



ISSN (Print) : 2320 – 3765  
ISSN (Online): 2278 – 8875

# International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: [www.ijareeie.com](http://www.ijareeie.com)

Vol. 7, Issue 12, December 2018

## Electricity Distribution Using Internet of Things Application

Mrudul Shitole<sup>1</sup>, Vishal Kathore<sup>2</sup>, Abhijit Shahane<sup>3</sup>, Vinaya Jamnik<sup>4</sup> Payal S Burande<sup>5</sup>

UG Student, Dept. of Electrical Engineering, D.Y.Patil Institute of Engineering & Technology, Ambi, Pune  
Maharashtra, India <sup>1-4</sup>

Assistant Professor, Dept. of Electrical Engineering, D.Y.Patil Institute of Engineering & Technology, Ambi, Pune  
Maharashtra, India<sup>5</sup>

**ABSTRACT:** Nowadays electricity plays important role in our life and its demand is increasing day by day. Indian power grid is a geographically dispersed network of generators having capacity more than 2, 00,000 MW. For Maharashtra MSEB (Maharashtra State Electricity Board) works & provide electricity to all over Maharashtra. The main aim of this project is to bring smart Distribution Box which includes various points such as Fault Detection Technique with Bluetooth Technology, Automatic Phase Shifter, and avoid theft problem by using RFID technology with password security to distribution box. This project makes use of PIC microcontroller which act as the Heart of the project. Bluetooth technology also comes in this project to provide Real Time Monitoring for the Sub Station. With the help of Phase Shifter technique, LCD display and Keypad this project becomes more interesting. Looking towards consumer end and benefit to customer as well as distribution end we are trying to achieve the whole system of MSEB any other sector becomes fast without any interruption of supply. It is a smart distribution system with lots of benefit and having much future scope in it.

**KEYWORDS:** Efficiency, System Security, Distribution, Generation, Phase Failure etc.

### I.INTRODUCTION

Electricity is the general need of human beings. It is used in various sectors like transportation, education, industry, healthcare, lightings, and entertainment & used for various purposes. Indian power grid is a geographically dispersed network of generators having capacity more than 2, 00,000MW. The generating production capacity is based on thermal generation, hydro generation and nuclear generation and also some non-conventional generation like wind & powers etc. For the Maharashtra state, the MSEB (Maharashtra state electricity board) works & provide electricity all over Maharashtra. While providing electricity if some problem is occurred it is more problematic to the user as well as there is no security for DP (distribution point) boxes & system does not provide any kind of security for power line cable. In this system the thief can easily access electricity illegally. To overcome these problems and limitations, a new technology/system is introduced. The name of that system is IOT Based Electricity Distribution Box.

IOT Based Electricity Distribution Box technology can easily interphase with the current electricity distribution system. In that system for security, RFID technology & password technology is used along with the fault displaying through messages. By using this technology, we can easily solve the problems like DP security, illegal electric connections. As well as it has an ability to show the fault which has occurred in electric phases & fuses. If any phase is failed or if fault is occurred in phase it will display a message on LCD screen. It also has ability of real time monitoring. That means if any fault is occurred in system it indicates fault in DB box as well as it will message to MSEB. Overcoming on these problems and limitations, the system has an ability to find fault which will help electricians. This technology also helps to repair fault in less time. Indisplay circuit we have used LEDs for indication. Red is used for short circuit & white LED is used for open circuit. It is a smart distribution box system which is very useful in current electricity system having lot of future scope.



# International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: [www.ijareeie.com](http://www.ijareeie.com)

Vol. 7, Issue 12, December 2018

## II. METHODOLOGY

**2.1 Automatic Phase Changer:** In distributed lines, if any one phase of the three-phase system gets overloaded, the domestic load connected to that phase becomes abnormal. It is necessary to provide normal voltage for the domestic loads connected in that phase. For that the phase contacts must be changed and this is done manually by the line man of Electricity Board using Jumper rods. Jumper is a tiny metal connector that is used to close or open part of an electric circuit. It is made up of material that conducts electricity and is sheathed in a non-conductive plastic block to prevent accidental circuit shorts. This time lagging manual operation is replaced by this paper.

