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# A REVIEW PAPER ON HOME AUTOMATION

[1]Nikita Baidya , [2]Prem Kumar S
1Final Year UG Student, B.Tech ECE, DR.B.R.Ambedkar Institute of Technology, Port Blair
2Technical Analyst, Sovtech, Dbrait Campus, Port Blair.

## Abstract:

Automation of a device has a wide scope for this Generation as well as in forthcoming generation. In this wide scope, Mobile communication technology is playing a major role in the world of automation. This article is fully based on low cost and reliable home control monitoring system for accessing and controlling devices and appliances remotely using Android based Smart phone application. While using this technology the system improves the living standard at home, reduces human effort, energy efficient and time saving and thus make a smart home .And also it was very helpful for providing support to disabled people and fulfil their needs in home and thus they leads a normal life. The proposed systems consist of android mobile, Arduino Uno board, Wi-Fi module and a relay circuit. We are using Wi-Fi technology to monitor the device because of its accuracy, high range and instant connectivity. This module controls the home appliances with a very ease of installation and it is user friendly.

*Keywords* — **Automation, Android, Wi-Fi module.**

## I. INTRODUCTION:

Home automation is become more beneficial because of its safety and security. Nowadays, home automation became more advance and precise to monitor all the home appliances. Home automation system become energy efficient and highly approachable smart home technique. It involves basic features to maintain the user satisfaction and comfort. [3]
This proposed system is a precise combination of Android smart phone and embedded system which include Arduino Uno Board, Wi-Fi module and Relay circuit.[4]

In this paper, we used a Wi-Fi wireless technology to monitor the device. An android application is installed in a mobile device i.e. android smart phone and it has inbuilt switch interface of all the appliances separately in it. Through which all the respective devices can be control and monitor individually.

The Wi-Fi module receives the command from mobile phone and passes to relay circuit. As per the given signal from the user, the relay circuit switched ON/OFF the respective devices. The main purpose of using Wi-Fi wireless technology is to provide a greater extent to range and better feasibility.[2]

This paper will provide the future access to control the various home appliances with the help of android smart phone.

### *A. HOME AUTOMATION:*

Home Automation is a unique system that can control and establish communication between nearly all aspects of your house. [1] Home Automation is a term used to describe the working together of all household amenities and appliances. For example, a centrally-microcontroller panel can have the capability to control everything from heating, air conditioning, security system, lighting and overall electrical appliances. [3] Home automation can include controlling aspects of our home remotely through a computer or any mobile equipment, programming electronics devices to respond automatically to some conditions or scenarios or centralizing the control of a variety of appliances in our home into a single control center. For example, Control of lights in and around our house from one central location so there is no need to get out of to that place or go to downstairs if we forgot to turn OFF or ON any appliances, just we can control remotely. [5]

It is essential that the different controllable appliances be interconnected and

communicates with each other. The main purpose of Home automation is to control or monitor signals from different appliances, or basic services. A smart phone or web browser can be used to control or monitor the home automation system.[1]

## II. LITERATURE SURVEY:

### *A.IMPLEMENTATION OF INTERNET OF THINGS FOR HOME AUTOMATION:*

Mamata Khatu, Neethu Kaimal, Pratik Jadhav and Syedali Adnan Rizvi [1] they presented a paper on the implementation of Internet of things for home automation. This paper mainly focused on IoT coverage that connects all the variety of objects like smart phone, tablets, digital cameras and sensors in the internet and thus provides many services and huge amount of data and information. They also focused on Cloud computing, Cloud based platform help to connect the things that surrounds as so that we can easily access anything at any time and in any place. They have illustrated sensing as a service on cloud by using certain application like Augmented Reality, Agriculture, Environment monitoring etc. and finally they have proposed a prototype model for providing sensing as a service on cloud.

The society need new and scalable, compatible and secure solutions for both the management of the ever broader complexly networked Internet of Things.

Security concern is overcome by this model since we are using Wi-Fi Wireless Equivalent Privacy (WEP) and Wi-Fi Protected Access (WPA) are two most used security accesses used in Wi-Fi

### *B. BLUETOOTH BASED WIRELESS HOME AUTOMATION SYSTEM USING FPGA:*

B.Murali Krishna, V.Narasimha Nayak, K.Ravi Kishore Reddy, B.Rakesh, P.Manoj Kumar and N.Sandhya [2] they presented a paper on the Bluetooth based Wireless Home automation system using FPGA.They primarily focused on Bluetooth technology. With the help of the Bluetooth module (HC-05) and Android Phone, they control the home appliances, which all connected to FPGA board. Thus, they have mentioned the advantages of the home automation, which not only reduces the human efforts, but it is also energy efficient and time saving. Moreover, they have included that it is also help to the handicapped and old aged people to control the home appliance without any difficulties.

