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A Smart Switch to Connect and Disconnect Electrical Devices at Home by Using Wi-Fi

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Abstract:-An environment of the home appliances control system, the component selection generally thoughtful the stability and economy. Power saving is very important in the present situation and must be done to a maximum level wherever it is probable. Power can be successfully saved if we can control the house electrical appliances such as fans, lights, AC, refrigerators, TV's and motor etc. The key concept of this paper is to propose an advanced electrical appliances controlling at offices and homes by smart phone using Wi-Fi technology. The controlling of electrical appliances is done by using mobile app through smart phone using the Wi-Fi feature present in it.

Keywords: -ARM-7 Processor, Wi-Fi, Relay

I. INTRODUCTION

Automation has created a bigger publicity in the electronics. The main cause for this publicity is automation providesuperior advantagesuch as energyconversation, reliability, accuracy and more over the automated systems do not need any creature attention. Any one of the necessities stated above demands for the design of automated components. The power saving is very important in the current scenario and must be done to a maximum extent where ever it is probable. Now a day's houses and offices automation systems are used more and more. On the one hand, they provide increased comfort especially when employed in a private home. In other way, automation system installed in profitable homes does not only enhance comfort, but also permitcentral control of heating, air conditioning, lighting and ventilation. Hence, they donate to an overall pricedecreases and also to power saving is unquestionably a major issue today.

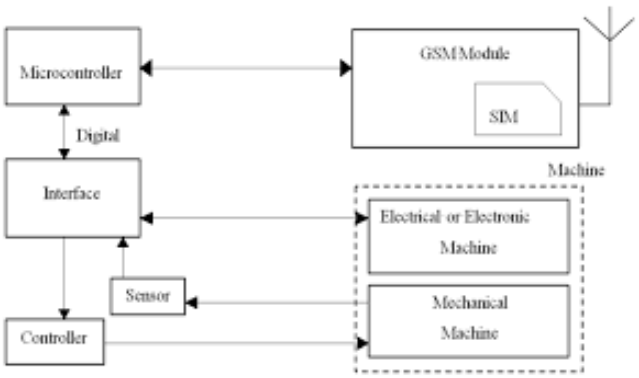
This paper main AIM of connecting and disconnecting of electrical devices at home using Wi-Fi. In this project we are going to make a home automation system using Wi-Fi module and ARM-7 Processor. Using these we will be able to control electric fan, lights, motor and other home appliances through a web browser using your smart phone. These appliances of AC mains will be connected to relays; transistors are controlled by the processor. Home automation system uses the portable devices as a user interface. These devices can communicate with home automation network by using an Internet gateway, by means of low power communication protocols, example of Wi-Fi etc.

The main controlling part of the total project is ARM -7 Processor. Devices, relays, transistors, Wi-Fi module are interfaced to the processor. The processor control's the devices connected to it after receiving the data from the smart phone through Wi-Fi module. Relays, Transistors are connected to turn ON/ OFF the devices. To do this task processor is programmed using with the help of embedded c language.

II. LITERATURE SURVEY

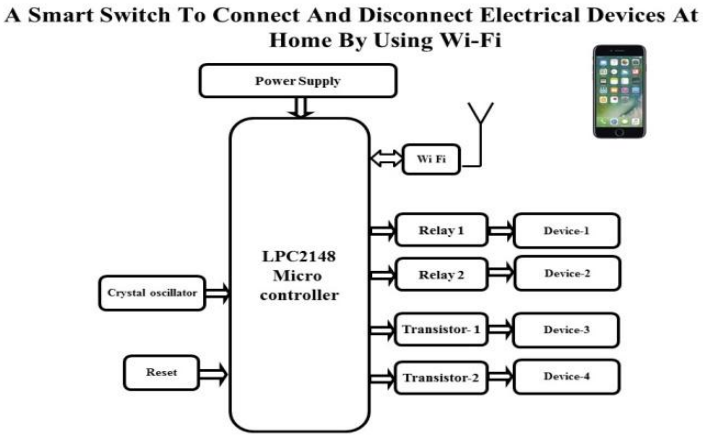
[1]GSM based home automation system using cell phones: Because of the smart phone and GSM technology, the GSM based house or office automation is lure to research. The SMS based house automation, GPRS based house automation and Dual Tone Multi Frequency (DTMF) based house automation, these options we measuredmostly for communication in GSM. In figure shows the logical diagram the work of A. Alheraish, it showing the how the house sensors and componentswork together with the house network and interacts through SIM (subscriber identity module) and GSM. This system use transducer that converts machine function into electrical signals which goes into microcontroller.

The sensors of system convert the physical qualities like sound, temperature and humidity into some other quantity like voltage. The microcontroller analysis all signal and convert them into command to understand by GSM module. Select appropriate communication method among SMS, GPRS and DTFC based on the command which received GSM module.