**2.2 Fault Detection & Indication on Display:** If fault occurred on any one phase of 3 phase network RYB in distribution box it will send indication via Bluetooth to distribution centre and also display it on the Distribution board display. Bluetooth Hardware ID HC-05 is used.

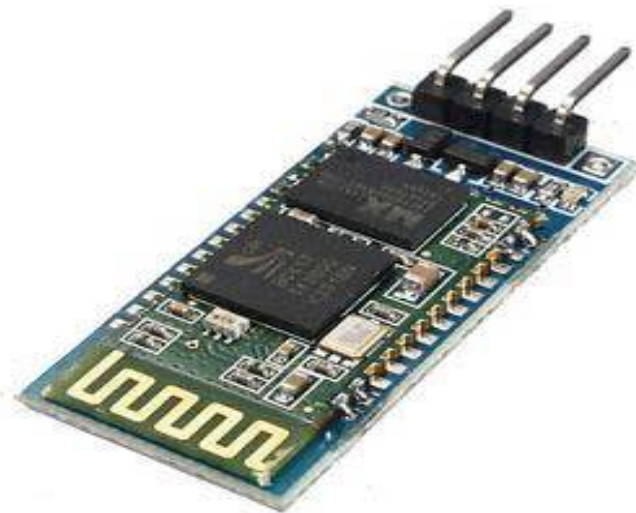


Fig 1:- Bluetooth Module

### 2.3 Security of distribution box:

**2.3.1 RFID:** In recent years, radio frequency identification technology has moved from obscurity into mainstream applications that help speed the handling of manufactured goods and materials. RFID (Radio Frequency Identification) enables identification from a distance, and unlike earlier bar-code technology, it does so without requiring a line of sight. RFID tags support a larger set of unique IDs than bar codes and can incorporate additional data such as manufacturer, product type, and even measure environmental factors such as temperature. Furthermore, RFID systems can discern many different tags located in the same general area without human assistance. In contrast, consider a supermarket checkout counter, where you must orient each bar-coded item toward a reader before scanning it. So why has it taken over 50 years for this technology to become mainstream? The primary reason is cost. For electronic identification technologies to compete with the rock-bottom pricing of printed symbols, they must either be equally low-cost or provide enough added values for an organization to recover the cost elsewhere. RFID isn't as cheap as traditional labelling technologies, but it does offer added value and is now at a critical price point that could enable its large-scale adoption for managing consumer retail good.

### 2.3.2 Passcode:

The unique RFID card & password are given to the electrician. The electrician will swipe the card on the reader section so that the RFID reader reads the data on a card and sends the data to the microcontroller and if the data is matched

# International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: [www.ijareeie.com](http://www.ijareeie.com)

Vol. 7, Issue 12, December 2018

then password security technology is used. To type the password 4x3 matrix keypad is used. This keypad is used to insert the password which is provided to the electrician to open the door. So the electrician will insert the password on the keypad which is displayed on the LCD screen. If the password is correct then door will be automatically open. It is done by motor driver circuit in that the data which is to be send to the microcontroller.

