

# Home Automation Using IOT

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**Abstract**-The main aim of this paper is to develop a system that will provide remote control of home appliances and also provide security against the mishaps when the host is not at home. This paper is mainly concerned with the automatic control of light or any other home appliances using internet. It is meant to save the electric power and human energy. This application is made with the help of internet of things and raspberry pi. The various appliances connected to the raspberry pi is using wireless network.

**keywords** : Raspberry pi, IOT, Wi-Fi modem, relay, HTML, PHP, python.

## I. INTRODUCTION:

We live in an exciting time where more and more everyday things are becoming smart. Appliances have sensors and can communicate to other things and can provide control to more things.

The Internet of Things, IoT, is in a huge way and people are rapidly inventing new gadgets that enhances lives. The price of microcontrollers with the ability to talk over a network keeps dropping and developers can now tinker and build things inexpensively.

IoT based home automation project is done using low cost ESP8266 Espino ESP-12 WiFi Module, It uses relays and few simple components, four electrical devices can be controlled and temperature can be monitored . ESP-12 is low cost module is used here.

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.

With advancement 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 everybody is 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.

## II. ADVANTAGES OF HOME AUTOMATION SYSTEMS OVER WIRED SYSTEM

System scalability and easy extension:

Many people are always on the move from place to place due to business demands. Some people can spend a couple of days away from their home leaving all their household appliances without any kind of monitoring and control.

Some devices are left plugged into power sockets whereas others are supposed to be plugged into and out of power sockets at different intervals depending on the time of the day. All this requires an individual to manually attend to each of the devices independently from time to time.

All such monitoring and control can be done without necessarily being around or inside the home some devices if not controlled properly consume a lot of energy which leads to extra expenditure on electricity.

Therefore an internet based home automation system is proposed which will enable one to remotely manage appliances from anywhere, anytime.

As we enter the 21<sup>st</sup> century, the interaction between humans and computer is breaking old barriers and entering a new realm. In the highly technology driven world of today's mobile phones have become a part of our Lifestyles. Mobile phones are not just communication tool. This paper t tries to derive solution providing better control on home appliances with help of cell phone.

The Existing System consists of physical appliances in home that are been controlled through switches. These devices can be switched ON & OFF manually whenever needed this system is less secured and prone to electrical hazards. Also the wastage of electricity tends to be a major factor of concern.

Secure Digital (SD) cards are used to store the operating system and program memory in either the SDHC or Micro

### III. COMPONENTS USED

- 1.ESP-12WiFiModule
- 2.raspberrypi
- 3.Relay
- 4.Resistors
- 5.Capacitor
- 6.sensors
- 7.12V Power Supply

The end user can use their mobile phone to log into the system an initial check is performed for whether the hardware device is ON or not. Only if the Hardware is authorized and ON then the user is authenticated. Once the authentication's done successfully the user is able to send the control signals to the Hardware machine.

At the hardware machine the driver program will continuously track for the change in the status & will accordingly send the signals to the Circuit. When a user select a change in the status for any of the device i.e ON the data from the hand held is sent to the Web Server in a string format, where the Website is hosted. On the server the status is stored in the database in their respective device field. is used to retrieve the status of the devices in a timely pattern for every 10sec.

These changes come in to form of cookies which are temporary internet files from the web server& are stored on the computer in the name of the web site every 10 sec as the page refreshes the new cookie values are updated.

SDHC sizes. Most boards have between one and four USB slots, HDMI and composite video output, and a 3.5 mm phone jack for audio. Lower level output is provided by a number of GPIO pins which support common protocols like I<sup>2</sup>C. The B-models have an 8P8C Ethernet port and the Pi 3 has on board Wi-Fi 802.11n and Bluetooth.

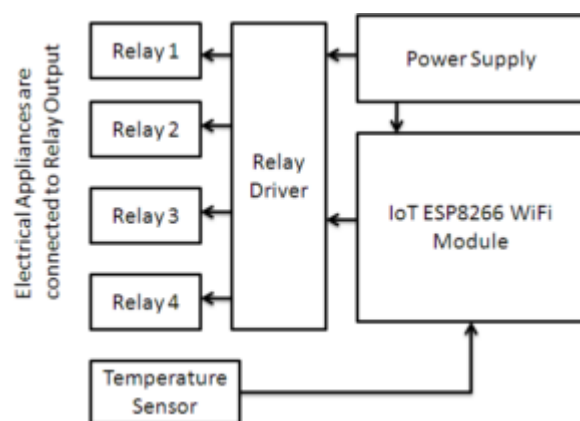
### RASPBERRY PI

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside of its target market for uses such as robotics. Peripherals (including keyboards, mice and cases) are not included with the Raspberry Pi. Some accessories however have been included in several official and unofficial bundles.

