

# IOT Based Remote Monitoring Of Industrial Earthing

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**Abstract—** Power continuity and electrical safety are essential for all industrial and commercial application some of the calamitous effect. Created by faults in the system include loss of power, destruction of equipment and injuries to operating person. This article provides a design and the development of remote system for continuous monitoring condition of earthing pit resistance. The value of earthing resistance is more than the permissible limit than there will be send the message by using GSM module GSM device is used to convey a accumulated data to remote mobile in the form of sms and on the alarm. The current value of earthing resistance is show in the LED display. The basis of measurements soil resistivity with measured in real conditions its values. The increasing the value of earthing we provide the water pump modification of earthing resistance the purposed of this project is calculations and monitoring and increasing the life of earthing pit. For the system is standby earthing resistance play very importance role in power system. It was observed that the soil resistivity varies based on the type of soil and moisture content. The wet soil had lower resistivity than the dry soil.

**Keywords—:-** Soil resistivity, grounding arrangement, grounding pit design, earth resistance, wireless transmission, Online monitoring.

## I. INTRODUCTION

The purpose of earthing is to ensure human safety as well as instrument safety. Higher earth resistance can cause fault current to flow through human body causing serious injury or death. The ideal value of earth resistance should be around 5 Ohms. We often add water and add salts at regular interval into the earth pits in order to maintain the value of earth resistance. This keeps the earth pit moist and damp. Over a period of time, the corrosive soils with high amount of moisture, salt content and high temperatures can degrade the earthing electrodes and their connections. The earth resistance when the earthing electrodes are installed is lower but over a longer period, the earthing rods starts eroding ultimately increasing the resistance of ground. This may result in bad earthing adding to the risk of loss of safety.

With increase in value of earth resistance, if exceeds 20 percent, the technician should investigate the source of problem and make the correction to lower the

resistance by replacing or adding ground rods to the system. Therefore, we can state that water and salts added in order to improve earth resistance over a period of time are also responsible for eroding the earth electrode ultimately increasing the resistance. Hence, it is necessary to check annually the condition of the electrodes so as to add or replace electrodes in order to reduce risk. In proper maintaining earthing moisture content is one of the controlling factors of earth resistivity. Above 20% of moisture content, the resistivity is very little affected. But below 20% the resistivity increases rapidly with the decrease in moisture content. If the moisture content is already above 20% there is no point in adding quantity of water into the earth pit, except perhaps wasting an important and scarce national resource like water. For maintaining the moisture level and continuously analysis of earthing we are introducing Automatic Moisture Level maintain and monitoring of earthing pit system.

## II. METHOD OF MEASUREMENT OF EARTHING

There are Four methods of grounding resistance as follows.

- Two point(dead earth) method.
- Three point(fall of potential)method.
- Four point method.
- Clamp on method

1.Two point method :- with this method, the resistance of two electrode in a series is measure by connecting the P1 and C1 terminal to the ground electrode under test;P2 and C2 connected to separate all metallic grounding point (like a water pipe or building steel).the dead earth method is a simplest way to obtain ground resistance reading but is not accurate as the three point method and should only be use as last resort, it is most effective for quickly testing the connection and the conductor between the connection point.

2.Three point method :- With four terminal tester,P1 and C1 terminal on the instrument are jumpered and connected to the earth electrode under the test while the C2 reference rode is driven into the straight out as far from the electrode under test as possible. Potential reference P2 is then driven into the earth, as a set number of points , roughly on straight line between C1 and C2 resistance reading are logged for each P2 point.

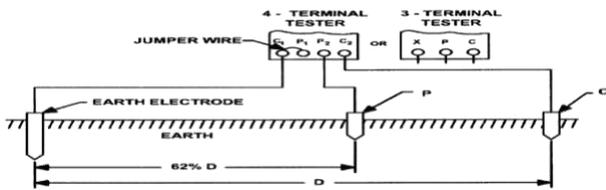


Fig:- three point method

3. Four point method :- This method is most commonly used for measuring soil resistivity, which is important for designing electrical grounding systems. In this method, four small-sized electrode are driven into the earth at the same depth and equal distance apart-in a straight line –and a measurement is taken. The amount of moisture and salt content of soil radically affects its resistivity. Soil resistivity measurement will also be affected by existing nearby grounded electrode. Buried conductive object in contact with a soil can invalidate reading if they are close enough to alter the test current flow pattern. This is particularly true for large or long object.

