HOME AUTOMATION USING NODE MCU AND ANDROID APPLICATION

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***Abstract*:** The purpose of this paper is creating a mobile app on a smart phone device so that the user can control electronic devices form that application. The Home Automation is a wireless home automation system that is supposed to be implemented in existing home environments, without any changes in the infrastructure. Home Automation let the user to control the home from his or her smart phone and assign actions that should happen depending on time or other sensor readings such as light and temperature from any device in the Home Automation network. This research paper involves the design and construction of an individual control home automation system using Node MCU. Home automation is the automatic or semi-automatic control and monitoring of household appliances and residential house features like Tube light, Fan and even the Room Heater. This research paper also consists of a Door bell which automatically rings when any obstacle comes in front of the IR sensor.

Keywords: Home Automation, Smart Home, Smart home appliances

1. INTRODUCTION

Generally, when we go out the house we switch off the light or the electrical equipment to avoid accidents such as short circuit, firing, etc. but sometimes we forget to switch them off, we have to come back home to do so. This is wastage of time and creates lots of chaos and tension. So to avoid such kind of situation the latest technology already came world wide is smart home technology. Smart home is one in which all electrical equipment around the home is technologically smart or intelligent or automated with highly advanced automatic system for security in other system. Smart home is useful for everyone and can also be used in everyday life at home. Smart home is consisting of three parts- network, controlling device and Home automation.

Network can be wired or wireless. It is used for connecting the automation to controlling device. Controlling devices can be used for managing the system. Home automation are the devices which control the physical environment.

2. LITERATURE SURVEY

In recent year, there are many implementation is going for the smart home system for residential building to make it more efficient day by day.

Many researchers are implementing to optimize efficiency of the Home automation system; Nowadays, mostly VB (visual basic) and PLCC are used. Practically we can implement the smart home to optimize the better result and to improve the technology and provide humans with more comfort and less consumption of electricity.

3. MATERIALS AND METHODOLOGY

Through Node MCU and Android application the optimization of smart home has been done. We observed the variation of temperature, and the room heater will turn on and turn off as per temperature. And the loads which are connected through relays which are used to switch on and switch off the loads via sending request through mobile phone. It will work only with the output of 3.3V.

4. HARDWARE IMPLEMENTATION AND WORKING

We prepared a home like environment and connected all the components to each other as needed. The hardware implementation of this project needs following component - NodeMCU, Relay, DHT 11, IR Sensor, Buzzer, Bread Board Jumper Wires, LEDs and Arduino(IDE).
The Hardware implementation of proposed project work is shown in figure below:

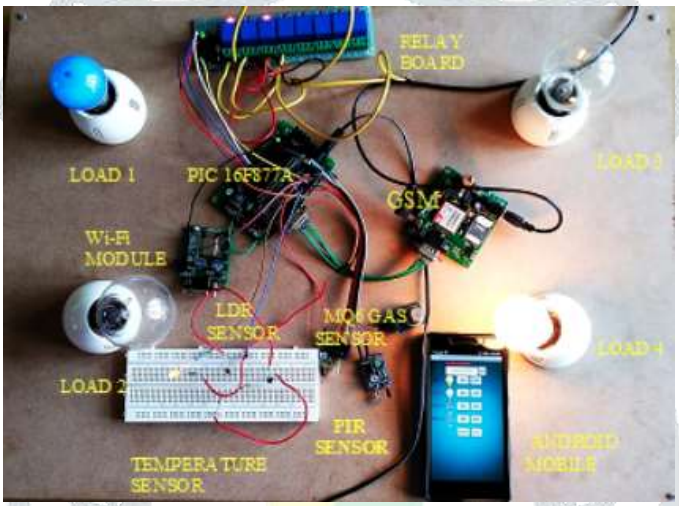

Figure 1: Hardware Implementation of Model Project

5. WORKING OF MODEL PROJECT

Firstly, we provide the 220v supply to model project to connect the bulb in the circuit. Our project has three modules: Automatic Door Bell, Smart Room Heater and Turning ON/OFF appliances via mobile.
Automatic door bell works smartly when any one comes in front of the IR sensor the buzzer will start ringing. Smart Room heater turns off after reaching to peak temperature which is fed in to the code. Appliances connected to relay turns ON/OFF using an Android application which may be a distance apart.

