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Intellectual Earthing System

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Abstract: The present invention relates to a system for maintaining and controlling earth resistance. The earth resistance is maintained by controlling moisture of earth using moisture sensor. The main component of the proposed earthing system is smart earthing kit which limits the leakage current. Soil moisture sensor senses the moisture of the soil and gives data to the micro-controller. If moisture decreases microcontroller operates solenoid valve through opto-isolator and water supplied to soil. If the fault current is excessive than the conventional earthing capacity then controller circuit sense this excessive current and divert this leakage current into Smart earthing kit.

Keywords: Earthing, smart earthing system, excess current, dry earthing surface.

1. INTRODUCTION

With the increasing use of Electrical energy, the demand of electrical safety equipment has also increased. In this era of technology, the use of electricity will further also increase rather than decrease. Also, the safety equipment will play a major role. Electric power system grounding is very important, particularly since large number of faults are caused by poor grounding system or due to lightning strikes. The terms earthing and grounding have the same meaning. The purpose of grounding is to minimize potential transient overvoltage, in compliance with standard for personnel safety requirements also to assist within the rapid detection and isolation in the fault areas.

The factors that influence the earthing resistance of an electrode or group of electrodes includes the composition of the soil, the temperature of the soil, the moisture content of the soil and the depth of the electrode. The factors that influence the earthing resistance of an electrode or group of electrodes includes are the composition of the soil, the temperature of the soil, the moisture content of the soil and the depth of the electrode. To overcome this problem, solutions that require by installed another rod that connected in parallel. But these solutions need extra area which is minimum space between each rod are 6 feet away. The provision of good and effective electrical grounding system is necessary to protect personnel and equipment from the hazards of high potential rise due to the flow of high current to earth. Besides that, this system also becomes a major importance in the efforts to increase the reliability of the supply service, as it helps to provide stability of voltage conditions, preventing excessive voltage peaks during disturbances and also means to discharge lightning surges.

2. MOTIVATION

Electrical safety plays a major role while working on electrical machineries. As far as the industry standards are concerned, the use of safety equipment is very important. This system is mainly made for industry usage but it can also be implemented in residential areas. As per a study done by the Ministry of Power, in India the percentage of deaths caused due to electricity safety equipment failure accounts about 60%. While the same numbers in developed nations like USA, Germany and Japan is less than 10%. So, after evaluating the death count and increasing use of electricity in India a system which can safeguard the people working on the electrical machine, we came up with the idea of intellectual earthing system.

3. BLOCK DIAGRAM

3.1. Block Diagram Description

- In this project, the main controller used is Arduino Uno.
- To power the circuit a 5V 1 Ampere power supply is designed.
- The moisture level sensor is placed along with the electrode at the places where earthing is done.
- This sensor will detect the moisture content at the electrode.
- Signal from this sensor will be sent to the Arduino controller and based on the input the Arduino will take actions of turning on of the

system providing the moisture at electrode.

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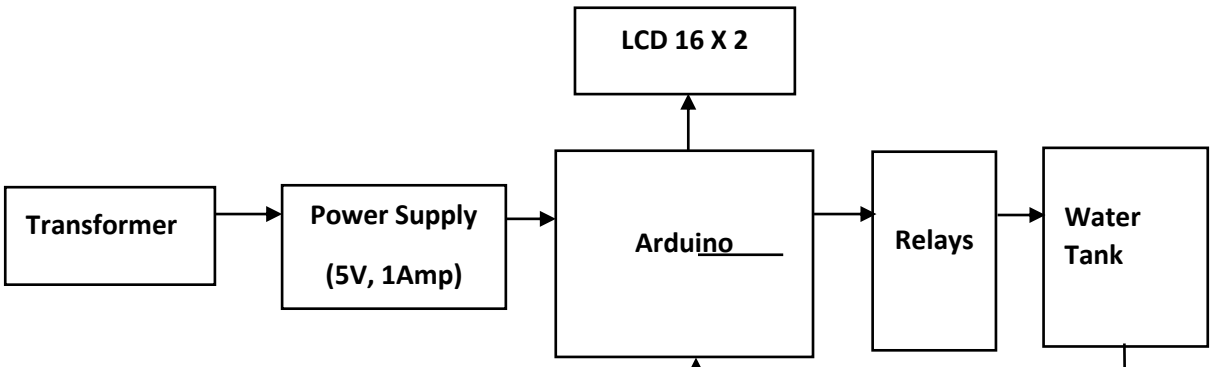
- Also, if excess current is detected then the supply will be transferred to the Intellectual earthing kit.
- The LCD display (16 X 2 LCD) will indicate the status of the system.
- Relays are used for switching purpose.