[2]. Home automation using RF module: The important goal of Home Automation System is to build a home automation system using a RF controlled remote. Now technology is accelerating so homes are also getting smarter. Modern homes are deliberately relocating from current l switches to centralized control system, containing RF controlled switches. Today traditional wall switches situated in various parts of the home makes it laborious t for the end user to go near them to control and operate. Even further more problematic for the old persons or physically handicapped people to do so. Home Automation using remote implements an easier solution with RF technology. In order to accomplish this, a RF remote is joint to microcontroller on transmitters'sideways that move OFF/ON signals to the handsetwhere components are associated. By operating the stated remote switch on the receiver, the load should be turn OFF/ON globally using wireless technology

III. IMPLEMENTATION



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From the above figure, we can see that, the device which is able to perform the whole task is an ARM-7 processor. All the hardware components are interfaced to the processor. ARM-7 processor performs all the necessary things to connect and disconnect electrical devices using wireless technology (Wi-Fi). To do this it is programmed Embedded C language

IV. RELATED COMPONENTS

Controlling of home appliances is done by smart phone through mobile app using Wi-Fi, which is interfaced with the ARM-7 Processor.

The brief introduction of different components used in this project is discussed below:

ARM-7 PROCESSOR:

ARM is a combination of tutoring set architectures for computer processors based on a compacttutoring set computing (RISC) architecture developed by British corporation ARM Assets. ARM7 is one of the broadly utilized smaller scale controller family in installed framework application. LPC2148 is the broadly utilized IC from ARM-7 family. It is produced by Philips and it is pre-stacked with numerous inbuilt peripherals.

1. 8 to 40 kB of on-chip static RAM and 32 to 512 kB of on-chip streak program memory.
2. 128-piece wide interface/quickening agent empowers rapid 60 MHz task
3. USB 2.0 Full Speed agreeable Device Controller with 2 kB of endpoint RAM.
4. In expansion, the LPC2148 gives 8 kB of on-chip RAM open to USB by DMA.
5. Single 10-bit D/A converter give variable simple yield.
6. Two 32-bit clocks/outer occasion counters (with four catch and four look at channels each),
7. Power sparing modes incorporate sit without moving and Power-down.
8. Individual empower/incapacitate of fringe works and in addition fringe clock scaling for extra power enhancement.
9. Processor wake-up from Power-down mode by means of outside intrude on, USB, Brown-Out Detect (BOD) or Real-Time Clock (RTC).
10. Single power supply chip with Power-On Reset (POR) and BOD circuits
11. – CPU working voltage scope of 3.0 V to 3.6 V (3.3 V ± 10 %) with 5 V tolerant I/O cushions

POWER SUPPLY:

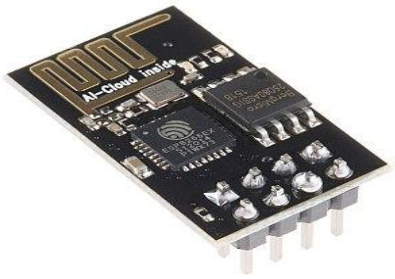
An (electrical) adapter or connector is a gadget that proselytes quality of one electrical gadget or framework to those of a generally contradictory gadget or framework. Some change power or flag properties, while others simply adjust the physical frame of one electrical connector to another.

In this adapter one type external power suppliers are AC/DC converter or AC/DC adapter, with this a case related to an AC plug. Other names of adapter are plugging in adapter, plug pack, domestic mains adapter, adapter block, wall wart, line power adapter, or power adapter. These devices are used with electrical components they need power but do not include internal devices to derive the necessary power and voltage from main supply. An external power supply of internal circuitry is much related to the design that could be used for a internal supply or built-in.

- Must be a DC adapter (i.e. put out DC, not an AC);
- Must be between 9Volts and 12Volts Direct current (DC).
- Should be rated for a smallest amount of 250 mille-amps. Current output, even though you will probably want incredible, more like 500 mille-amps or 1Amp output, as it gives you the current necessary to power a servo or 20 LEDs if you desire to.
- Should have a 2.1 mille-meter power plug on the Arduino end.
- The plug should be "centre positive", i.e. the central point pin of the plug has to be positive connection.

WIFI MODULE:

WLAN **or** Wi-Fi is generally known as becomes the prefer mode of interfacing to the internet. More people do not know the relation between explanations and descriptions. Full form of Wi-Fiis WirelessFidelity known to networksand operating under 802.11 standards. Wi-Fi allowing devices are smart phones, computers, PDAs, tabs and other devices are interacting to the broadband connection in a mode of wireless**.** 802.11 standards defining the wirelesscommunication is working electromagnetic waves processing. While understanding the explanations and descriptionsare Wi-Fi mode relation. For many types of purposes there are different modes of wireless networks such as Ad-Hoc mode and infrastructure modes are maximum using network modes.



