UNDERGROUND AND OVERHEAD CABLE FAULT DETECTION USING IOT

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Abstract: *This paper is about loss of electric energy in transmission line of both overhead and underground cable fault due to. So for increase reliability for electricity we make one underground and overhead cable fault detection circuit using internet of things. In this circuit internet of things device using detect the distance of fault in cable in form of line station and using Arduino microcontroller and showing result in webpage. In urban areas most of electric cable run in underground instead of overhead cable line. When the any fault in underground cable difficult to detect the location of fault. And very difficult to repair the fault of cable. Wide Variety fault of cable in underground condition, wear and tear ,rodents etc. its very difficult to detect the fault using all over underground line dug and find out fault of cable. Here we make cable fault detection to detect fault of cable over internet of things to make repairing work very easy. So repair men find easy way fault of cable and dug only faulty area. The system is detect fault by help of voltage divider circuit across the line of cable. When a fault is created at a point shorting two lines and open line fault a specific voltage is generated as per resistor networks. Voltage is sensed by microcontroller and given data to user. microcontroller retrieves the fault of cable data and displays over LCD display, also it transfers this data over a network to display in a web browser.*

IndexTerms *– Arduino microcontroller, esp-01 wifi module, relay module , bridge rectifier, cable, voltage divider circuit.*

I. INTRODUCTION

The electrical distribution & transmission systems is to transport electrical energy from the generation to customer. when fault on transmission lines, detecting fault is necessary for power system in order to clear fault before it increases the damage of power system. Also the underground cable system provides higher reliability than the overhead line system, it is hard to locate the fault location.. fault of cable are damage to the cable which affects a resistance in cable. If allowed to persist, this can lead to a voltage breakdown. As the cable fault detection is the process of locating the periodic fault, a programmed to Arduino microcontroller. display the precise digital value of series resistance voltage drop converted by Analog to Digital Code in unit distance from the base station. This paper deals with Arduino and LCD. This system greatly reduces the time and operates effectively.

Fault of cable detector is the advance method to find out fault compare to other method the tracing method is very time consuming. So we are presenting a underground and overhead cable fault detector using internet of things, relay module and Arduino microcontroller. In relay module using continues checking of three line to detect a fault. When any fault gets generated relay through detect by voltage drop nearer to point signal wire.

II. METHODS AND MATERIAL

The proposed design primarily consists of two sections: Transmitter and Receiver.

A.Transmitter

In the transmitter side, all fault is detect by relay module and the created of each fault is shown on LCD display. The data is further send to the receiver side through WIFI esp-01 module.

Block diagram of Transmitter end

First ac voltage applied to the transformer and step down voltage to 24 v and bridge rectifier through decrease the voltage and parallel to capacitor through LM 7812 ic through make 12v. 12v is given to all circuit like relay module as per requirement.

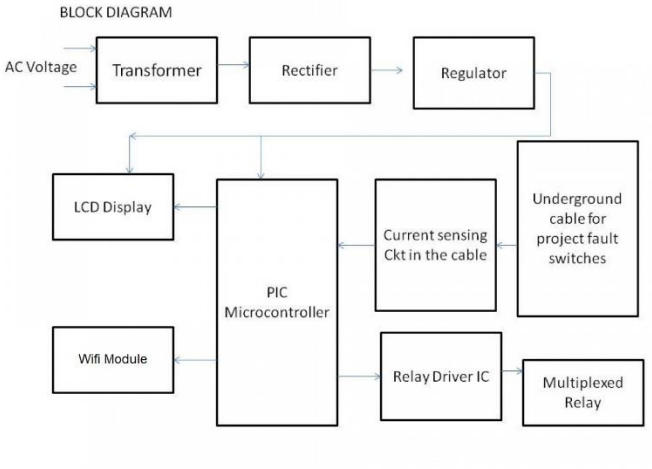

Figure 1 Transmitter Side Block Diagram

B.Receiver

The data sent by the transmitter is received by the mobile phone in three phase form.