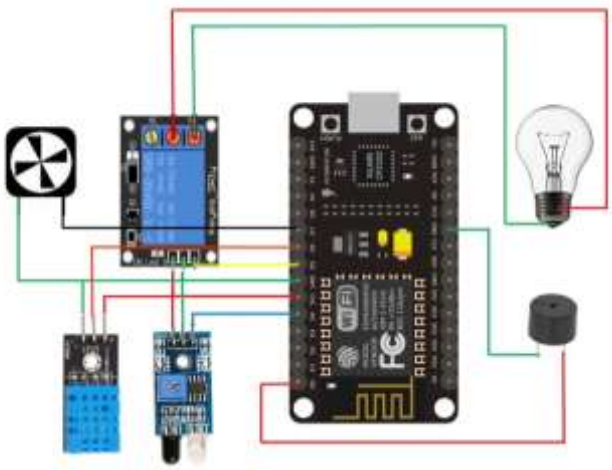

Figure 2: Circuit Diagram of model project

There are three control methods by which we can control it.

- Automatically Control
- Smart Phone Control
- Computer Control

For controlling the bulb from smart phone there is Android application through which we can turn on/off the bulb. The android App sends the data to Google firebase and through Google firebase the data is sent to NodeMCU which performs the action of turning on/off the devices.

There are various to process for connecting android app with Google Firebase and Google Firebase to NodeMCU

- The first approach, listing ports and connecting with Firebase
- Create a client app for managing lights and Fans
- Provide Authentication based on firebase auth

Figure 3: Android App

When we click on any button of this Android app the App send the data to the Google Firebase and the data may be "TRUE" or "FALSE" and this data got saved in Google Firebase Database as shown in figure 4.

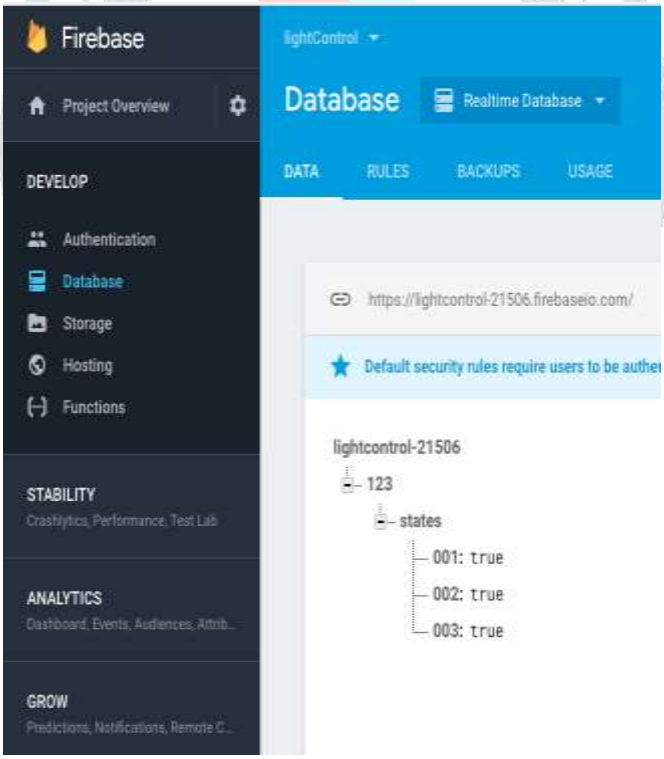

Figure 4: Google Firebase Database

And when the action (True or False) is sent from Application it gets saved into the database and at the same time Firebase sends it to NodeMCU. NodeMCU preforms the action received from firebase.

6. RESULT

It is evident from this project work that an individual control home automation system can be cheaply made from low-cost locally available components and can be used to control multifarious home appliances ranging from the lamps, the television to the air conditioning system and even the entire house lighting system. And better still, the components required are so small and few that they can be packaged into a small inconspicuous container.

7. CONCLUSION

The designed home automation system was tested a number of times and certified to control different home appliances used in the lighting system, air conditioning system, heating system, home entertainment system and many more (this is as long as the maximum power and current rating of the appliance does not exceed that of the used relay).

Finally, this home automation system can be also implemented over WI-FI, Infrared and WAP connectivity without much change to the design and yet still be able to control a variety of home appliances. Hence, this system is scalable and flexible.

8. FUTURE SCOPE

The next phase for the Home automation market will occur based on a few key improvements in the technology available in Automation, such as improvement in Wireless Automation solutions as well as lowering of price points as the market begins to accept Home automation usage in larger volumes. Some trends that we foresee for this phase of the industry are:

- Big companies like Philips, Siemens & Schneider will eventually bring out fairly mass market automation products with appealing user interface but at a lower price point than today, and more people will be able to afford the products
- Solution offerings will slowly move to a more user friendly design, where aside from a few key components, users will be able to buy and use the Automation products themselves without the aid of any technical expert
- Some foreign players will have niche in high end automation and focus on the premium market (>20 Lakh ticket size).

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