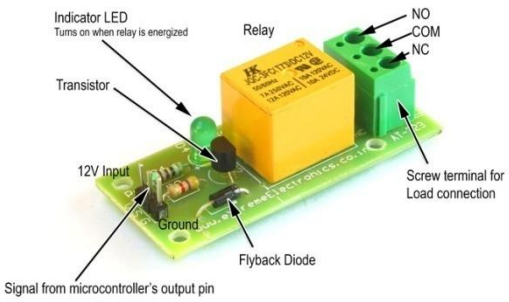
ESP-01 is one of the furthermostprevalent ESP8266 module obtainable in the marketplace. ESP8266 is a self-contained SoC with combined IP/TCP stack which help any microcontroller having UART to access a Wi-Fi network it can go about as both Wi-Fi passage and additionally a Wi-Fi customer. It is pre-modified with AT summons, so we can basically dish and arrange it utilizing a microcontroller.

ESP8266 keeps running on 3.3V and its information pins are not 5V tolerant. Along these lines, we require diminishing the 5V yield of the LPC2148 TX stick to 3.3V by utilizing voltage controller to append to Rx stick of ESP8266 module.

RELAY:

A **Relay** is an electrically worked switch. Many transfers utilizes an electromagnet to work an exchanging instrument, however other working standards are additionally be utilized. Transfers discover applications where it is basic to control a circuit by a low-control flag, or where various circuits must be controlled by one flag. The main transfers were utilized in long separation broadcast circuits, rehashing the flag rolling in from one circuit and re-transmitting it to another. Transfers discovered wide use in phone trades and early PCs to perform sensible tasks.

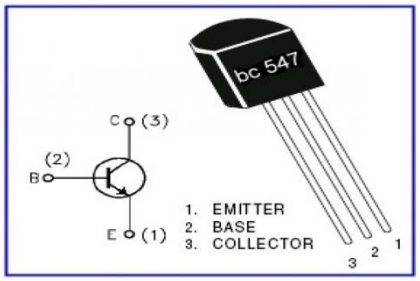
A kind of hand-off that can deal with the powerful important to specifically drive an electric engine is known as a temporary worker. Strong state transfers control circuits with no moving parts, rather utilizing a semiconductor segments activated by light to perform exchanging. Transfers with aligned working attributes and once in a while different working loops are utilized to shield electrical circuits from over-burden or blames; in current electric power frameworks these capacities are performed by advanced gadgets still called "insurance transfers".



TRANSISTOR:

A **transistor** is a semiconductor gadget used to intensify and switch electronic signs and electrical power. It is made out of semiconductor material with somewhere around 3 terminals for association with an outside circuit. A current or voltage connected to one sets of the transistor's terminals changes the present coursing through another match of terminals.

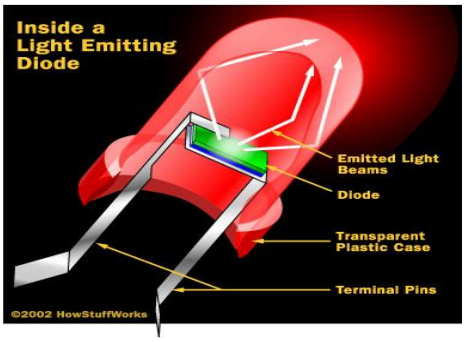
There are 2 kinds of transistors, which have slight contrasts by they way they are utilized in a circuit. A bipolar transistor has terminals named gatherer, base and producer. A little current at the base terminal (that is, streaming between the producer and base) can control or switch a significantly bigger current between the gatherer and producer terminals.



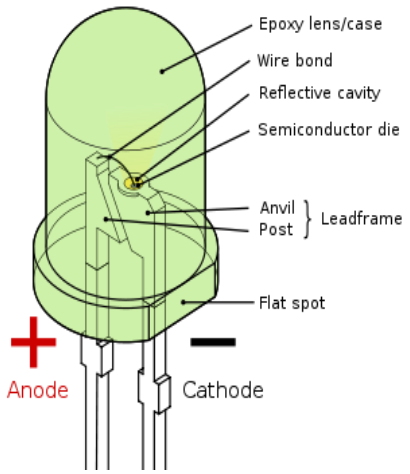
LED INDICTAOR:

A light-emanating diode (LED) is a semiconductor light source. Dirven's are utilized as marker lights in numerous gadgets and are progressively utilized for lighting. The structure of the LED light is totally not the same as that of the light. Incredibly, the LED has a straightforward and solid structure with semiconductor material which decides the LED's shading. The LED depends on the semiconductor diode. At the point when a diode is forward one-sided (exchanged on), electrons can recombine with gaps inside the gadget, discharging vitality as photons. This impact is called electroluminescence and the shade of the light (relating to the vitality of the photon) is dictated by the vitality hole of the semiconductor. Dirven's present numerous preferences over brilliant light sources including lower vitality utilization, longer lifetime, enhanced heartiness, littler size, quicker exchanging, and more noteworthy solidness and unwavering quality.

