

IoT Based Remote Control for Office Automation

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Abstract— This work will present one of the application of internet of things (IoT) that is Office automation. The objective of this paper is to control independent Office electrical appliances through internet based remote system. From anywhere, any place where there is internet connectivity, it can change the state of those electrical appliances either in on state or off state. The controlling circuit is built around Node Mcu ESP8266 and any android phone for controlling the appliances. In addition to the mobile phone, controlling can also be done through web dashboard from laptop or desktop. Any four GPIO pins are selected from the node mcu to control four specific applications such as corridor light, main door locking system, running the motor for overhead tank and fan.

Keywords— **IoT, nodemcu, web dashboard, relay, solenoid key.**

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I. INTRODUCTION

The advancement of technology has led to the increase of electrical equipment's and modern household appliances to make our life much easier and comfort. Nevertheless, operating through manually is a tedious job and again hectic sometimes. If one can control those appliances, equipment's and devices with a hand held remote button from a distance place, life would be more comfortable and simpler. Home automation through internet of things is becoming very common and popular these days with the change of technology to reduce manual work. To switch off or to switch on the appliances or devices, one has to move to the switch board which is inconvenient even for an able person. If all this tedious manual work can be replaced by a single remote control system then even the aged and disable person can do the task like a normal person does. Many related work has been reported and published for the same function by different groups with different approaches. Multiple home devices switch can be control with a designed system using microcontroller as heart of the circuit with android based mobile phone. Here the mode of controlling devices is by sending command wirelessly through Bluetooth [1]. Infra Red remote control has a very wide application in the field of electronics. IR based remote control for controlling multiple home appliances with microcontroller is also reported for the same function [2], [3]. Another approach is by GSM based for home automation. This is done by sending short sms code from a mobile handset. Here it has a wider coverage area. So to control any house hold appliances from a distance place within the network area coverage sending a short sms code will either ON or OFF the devices at home [4], [5]. Controlling and monitoring of home environment with IoT is also presented [6], [8]. Designing an advance and wireless home automation system using Wi-Fi Technology has also implemented [7], [9], [10]. All the above work is carried out for the same application with different approach by using different technology. Some use Bluetooth technology for shorter distance while other use GSM technology for wider coverage or RF technology. Each of the technology offers both advantages and disadvantages over the other but they all serve the same purpose that is to replace tedious manual work. The main objective of this work is also to create another system to control multiple office appliances by using IoT. One big advantages of IoT based remote control is that it can operate and control the appliances from anywhere and anyplace as long as there is internet connectivity whereby increase its operating range. Figure.1 shows the basic overall design system to control four independent office appliances like door locking system, running the motor for overhead tank, lighting the corridor and operating the fan through a remote with four switches.

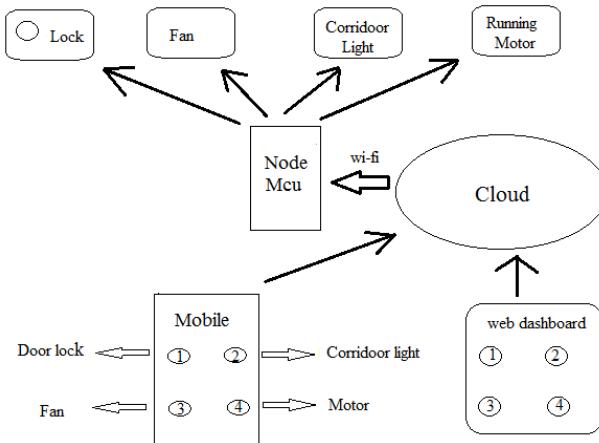


Figure.1 controlling the appliances with IoT

Figure.1 shows the overall architecture of the operating mechanism to control the appliances remotely through a mobile phone or web dashboard. It is a one way communication in which each of the appliances will act as per the control signal from the mobile/web dashboard. The cloud is linked to the nodemcu through a wi-fi module and to the mobile phone application through an internet connectivity. When a button is pressed from the mobile phone or web dashboard, the corresponding output port of the nodemcu will be active which in turn will activate the relay and control the appliance.

II. CIRCUIT IMPLEMENTATION

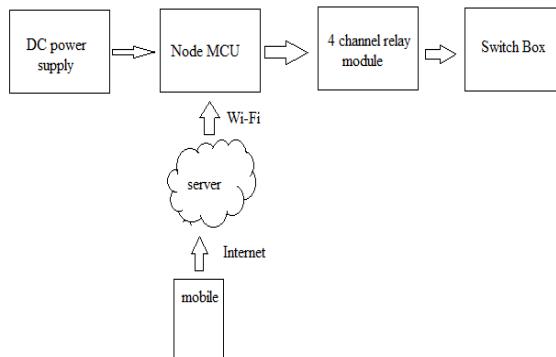


Figure.2 Automation architecture at Block level.

The whole architecture of controlling the state of the switch box where loads or electrical appliances to be connected is shown in Figure.2. With the help of a mobile application, four way switches will be created which will corresponds to each of the switch box through a relay. Any signal to change the state of the switch box either in on state or off state is controlled by those switches remotely. Mobile is connected to the internet and the nodemcu is connected to the mobile phone through a Wi-Fi module which is embedded inside. Four general purpose input output pins from the node mcu is connected to the input of relay which its output in turn will control the state of the switch.