### III. ELECTRICAL DISTRIBUTION SYSTEM:

#### Distribution system layout

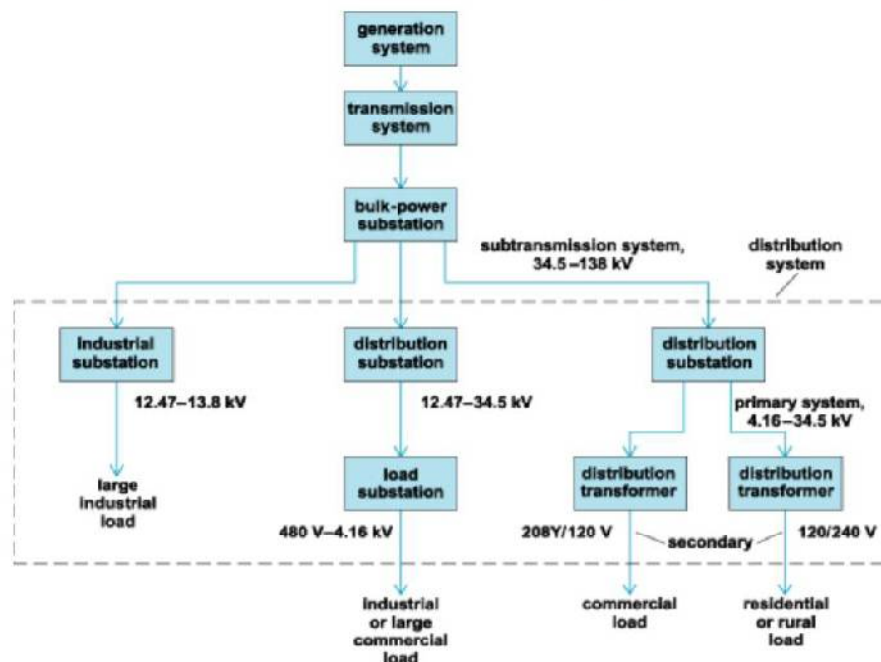


Fig 2:- Electricity Distribution System

1. The generation generally takes place at voltages around 3.3kV to around 22kV which is medium voltage.
2. The voltage is then stepped up to a level of 110kV or 220 kV (high voltage) or even 400kV (extra high voltage) depending on the amount of power to be transmitted.
3. At distribution stations the power is stepped down to a voltage of 430/250 V for customers taking into account the voltage drops in distribution lines.
4. In India the power supply to the residential premises is at 240V, single phase, 50Hz ac. The three-phase supply is at 415V.

### IV. CIRCUIT DEVELOPMENT & IMPLEMENTATION

A simple transformer is used to power down the voltage level. It will convert 230VAC to 15VAC. This voltage level is provided to rectifier. Which convert it AC to DC. The output dc supply is filter by using capacitor. To get the constant output the rectifier is used. Which gives 12VDC and 5VDC supply to required circuit.

All required power is provided to all circuit. All circuit is in stable condition. If any fuse will break or cut due to the extra power load then all circuit will start their working immediately. There are 3 individual phases that is R, Y& B. If any line or fuse will get break. Then this signal will send to microcontroller through power down circuitry. A power down circuit is helps to interfacing 230VAC to Microcontroller. It is a special circuit which converts 230V AC to 230V DC. Then all power or signal will attenuate with the help of register. The same procedure follows

# International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: [www.ijareeie.com](http://www.ijareeie.com)

Vol. 7, Issue 12, December 2018

for all 3 phases and the output of 5V DC signal is providing to Microcontroller. Microcontroller analysis these all signal. And provide all information on LCD display. At the same time it will send the signal on LED indication panels. Also it will send message to the MSEB by using wired or wireless connection. Through the wire it will send the location of DP box. To reduce the wired network the wireless communication systems will used. For wireless communication GPS, GSM, SATTELITE etc. System can be used. The all information will received by main station or in MSEB office. To solve the problem officer or the electrician will come on location or site. He will notice the default on the LCD.

To verify the original electrician the high security system is used. For that first RFID technology is used. And then password system is also used. The electrician has a tag, which is RFID tag. The tag has a particular code pattern. The code patterned is defined in programming. The electrician swap the tag in particular portion on board, and this tag is read by RFID reader. Then reader sends a tag pattern to microcontroller. Microcontroller verify the tag pattern, if it is wrong then it cannot open the system and cannot allowed to type the password. If the verified tag is correct then system allowed it to type the password. For typing the password the keypad is used. The type key or password we can see on LCD display. The correct password opens the system. If password is wrong then it still allowed it to type password 1 to 3 times. The correct password will open system door. If any fuse is faulty then he will see the indication on LED panel. Then electrician will resolve the problem. After solving the problem the indication will get off automatically.

In case due to the heavy rain fall and due to the constructional work the underground cable may get short or may get open. This type of problem also analysis by system, and automatically it will show the indication on LED panel and it will switch it on safe mode. Below shows the circuit Diagram of this system.