A semiconductor light source of component is light-emitting diode (LED). These are mainly used as indicator lamps in a lot of devices, and are more and more used for lighting. This component Introduced in 1962, early LED's emits low-intensity red indicating light, but now a day's versions are presented across the visible, infrared wavelengths and ultraviolet, with very elevated intensity



Internal view of a LED



LED parts

V. SCHEMATIC DAIGR0AM

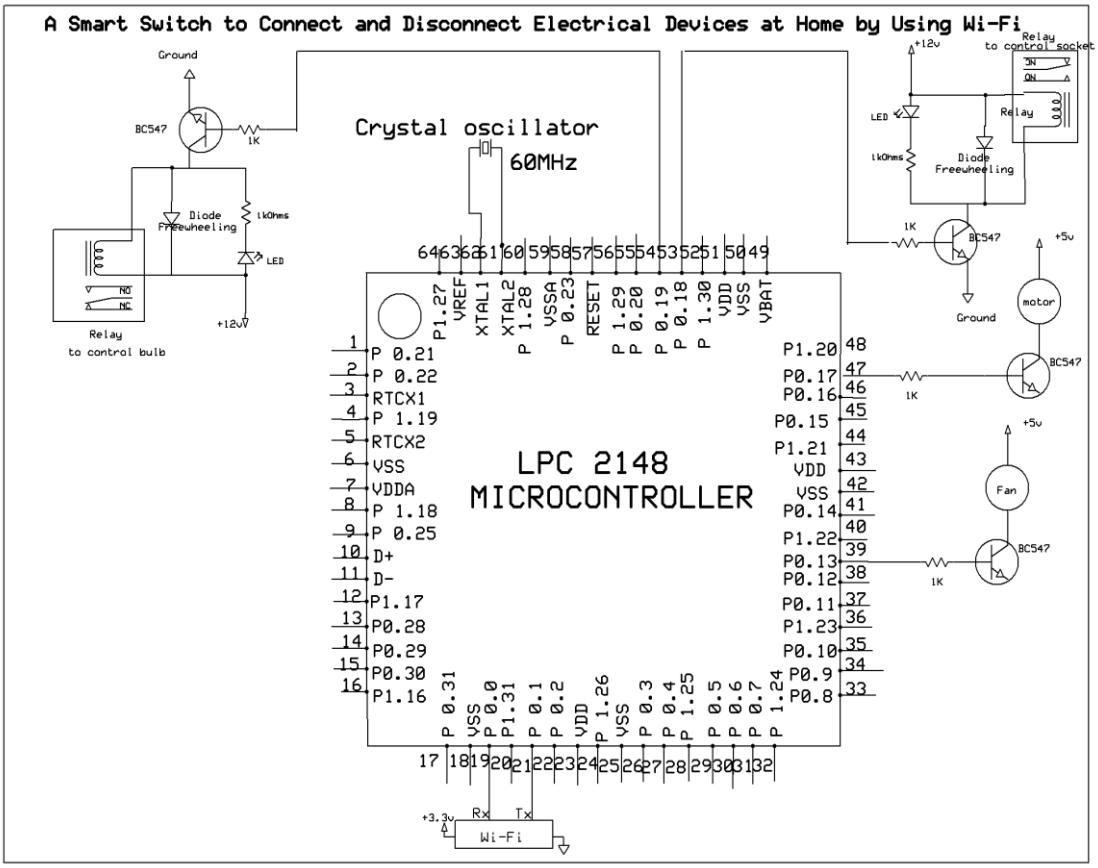


Fig.: Schematic diagram of A Smart Switch to Connect and Disconnect Electrical Devices At Home by Using Wi-Fi

The above schematic diagram of **A Smart Switch to Connect and Disconnect Electrical Devices At Home by Using Wi-Fi** explains the interfacing section of each component with micro controller.