We need module so that the range will be high as well as it can operate in different frequencies.

This drawback is overcome by our model.Wi-Fi based networks work at 2.4, 3.6 and 5 GHz. In addition, it can extend up to range 100m.

### *C. HAND GESTURE BASED HOME AUTOMATION FOR VISUALLY CHALLENGED:*

Smitha M, T.Ayesha Rumana and Sutha P [3] published a paper entitled Hand gesture based Home Automation for Visually Challenged People. They have designed a device for the visually challenged people to help them to operating the home appliances. They have used MEMS (Microelectromechanical Systems) accelerometer which is used to sense the accelerations of a hand in corresponding three perpendicular direction that is (x y z) and thus transmit the signal to wireless protocol using Radio frequency. The gesture templates were stored in a microcontroller at the receiver end. The received gesture and the hand gesture were compared by the templates. If the corresponding gesture were matched with the templates then accordingly home appliances were controlled. In addition, these devices were help for the old aged person too.

Since they have used four types of gesture and stored in the microcontroller and it processed further. However, we need the system to be automated without the use of gesture.

We do not need the gesture to be stored in the controller. Nowadays, the application can be used by any means of people by the option “TALKBACK” in the android application.

### *D. HOME AUTOMATION USING ATmega328 MICROCONTROLLER AND ANDROID APPLICATION:*

S.Anusha, M.Madhavi and R.Hemalatha [4] presented a paper on Home automation using

AT mega Microcontroller and Android application. In this paper they have describe the design and development of a remote household appliance control system using the ATmega328 microcontroller and android mobile through GSM technology. In addition, this appliances remotely using the SMS-based system that satisfying user needs and requirements. Thus, all electrical household appliances can be controlled by sending a text message from an Android mobile.

For Controlling, the remote appliances carried out by sending a SMS message from a mobile phone, which again congestion process and make system, complicated for the disabled persons.

Here, we does not carry out this technique, we are using simple open source android application through Wi-Fi we can directly control the entire appliance with a greater extent. Thus, intend to be a reliable method.

***E. E-MAIL INTERACTIVE HOME AUTOMATION SYSTEM:***

Sirisilla Manohar and D.Mahesh Kumar [5] presented a paper on E-mail interactive Home automation system. They have enlighten on a basic home automation application on the public domain through the subject of E-mail ID.The switching action were done by LED indication. They provide a basic application of home automation using GVT app, which can be easily implemented and used as efficiently. The coding which they provide is generic and flexible in user-friendly manner and can be controlled in any application like power control, surveillance etc easily. In addition, all the results were generated by a series of E-mail sent to the user of G-mail account.

For each and every interrupts one email will generated and will send to the user of the G-mail account, which again a tedious process.

We can easily control the appliances instead of going through such process.

## III.PROPOSED SCHEME:

Home Automation usually is comprised of three main parts:

1. Main Controller
2. Interfaces
3. Control methods

*A. **MAIN AUTOMATION CONTROLLER:***

***1) ARDUINO UNO BOARD***

The 8-bit AT mega 328P microcontroller based on Arduino UNO is used in this proposal is to control the different components like Wi-Fi module and relay circuit networks. The advantage to having a separate controller is to focus only on the desired task.

***2) INTERFACES:***

An Interface is the way we interact with the Home automation controller. There are many types of interfaces like Touch Panels, Keypads, Remotes, Mobile Devices and Internet.

In this proposal, we used a Mobile device (Android smart phone).Nowadays it is a very common device for every user. We need to install an appliance controller application in it. In addition, within the mobile interface it can be able to control all the respected appliances of the home.

Wouldn't it be nice to be upstairs, pull out your mobile phone, and turn off all the lights in your house with the press of a button right before you go to bed?

***3) CONTROL METHODS:***

We now have a controller, interfaces to interact with the controller, and sensors that tell the controller what things are occurring in the house.

Controllers can communicate and control the many different parts of a Home Automation System in a variety of ways. Some of these are IP (Internet Protocol sp), Wi-Fi, Bluetooth, Zig-bee, IR, Serial Data, and Relays (for motorization).

***B. Wi-Fi technology:***

Wi-Fi is a great option when you cannot get Ethernet wiring to desired locations. It is a good medium for communicating to different locations in the house, and will allow large bits of information to be passed back and forth with no wires. It is always best if we can get a wire to the location you are trying to control, but sometimes this is not possible or would be cost prohibitive.

