitor and control real time appliances inhome.





V. CONCLUSION

It has proved that home automation system using IOT works satisfactorily by connecting simple appliances to it and also it has been verified that the appliances were successfully controlled remotely through internet. The home automation system also process the changes according to the requirement along with sensing data, like temperature, gas, light, motion sensors. It also stores the sensor parameters in the webpage in a timely manner. The user can check the conditionof various parameters in the home anytime anywhere.

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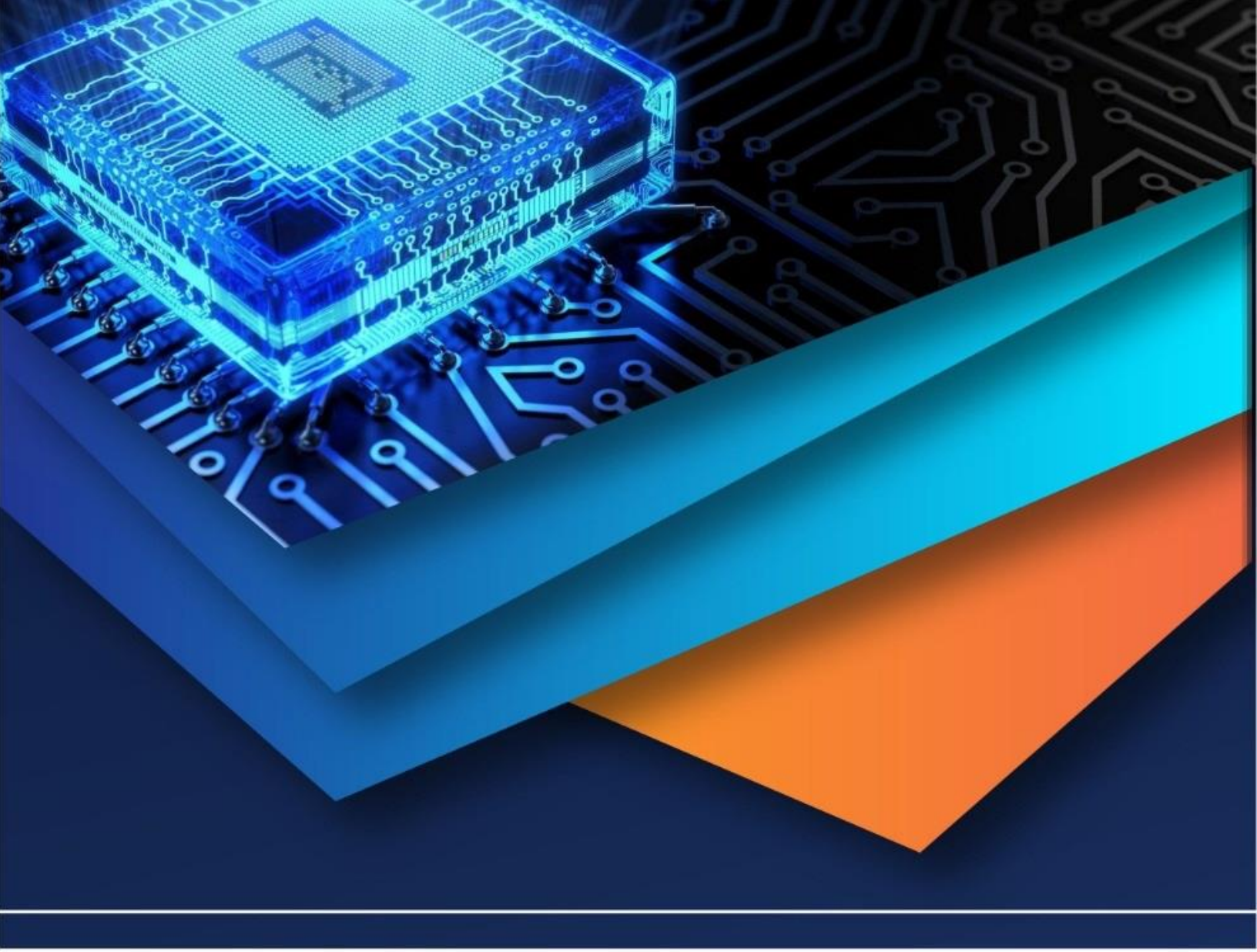

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