VI. EXPERIMENTAL SETUP

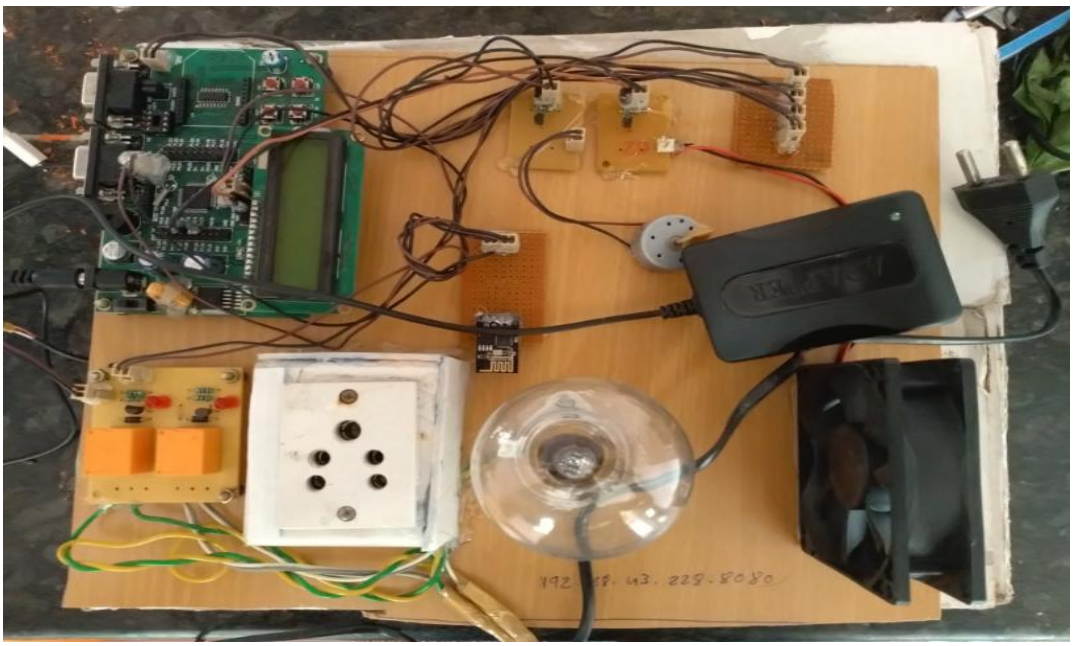
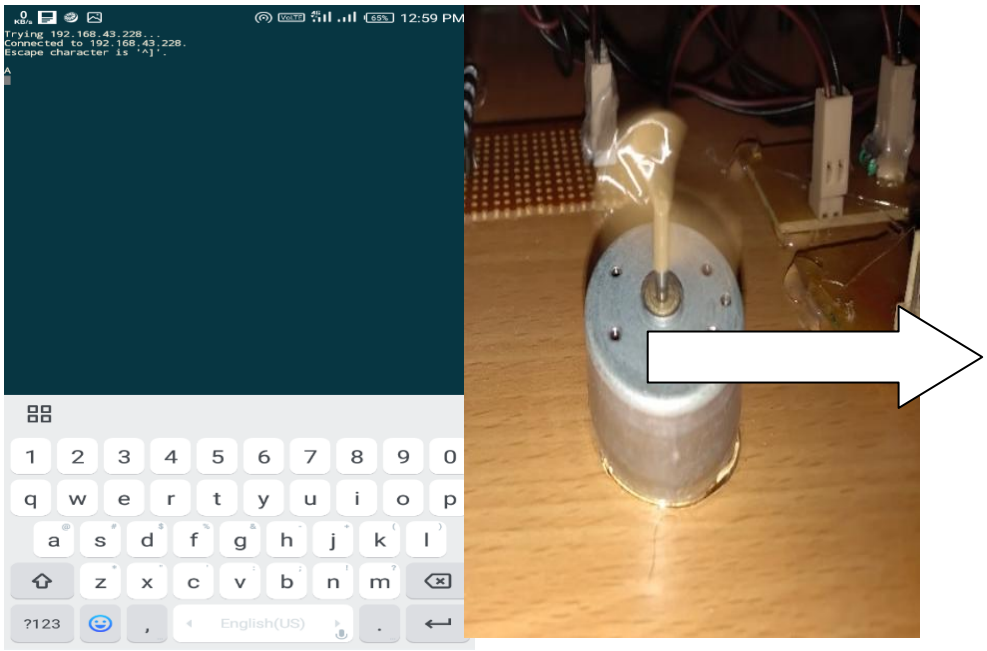