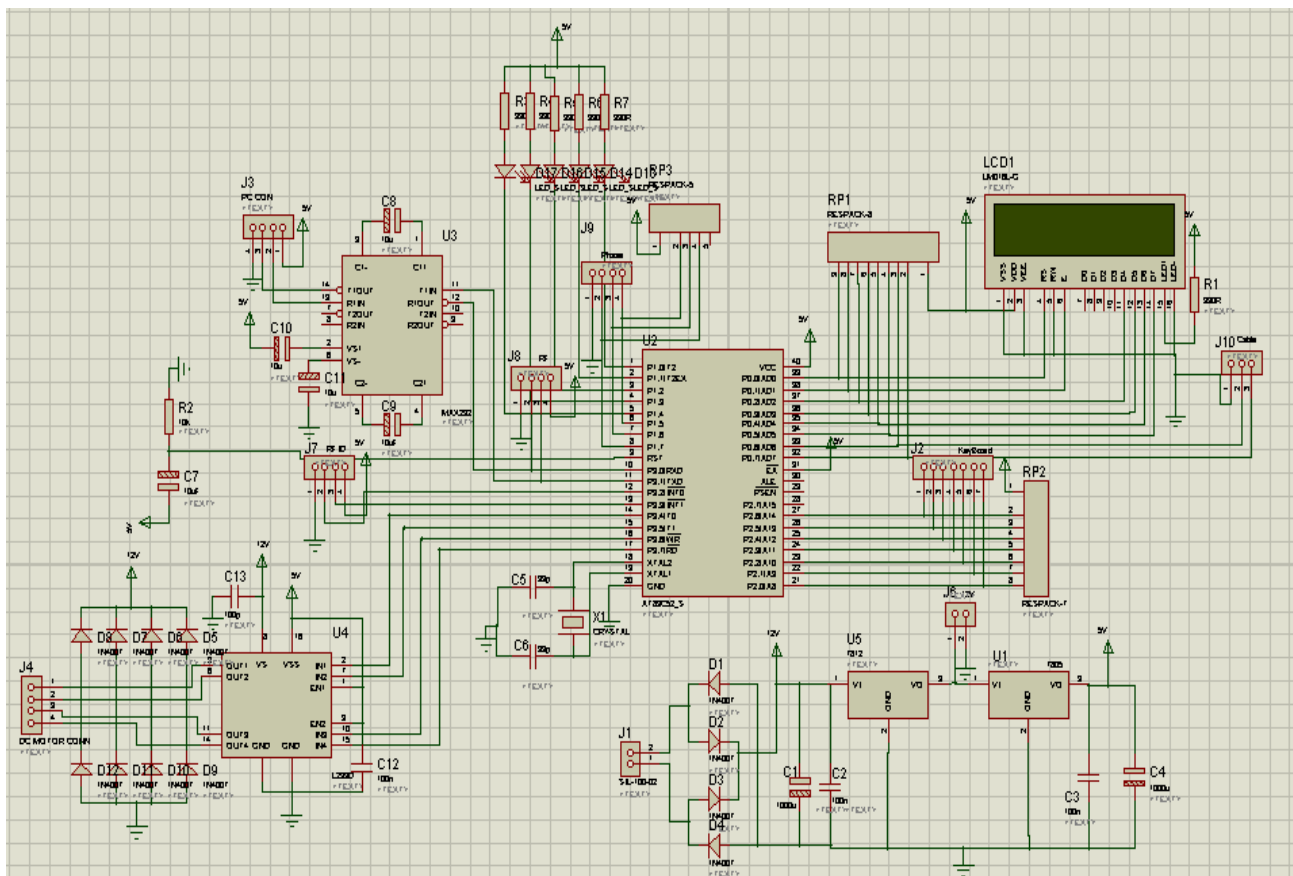


Fig 3: - Circuit Diagram



# International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: [www.ijareeie.com](http://www.ijareeie.com)

Vol. 7, Issue 12, December 2018

## V. ADVANTAGES AND DISADVANTAGES

### 5.1 ADVANTAGES

1. High voltage handling capacity
2. Entire system is password protected.
3. It gives real time monitoring.
4. It also gives on board indication.
5. Easy to install & simple in operation.
6. 24x7 capacities.
7. At a time location indication is directly provided to the MSEB office.
8. Easy to interface with current electricity system.
9. Eliminate the 24x7 continuous monitoring; it facilitates 24 hours a day.
10. 365 days in year communication between system and MSEB.
11. It gives fast response.
12. Low cost, high reliability & flexibility.