**Advantage of using Wi-Fi technology:**

- **Equipment can be placed almost anywhere**
- **No unsightly cords running through your home**
- **No need for additional Ethernet output**
- **Provide wide range and more efficient**

## IV.PROPOSED BLOCK DIAGRAM:

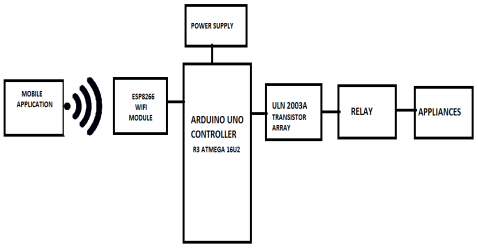


**Figure 1**

In this system, we are going to make a home automation system using ESP8266 Wi-Fi module and Arduino Uno Controller R3. With the help of these modules, we will be able to control lights, electric fan and other home appliances through a Wi-Fi application using our Android Smart phone. All the appliances will be connected to relays, which are controlled by the Arduino.

ESP8266 and Arduino together act as a web Server and it will send control commands through the mobile application i.e., android software.

We are implementing with the help of ESP8266 Wifi Module, as it is a self-contained SoC with integration of TCP/IP stack, which may help any microcontroller having UART to access a Wi-Fi network. It can act as both Wi-Fi access point as well as a Wi-Fi client. It is pre-programmed with AT commands, so we can easily access and configure it using a microcontroller. First, we can connect ESP8266 with Arduino Uno. The ESP8266 runs on 3.3V, it may damage if you connect it directly to 5V from Arduino. Now we can connect relays to Arduino. Here a ULN IC is connected which is used as relay driver. Then all the AC devices are connected to relay output to ON/OFF the AC devices.

### *A. ULN IC:*

It is a relay driver IC and it is a Darlington array having high voltages and high currents. It is made up of seven open collector Darlington pairs having common emitter which show ULN2003 has a capability of handling seven different relays at a time. A single Darlington pair consists of two bipolar transistors and operates in the range of 500mA and 600mA.

## V. IMPLEMENTATION:

For the implementation of our model, firstly we had developed a Webpage and tested successfully. The flow model for the control of appliances with a Webpage was given below:

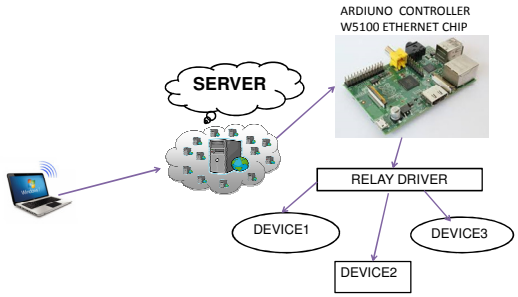


***Figure 2***

This complete system has two parts. One is web page to control and other is the appliance to be controlled like motor, bulb etc.

The web page consists of the login page, which is used for authentication of a particular appliance to particular user. Once we logged into it we can control the particular device, which is associated to that user.

The Ethernet shield allows an Arduino Board to connect to the Internet. It is based on the Wiz net W5100 Ethernet chip. In addition, the W5100 Ethernet shield uses the Ethernet library.

### *A. Proposed System Implementation:*

1. Start
2. System will be initialized.
3. Initially all control devices will be OFF after power-on.
4. Wi-Fi module will be initialized.
5. Open mobile application on Android smart phone.
6. Establish connection between Wi-Fi module and mobile application on Android Smart phone.

7. Waiting for control command to be received from Android mobile application.
8. Send control command (ON/OFF device) from Android mobile application.
9. Check received control command format.
10. If received command is "ON" then turn ON the particular Device.
11. If received command is "OFF" then turn OFF the particular Device.
12. Stop.

## VI. APPLICATION:

- Lighting control system
- Heating ventilation and air conditioning(HVAC)
- Appliance control with a smart grid
- Indoor positioning systems
- Home automation for elderly and disabled people

## VII. CONCLUSION:

Today, Android is the world's powerful mobile platform open source operating system to fit easily whatever the functionality we had in our mind. This article is about wireless home automation using Android mobile helps you to implement such a fantastic system in our home at a very reasonable price using cost-effective devices. Thus, it overcomes many problems like costs, inflexibility, security etc. In addition, will provide greater advantages like it decrease our energy costs, it improves home security. In addition, it is very convenient to use and will improve the comfort of our home.

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## Author's Profile:

Nikita Baidya presently pursuing her Under graduation final year in the Stream Electronics and Communication Engineering from Dr.B.R.Ambedkar Institute of Technology, Port Blair affiliated to Pondicherry University. Her area of interest are in Internet of things, Cloud Computing, Computer networks.