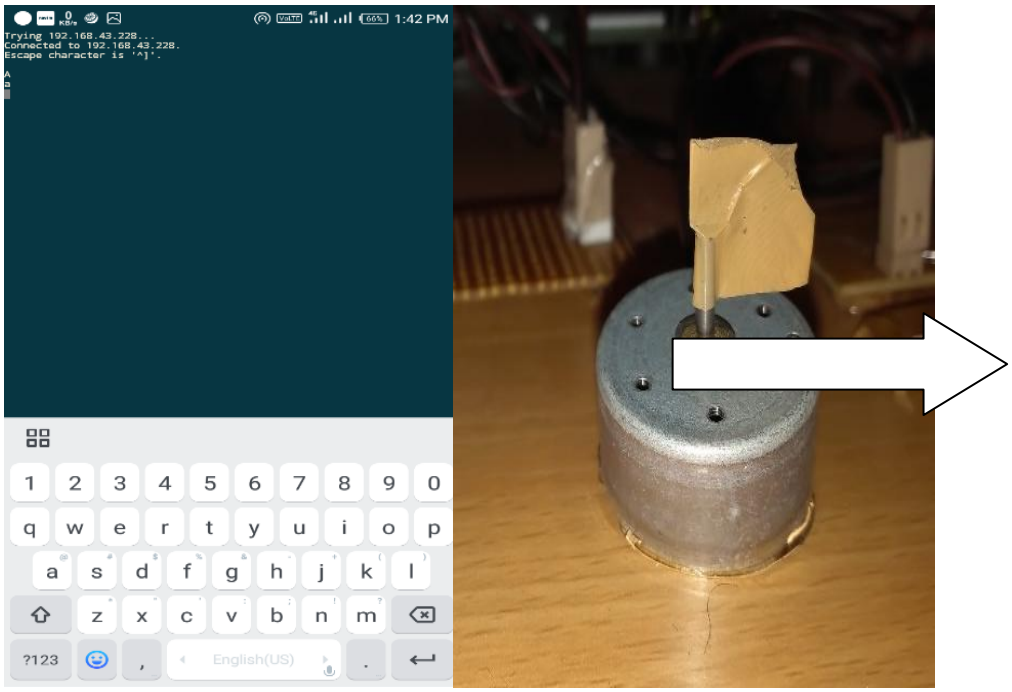
Fig. Experimentally setup of all components

VII. WORKING IMAGES OF PROJECT

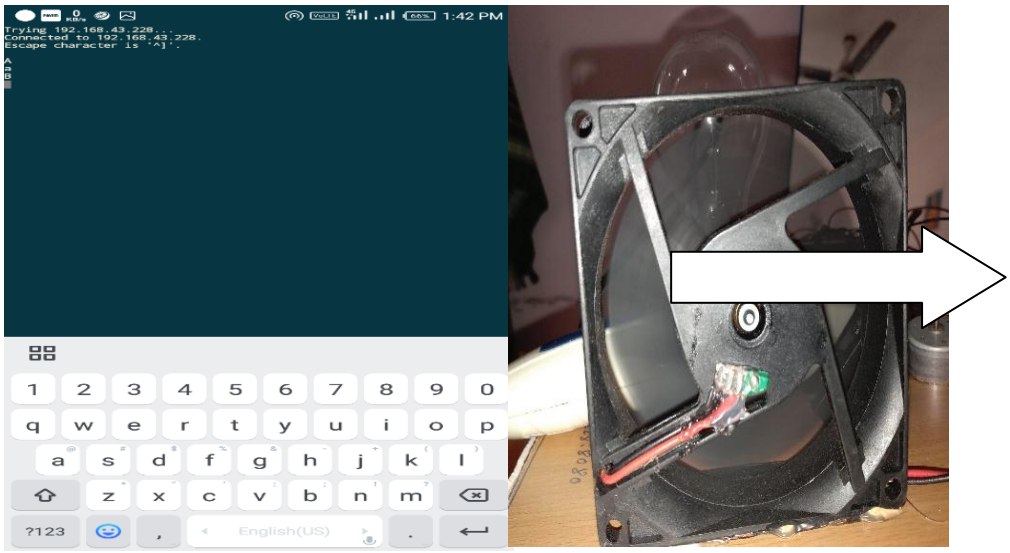
This project will be totally based on the android smart phone mobile app, i.e. juiceSSH app, this app will be installed from the google play store. Whenever connected to Wi-Fi component then total electrical output devices controlled by the juiceSSH app that will be explained step by step images as follows given programming in the android mobile app.



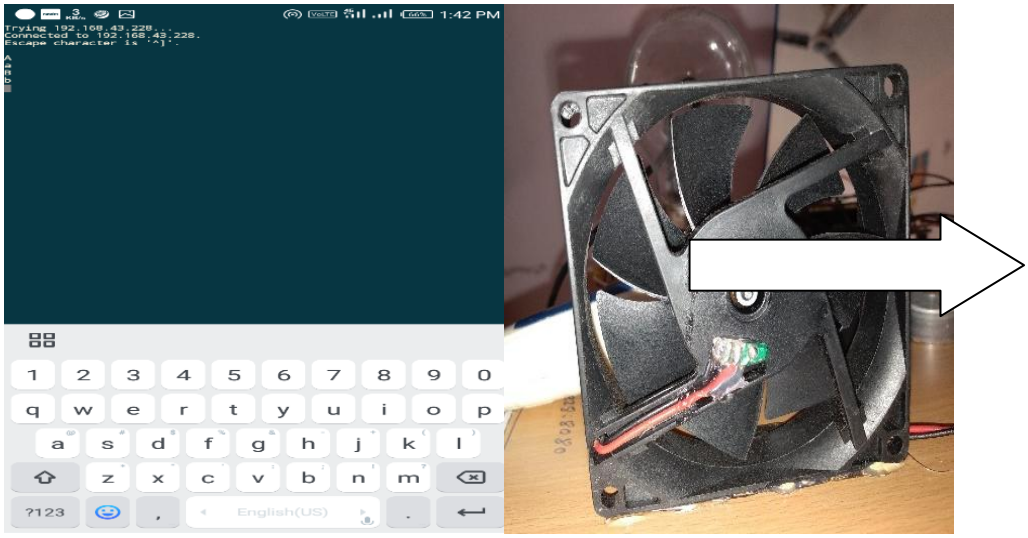
Type ‘A’ and press enter symbol in keypad Motor will be ‘ON’ position