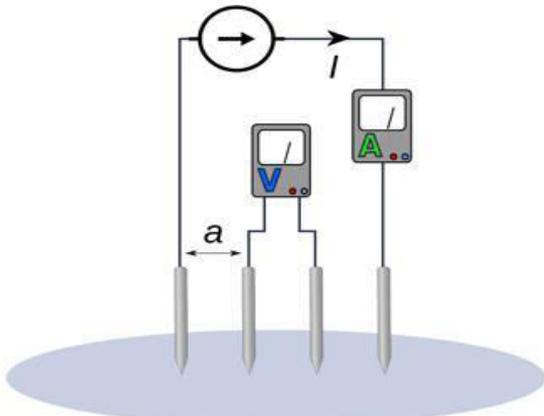


Fig:-four point method

4. Clamp on method:-The clamp on method is unique in that it offers the ability to measure resistance without disconnection the ground system. It is quick, easy and also includes the bond to ground and overall grounding connection resistance in its measurement. Measurement are made by “Clamping” the test around the grounding electrode under test, similar to how you would measure current with a multi-meter current clamp.

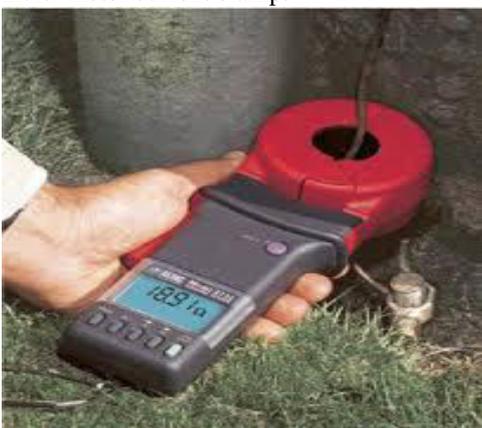


Fig: clamp on method

### III. BLOCK DIAGRAM

The remotely monitoring earthing system is basically used for analysis of earthing pit resistance. we are continuously monitoring the earth pit resistance and show it on LCD. if the earth resistance is more than permissible limit then there will be an alarm and similarly, if the moisture of the earth gets decreases the earth resistance increases this will be also displayed on the LCD which will especially monitor for the leakage current. If the permissible Limit get increases there will be an alarm signal or there will be a message to the observer through GSM device. GSM device is used to convey a accumulated data to remote mobile in the form of SMS. So overall, our project deals with the remote monitoring of the earthing system.