Block diagram of Receiver end

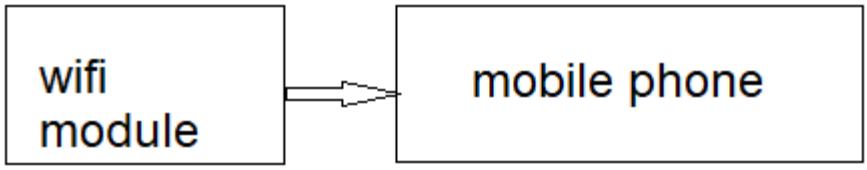

Figure 2 Receiver Side Block Diagram

A.Software Description

The proposed system makes use of Arduino Integrated Development Environment (IDE) and X-CTU platform.

1. Arduino IDE

ArduinoIntegrated Development Environment (IDE) connects to the Arduino hardware to upload programs and communicate with the outside world The programming for the proposed system is done in Arduino IDE so as to interface RELAY, LCD, WIFI MODULE etc.

2. Blynk application

Blynk application is use for the iot based wifi module to any Arduino board connection using . this application also use for the android and ios. Also use for raspberry pi over internet connectivity.

B. Hardware Descriptions

1. Arduino UNO R3

The heart of Arduino UNO is a 8-bit ATmega328P microcontroller. It has 14 digital input/output pins, 6 analog input pins, a USB port, a power barrel jack, an ICSP header pins and a reset button. It also features a serial data (SDA) line and a serial clock (SCL) line.

Figure 3 Arduino UNO R3

2. Relay Module

Relay module is the magnetic switch which turn on and of using electricity. As per requirement as specific voltage and current through we controlled many circuit by the minimum and maximum range by as per specification. Relay use as the protector of the circuit with another circuit. Many types of relay use in market as per our requirement like 5v,6v,12v,24v etc. also four ,five ,six terminals type.

In this project we use 5v relay. Here relay have 5pin. NO-Normally open ,NC-Normally closed, COM-common, also two point we say coil.

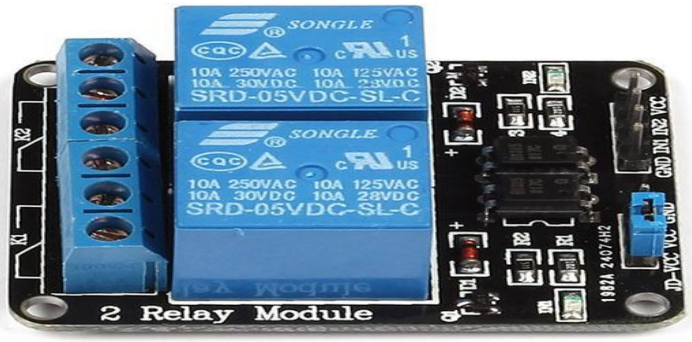

Figure 4 RELAY MODULE

3. Liquid Crystal Display

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines.

Figure 5 LCD 16*2

4. Esp-01 WIFI Module

Esp-01 is the wifi module to connect the micro-controller to wifi network. Esp-01 wifi module is self contained system on chip doesnot required any microcontroller input and output. Its very versatile for save mony and time also space.