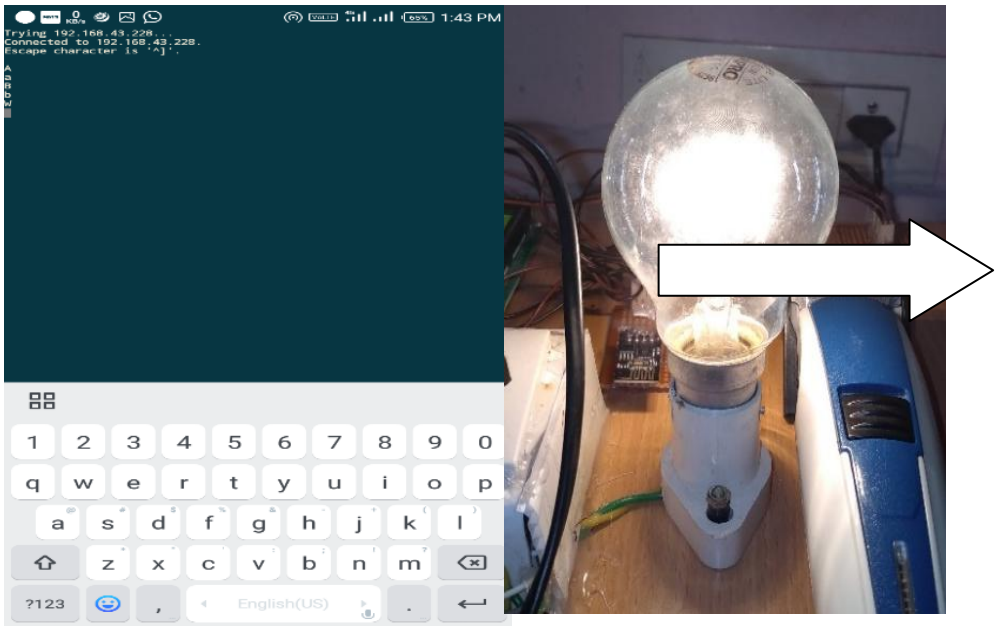
Type ‘a’ and press enter symbol in keypad Motor will be ‘OFF’



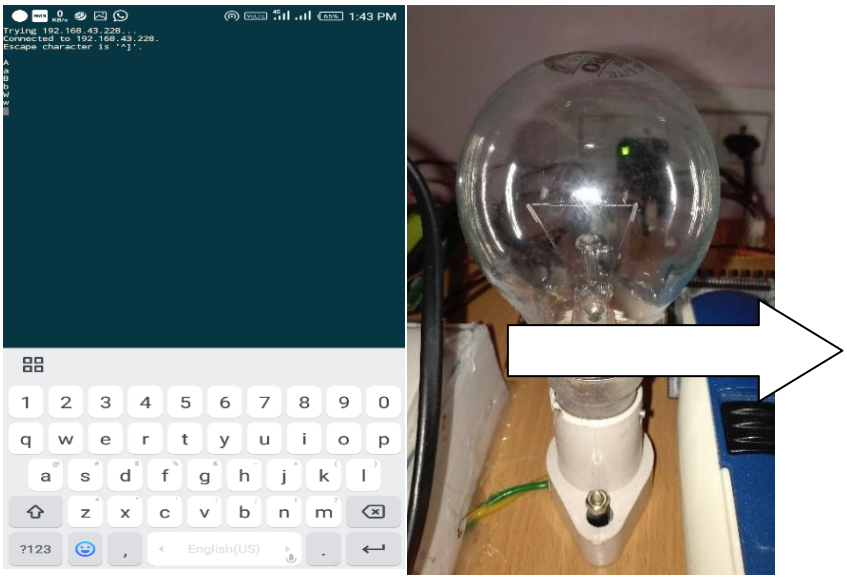
Type ‘B’ and press enter symbol in keypad Fan will be ‘ON’