### 5.2 DISADVANTAGES

1. If this DISTRIBUTION BOX system is to be replaced with the old one, it will take lot of time.
2. Even it will require lot of investment
3. One of the biggest disadvantage is that, if the RFID tag or password is lost by the electrician the reprogramming should be done, which will require lot of time and money and even it will be difficult.

### 5.3 APPLICATION

It is the one of the best project on which lot of sector is based, in which lots of application are used for the work. Few of them are as follows:-

1. To avoid fault and recognized the fault in current electricity system.
2. This type of system can be used in slum area, in village, where the unauthorized electricity is used or access.
3. It can use in current electricity system, in distribution boxes.
4. It can be used in hospital area, Educational complex, Residential area, GOVT. sector, private sector and other different sector where the electricity is used or distribute.
5. It gives instant result and real time monitoring so more useful to MSEB.
6. It can use in all type of DP boxes.
7. It is used for to prevent electricity theft detection system. It is used to maintain the record of fault occurs in distribution system and also give the solution.

### 5.4 FUTURE SCOPE:

1. To stop the unauthorized accessing of electricity.
2. To provide fast service to the consumer or user in less time.
3. It can easily interface with current electricity system.
4. It gives real time monitoring in both sides.
5. It is low cost system.
6. To find underground cable fault.
7. To detect short circuit.
8. Very much useful for the smart electricity development project.
9. It can be easily possible due to Distribution Box system.

## VI. CONCLUSION

1. The final conclusion is that “this SMART DISTRIBUTION BOX system is fully secured, advance, in that use of more technology and fully friendly to electrician. 2. In simple word “IT IS NOT A PROJECT its A NEED”.



ISSN (Print) : 2320 – 3765  
ISSN (Online): 2278 – 8875

# International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: [www.ijareeie.com](http://www.ijareeie.com)

Vol. 7, Issue 12, December 2018

## REFERENCES

1. Nur, M. A., Islam, J., Mostofa, M. G., & Chowdhury, M. A. (2014). Transmission Line Fault Detection using Android Application via Bluetooth. *Global Journal of Research In Engineering*.
2. Patil, S., Pawaskar, G., & Patil, K. (2013). Electrical power theft detection and wireless meter reading. *International Journal of Innovative Research in Science, Engineering and Technology*, 2(4), 1114-1119.
3. Nor, N. M., Zemri, N. S., Daud, S. A., Ibrahim, T., & Daud, H. (2017). Development of an Automated Three-Phase Distribution Box System. *Indonesian Journal of Electrical Engineering and Computer Science*, 6(2), 233-240.
4. Kaur, M., Sandhu, M., Mohan, N., & Sandhu, P. S. (2011). RFID technology principles, advantages, limitations & its applications. *International Journal of Computer and Electrical Engineering*, 3(1), 151.
5. <https://electronics.stackexchange.com/questions/335092/is-it-possible-to-stepdown-240-ac-to-5-dc-without-transformer>.
6. Vishay Dale/ Metal Film Resistors, Industrial, Power, Flameproof/ Data Sheet.
7. Guangzhou HC Information Technology Co. Ltd./ [www.wavesen.com/](http://www.wavesen.com/) Data sheet for Bluetooth Module.
8. National Semiconductor/ LM78XX Series Voltage Regulators/ Data Sheet for IC's 78XX.
9. Microchip/ PIC16F87XA Data Sheet 28/40/44-Pin Enhanced Flash Microcontrollers.
10. Maharashtra State Electricity Board office Akurdi, Pune 411007
11. [www.Atmel.com](http://www.Atmel.com)