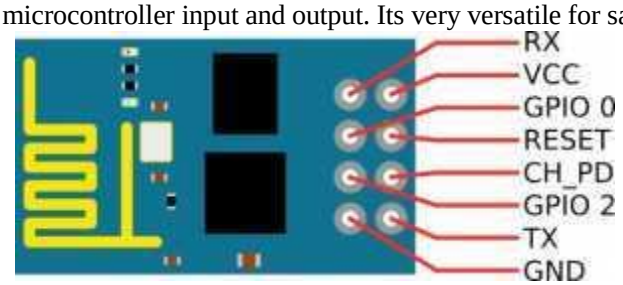

Figure 6 ESP-01 MODULE

C.Flowchart

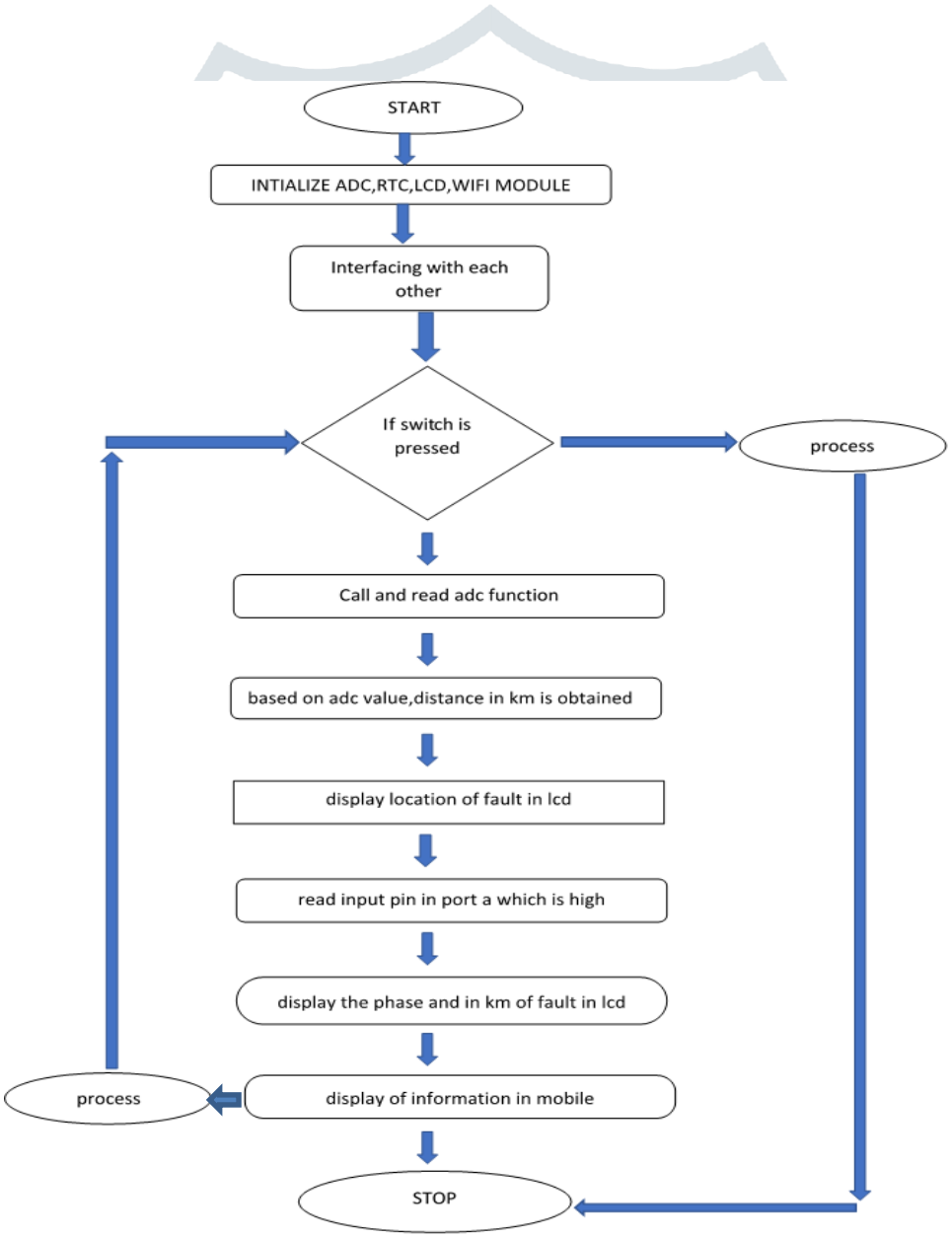

Figure 7 Flowchart of Proposed Model

III. Working of the Proposed Model

- In underground cable 4 wire use to detect the cable fault by voltage divider circuit.
- In main three live cable and one is signal cable to detect insulation, earth fault, short circuit fault, open circuit fault etc.
- By using voltage divider circuit through all fault we find out.
- In voltage divider circuit the one switch make 2km or as per our requirement fault created in km.
- When we pressed any switch the voltage drop at the point and microcontroller through to ADC conversion and display the fault in km on LCD display.