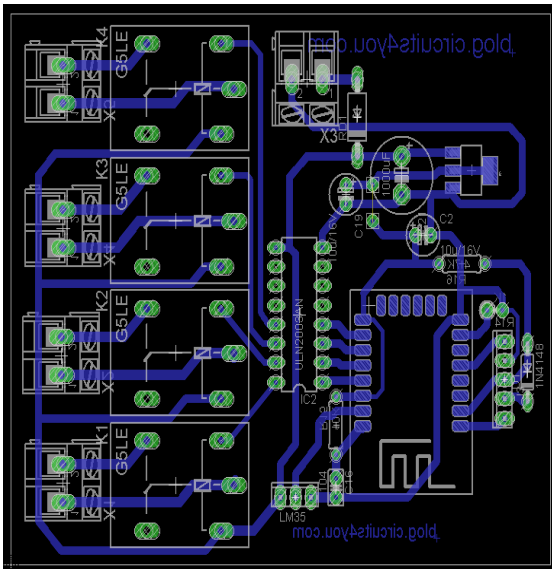
The proposed home automation system can control the following appliance:

- Lights on/off
- Fan on/off
- On/off different appliance.

### IV. HARDWARE AT APPLIANCES



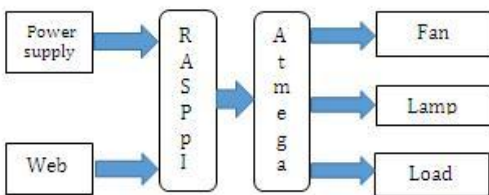
PCB LAYOUT OF HOME AUTOMATION:



### V. SOFTWARE DESIGN

HTML is a format that tells a computer how to display a web page. The documents themselves are plain text files with special "tags" or codes that a web browser uses to interpret and display information on your computer screen. HTML stands for Hyper Text Mark-up Language; an HTML file is a text file containing small mark -up tags. The mark-up tags tell the Web browser how to display the page. An HTML files must have an html file extension.

The system generates forms to collect data and stores the responses in a database. The system is very flexible since the data can include HTML, allowing the system to perform additional processing using JavaScript or other HTML techniques.



Above figure illustrates the sequence of activities in the WHAS. When the connection is established it will start reading the parameters of sensors like fan, tube light etc. The threshold levels for the required sensors are set as t1, t2, and t3 etc. The sensor data are sent to the web server and stored in the cloud. The data can be analysed anywhere any time. If the sensor parameters are greater than the threshold level then the respective alarm a1, a2,

a3 etc. will be raised and the required actuation is done for the controlling of the parameters.

### VI. HTML

Hyper Text Mark-up Language (HTML) is the standard mark-up language for creating web pages and web applications. With Cascading Style Sheets (CSS), and JavaScript, it forms a triad

of cornerstone technologies for the World Wide Web.<sup>[1]</sup> browsers receive HTML documents from a web server or from local storage and render them into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

HTML elements are the building blocks of HTML pages. With HTML constructs, images and other objects, such as forms may be embedded into the rendered page.

It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. HTML elements are delineated by *tags*, written using angle brackets.

Tags such as `<img />` and `<input />` introduce content into the page directly. Others such as `<p>` surround and provide information about document text and may include other tags as sub-elements. Browsers do not display the HTML tags, but use them to interpret the content of the page.

HTML can embed programs written in a scripting language such as JavaScript which affect the behaviour and content of web pages. Inclusion of CSS defines the look and layout of content.

The World Wide Web Consortium (W3C), maintainer of both the HTML and the CSS standards, has encouraged the use of CSS over explicit presentational HTML since 1997.

HTML documents imply a structure of nested HTML elements. These are indicated in the document by HTML *tags*, enclosed in angle brackets thus: `<p>`In the simple, general case, the extent of an element is indicated by a pair of tags: a "start tag" `<p>` and "end tag" `</p>`. The text content of the element, if any, is placed between these tags. Tags may also enclose further tag markup between the start and end, including a mixture of tags and text.

### VII. IEEE 802.11.

IEEE 802.11 is a set of media access control (MAC) and physical layer (PHY) specifications for implementing wireless local area network(WLAN) computer communication in the 900 MHz and 2.4, 3.6, 5, and 60 GHz frequency bands

They are created and maintained by the Institute of Electrical and Electronics Engineers (IEEE) LAN/MAN Standards Committee (IEEE 802).

The base version of the standard was released in 1997, and has had subsequent amendments. The standard and amendments provide the basis for wireless network products using the Wi-Fi brand.

While each amendment is officially revoked when it is incorporated in the latest version of the standard, the corporate world tends to market to the revisions because they concisely denote capabilities of their products. As a result, in the market place, each revision tends to become its own standard.