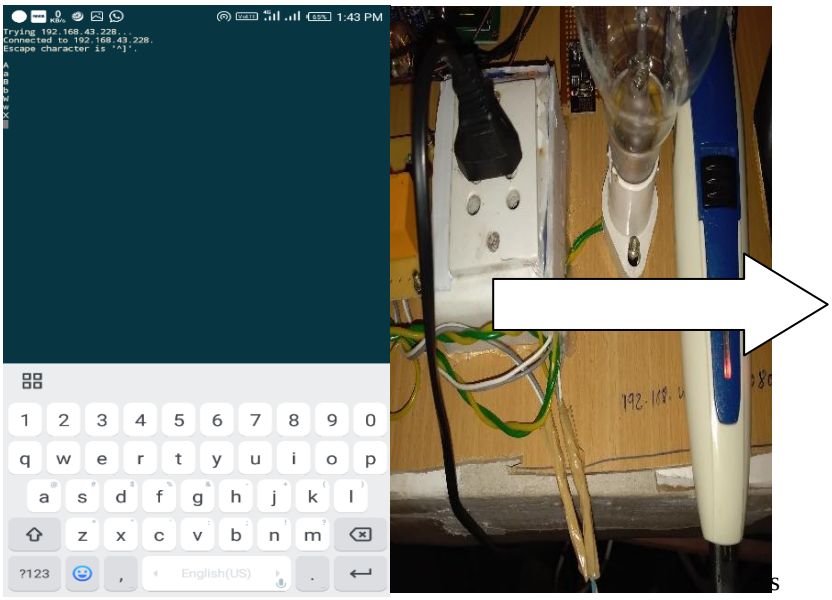
Type ‘b’ and press enter symbol in keypad Fan in ‘OFF’ position



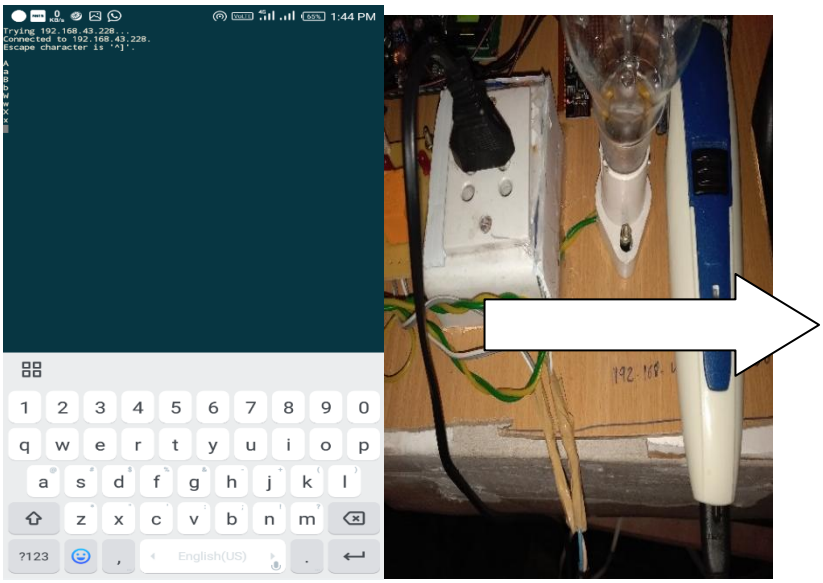
Type ‘W’ and press enter symbol in keypad Bulb will be ‘ON’



Type ‘w’ and press enter symbol in keypad Bulb will be in ‘OFF’ position



Type ‘X’ and press enter symbol in keypad socket will be ‘ON’



Type ‘x’ and press enter symbol in keypad socket will be ‘OFF’

VIII. SOFTWARES USED

This project is implemented using following software's:

- Express PCB – for designing circuit
- Keil u vision compiler - for compilation part
- Proteus 7 (Embedded C) – for simulation part

IX. FUTURE SCOPE

In our project "**A Smart Switch to Connect and Disconnect Electrical Devices At Home by Using Wi-Fi**" connecting and disconnecting of electrical devices at home use Wi-Fi.

The main controlling part of the total project is ARM -7 Processor. Devices, relay, Wi-Fi module are interfaced to the processor. The processor control's the devices connected to it after receiving the data from the smart phone through Wi-Fi module. Relays, transistors are connected to turn ON/ OFF the devices. To do this task processor is programmed using embedded c language. We can extend this project by using Raspberry pi instead of using ARM-7 processor. Raspberry pi has inbuilt Wi-Fi, so no need to connect ESP8266. And by using raspberry pi we can control the devices anywhere in the world.

X. CONCLUSION

The existing model presents an Integrating feature of all components. The Presence of each and all modules had been coherent out and located very carefully. Hence the causative tofinestoccupied unit for "A Smart Switch to Connect and Disconnect Electrical Devices at Home by Using Wi-Fi" has been designed perfectly. Thus, this project kit had been successfully designed and tested.

Thisproject is used in homes and offices with help of the android mobile phone, by implication of this project to decrease the humanoid efforts and saving the time. This project mainly useful for old age peoples for reducing their efforts.

XI. ACKNOWLEDGEMENT

We would like to thank all the authors of different research papers referred during writing this paper. It was very knowledge gaining and helpful for the further research to be done in future.

XII. REFERENCES

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