And for the overhead line we make some continuity check one point to another point and we measure the resistance and we found out current and also we find cable is ok or not.

IV. Results and Discussion

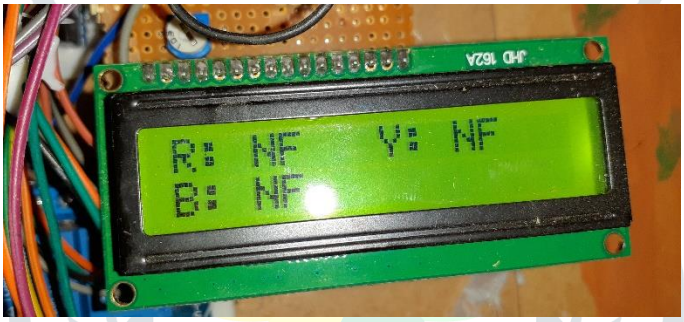

Figure 8 When circuit is on

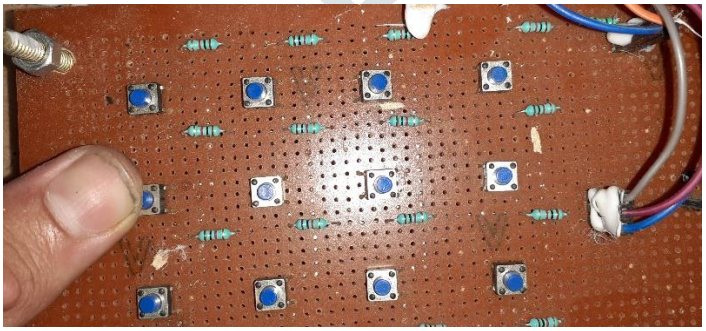

Figure 9 When pressed r phase switch

Figure 10 fault is created near 8km in R phase

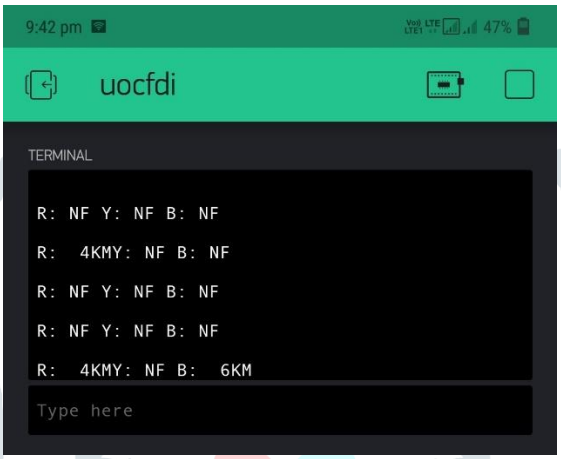

Figure 11 output of circuit iot based in blynk application

V. Conclusion

The short circuit fault at a particular distance in the underground cable is located to rectify the fault efficiently using simple concepts of Ohms law. The work automatically displays the phase, distance and time of occurrence of fault with the help of Arduino microcontroller and ESP-01 Wi - Fi module in a webpage. The benefits of location of fault are fast repair to revive back the power system, it improves the system performance, it reduce the operating expense and the time to locate the faults in the field.

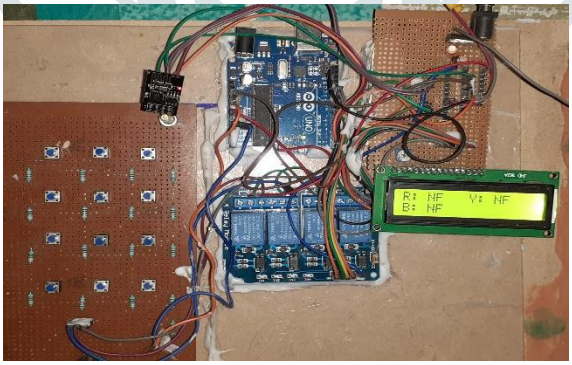

Figure 12 underground and overhead circuit

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