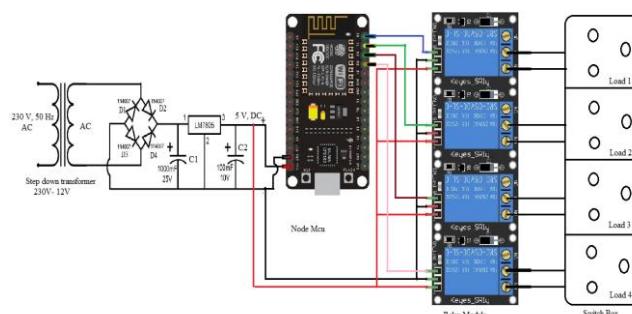


Figure.3 Circuit diagram of switch box to be controlled.

The complete hardware connection is shown in Figure.3. The heart of the circuit is nodemcu which is power by 5V DC power supply. A step down transformer, bridge rectifier and a 5V DC voltage regulator is used for constant power supply to the whole circuit as shown in the circuit connection above. Any four GPIO of the nodemcu is used as output to send the signal to the four channel relay module. The output port of relay module will than either put on or put off the loads which are connected to the switch box. This section of the circuit will act as a receiver part while the hand held mobile or the web dashboard will act as a transmitter. It is a one way communication from point to point link. Four remote button will set a communication link with the four switches independently. All the component parts for implementing the hardware connection is also listed in Figure.4.

Sl.no	Part list	quantity
1	step down transformer	1
2	1N4007 diode	4
3	LM7805	1
4	1000mF, 25V, C1	1
5	100mF, 10V, C2	1
6	ESP8266 nodemcu	1
7	5V, 4-channel relay module	1
8	Switch Box	1
9	wire & jumper	-

Figure. 4 List of components for the Circuit diagram.

In this work, the mobile application which is used for creating the virtual remote buttons for controlling the appliances is Blynk2.0. These button is also created in any device like laptop or desktop as a web dashboard so that the appliances can be control through either a mobile phone or web dashboard from desktop or laptop. Each state of the button which is control by mobile phone will reflect in a web dashboard and vice versa. The node mcu is then program for four output port to either remain in logic 1 or logic 0 corresponding to the logic state of toggle switch which is created in the mobile application.

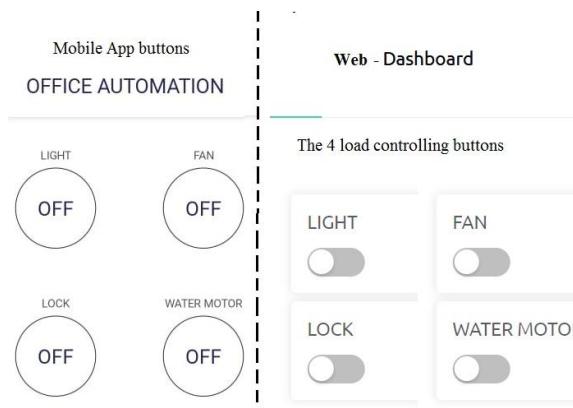


Figure. 5 Control panel buttons

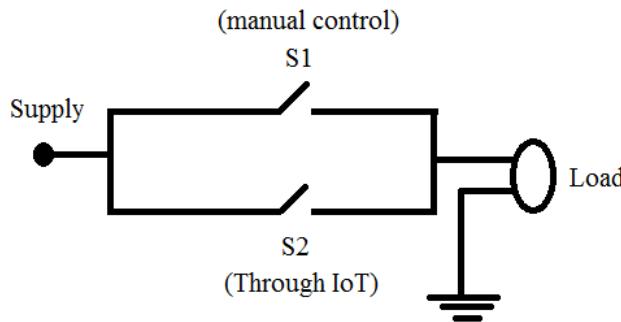


Figure. 6

The load can be controlled in two ways as shown in Figure.6. It follows a logic OR gate operation. By opening one of the switch (S1), the other switch (S2) can be controlled and vice versa. This can be controlled either manually or through internet. But to act independent either one of the switch should be open.

The overall implementation of the model to control the solenoid key door locking system, fan, lighting the bulb and running the motor from the main AC line is shown in Figure 7. One advantage of the model is that it can operate manually as well as with IoT.

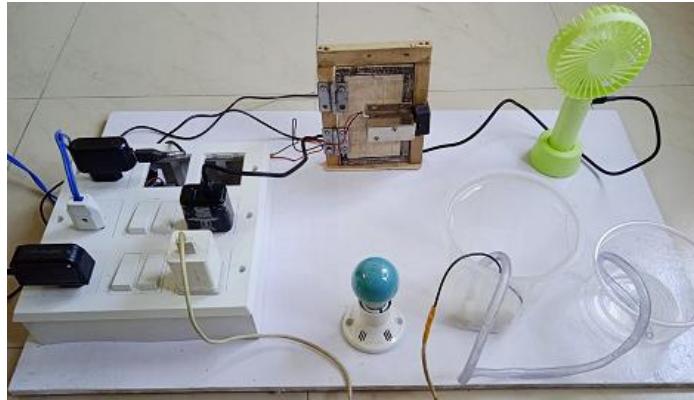


Figure.7 The complete model of the work

IV. CONCLUSION

The gift of technology to mankind is immense and it is to make life more comfortable and simpler. In this work, a smart switch box for controlling multiple office appliances is designed, presented and implemented as shown in Figure 7. The design module is durable, robust and reliable as it is implemented with an available compact IC's and relay module. From any place in or around the office, any four appliances can be controlled through a relay with the press of a button. Multiple devices can be controlled using the remaining GPIO pins of the node mcu using a single device.

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