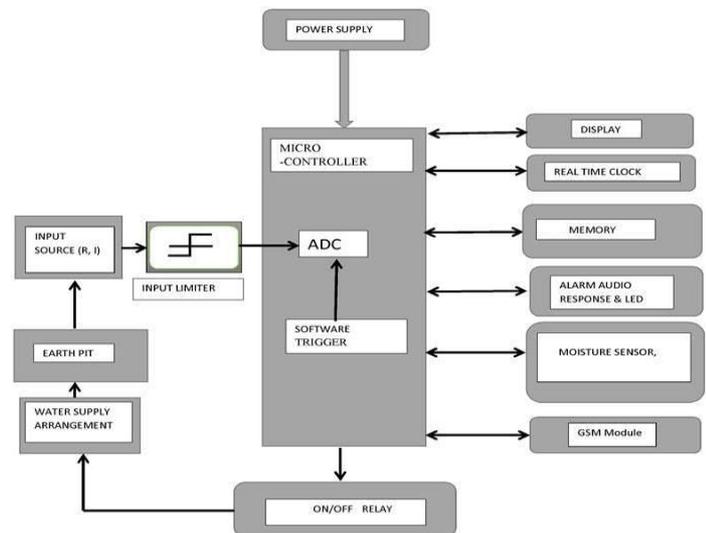


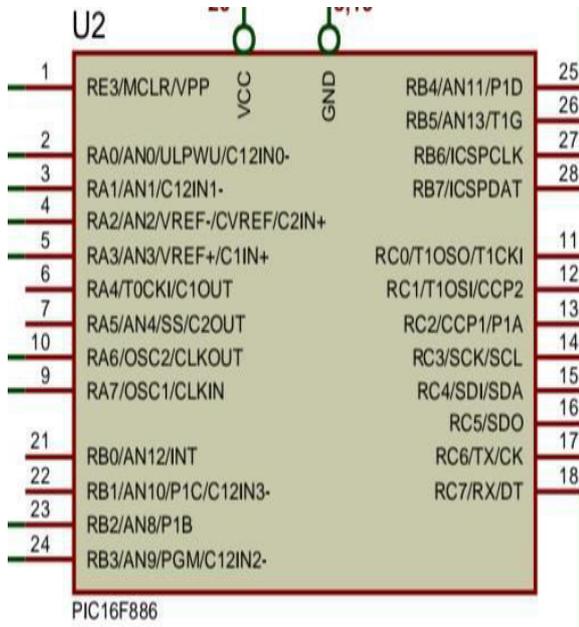
Fig.1:-Block Diagram Of Remote Monitoring Of Earthing System

From Fig.1 block Diagram, the continuous power supply to the various components like Microcontroller, Liquid Crystal Display, Sensors, Relay, Relay Driver, etc. Microcontroller is connected with DC power supply (5V), Display show Real time clock for the value of Leakage Current and Resistance Of Soil, Storage Devices is store parameters value with real time and save for particular Time and reset all the data again, this process will repeating, warning alarm Audio response (Buzzer) and indicating by LED ( RED & GREEN), Moisture sensor to sense the moisture of soil, Turn ON/OFF switch (Relay) to operate the pump, GSM module for the online monitoring.

#### MICROCONTROLLER:

The microcontroller is one of the main component of the Remote Monitoring Of Earthing System. This powerful yet easy to program (only 35 single word instructions) CMOS FLASH base 8 bit Microcontroller packs micro-chip powerful PIC Architecture into a 28 pin package. The PIC16F886 features 256 bytes of EPROM data memory, self-programming, an ICD, 2 comparators, 11 channel of 10 Bit Analogue to Digital (A/D) convertors, one Capture / Compare / PWM and 1 enhanced Capture / Compare / PWM. Functions, a synchronous serial port that can be configured

as either three wire serial peripheral interfaces or the two wires inter integrated circuit bus and enhanced universal asynchronous receiver transmitter (EUSART). All of these features make it deal for more advanced level A/D application in Automotive, industrial, Appliances, or Consumer application



CIRCUIT DIAGRAM:

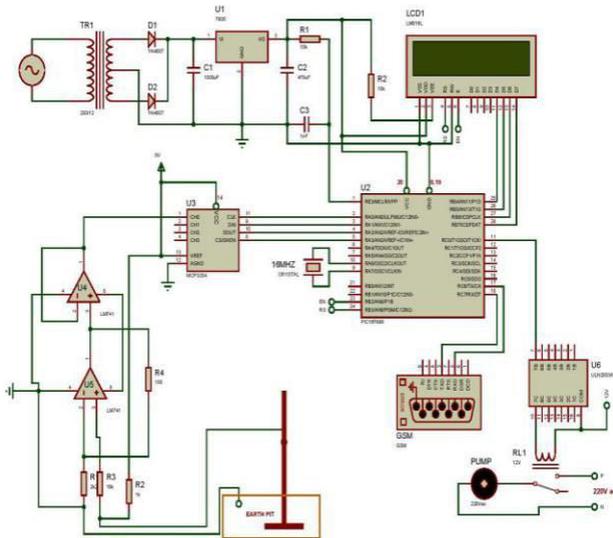


Fig.2:- Circuit Diagram

#### IV. CONCLUSION

After the successful execution the earthing pit resistance measure and continuously monitoring of earthing pit resistance and sending value of earth resistance to the user if resistance value is exits permissible limit value. Decreasing the value of earth resistance by using automatic turning on the water pump and increasing the moisture contain in the soil hence resistivity of soil is decreasing.

#### V. ACKNOWLEDGMENT

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