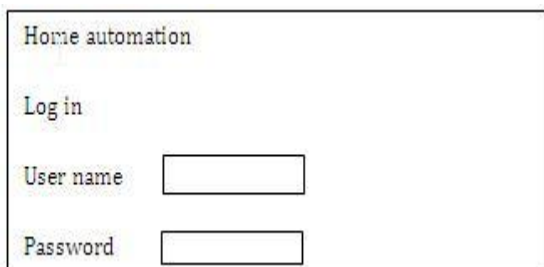
The 802.11 family consists of a series of half-duplex over-the-air modulation techniques that use the same basic protocol. 802.11-1997 was the first wireless networking standard in the family.

but 802.11b was the first widely accepted one, followed by 802.11a, 802.11g, 802.11n, and 802.11ac. Other standards in the family (c-f, h, j) are service amendments that are used to extend the current scope of the existing standard, which may also include corrections to a previous specification.

The segment of the radio frequency spectrum used by 802.11 varies between countries. In the US, 802.11a and 802.11g devices may be operated without a license, as allowed in Part 15 of the FCC Rules and Regulations. Frequencies used by channels one through six of 802.11b and 802.11g fall within the 2.4 GHz amateur radio band. Licensed amateur radio operators may operate 802.11b/g devices under Part 97 of the FCC Rules and Regulations, allowing increased power output but not commercial content or encryption.

#### VIII. USER ACCESS IN HTML PAGE FOR HOME AUTOMATION:

1. Turn on the circuit.
2. Turn wifi on mobile or laptop browser.
3. Enter ip address in your browser
4. You will find this page and operate relays.
5. Connect relay output to the electrical load



The screenshot shows a web browser window with the title "Home automation". Below the title, there is a "Log in" section. It contains two input fields: "User name" and "Password".

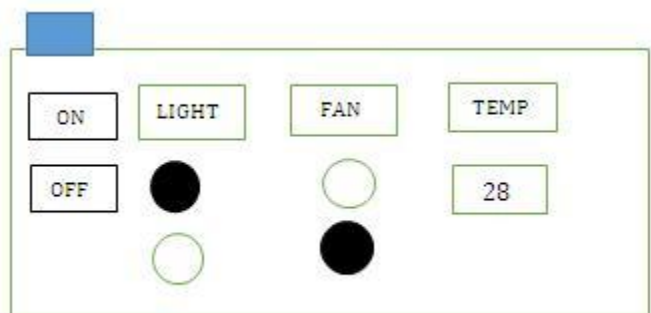
A model house is built for the home automation system and is as shown in the figure. Light 1 will turn on automatically when light sensor detects the darkness. A cooler/Fan will turn

on when the room temperature exceeds the set threshold and in turn reduces the room temperature.

Relay is used to switch the electrical appliances like light, fan etc. The raspberry pi board is placed in store room or garage. The Raspberry PI B+ is connected with Wi-Fi or LAN for the Connectivity with internet

After the successful connection to the server, the data of sensor are sent to the web server for monitoring of the system. The figure 3 shows the web server page which will allow us to monitor and control the system.

By entering the assigned URL address in the web browser this web server page will appear. The web server gives the information about the temperature in different places of the house. It also gives the status of the various electrical appliances like light, fan etc. which we can control remotely.



All the required data is stored in the database. The stored data can be analyzed at anytime and anywhere. The figure 4 shows the temperature in degree Celsius stored at different time intervals. And also it shows the state of the motion detector along with the time. It also provides information about time of motion detected and how many times as well. All this information is stored in the cloud which can be checked by the user any time when away from home.

#### CONCLUSION

In this paper, we have introduced the event of a home management using raspberry pi and internet of things technology. The system is suitable for remotely controlling the home appliances. A smart home system integrates various electrical appliances in a home with each other using information devices automatically according to the users' need. For the web application, the HTML part is provided inside the program, thus it doesn't require any other application to be developed for different gadgets. The automated mode makes life easier for users by complete automation of necessary appliances without any human effort.

## FUTURE SCOPE

Future scope for the home automation systems involves making homes even smarter. Homes can be interfaced with sensors including motion sensors, light sensors and temperature sensors and provide automated toggling of devices based on conditions. More energy can be conserved by ensuring occupation of the house before turning on devices and checking brightness and turning off lights if not necessary. The system can be integrated closely with home security solutions to allow greater control and safety for home owners. The next step would be to extend this system to automate a large scale environment, such as offices and factories. Home Automation offers a global standard for interoperable products. Standardization enables smart homes that can control appliances, lighting, environment, energy management and security as well as the expandability to connect with other networks.

## REFERENCES:

- [1] "Introducing Raspberry Pi Model B+" Raspberry Pi Foundation.
- [2] "raspberrypi 3 specs" *raspberrypi.com*
- [3] "First mention of HTML Tags on the www-talk mailing list" World Wide Web Consortium.
- [4] Tim Berners-Lee, "Information Management: A Proposal." CERN
- [5] "Wireless Sensor Networks: Concepts, Applications, Experimentation and Analysis"