3.2. Power Supply Circuit

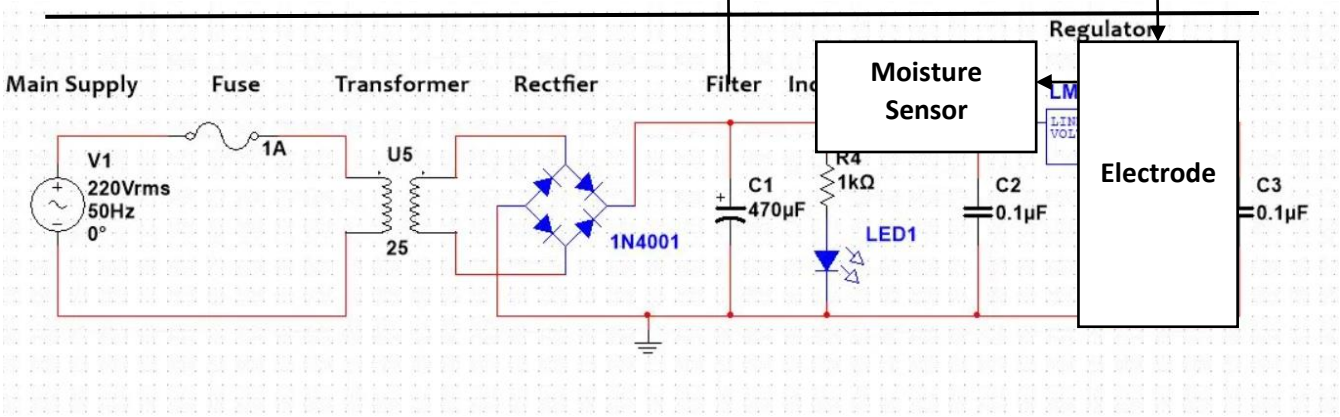


Fig 3.2. Power Supply Simulation on Proteus

3.3. Power Supply Circuit PCB Design

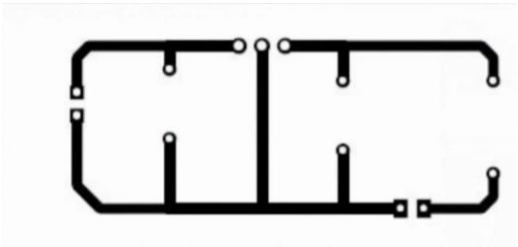


Fig 3.3. Power Supply Circuit on PCB

3.4. Detailed Working

- The transformer connected to the mains supply 230V @ 50Hz to the bridge rectifier circuit, and finally at the output of the power supply we get 5V 1 Amp regulated DC supply.
- This power supply satisfies the total power need of the project.
- The Arduino act as the main controller of the project. It processes the signals coming from the different components and gives commands accordingly.
- The moisture sensor is placed with the electrode deep inside the land, and it monitors the moisture content of the soil in which the electrode is placed.

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- If the moisture content goes below as referenced value, the sensor sends a signal to the Arduino board.
- The Arduino board gives command to the relay through the relay driver IC to turn on the water tank.
- The relay driver acts as the communicating mode between the Arduino board and the Relays.
- Once the water tank supplies water at the point of Electrode, the moisture content again goes up. This rise in moisture is sensed by the moisture sensor and again a signal is sent to the controller and then the Arduino board commands to stop the flow of water.
- The status of motor and the status of the moisture content is displayed on the LCD display in real time.

4. SIMULATION

4.1 Simulation of power supply

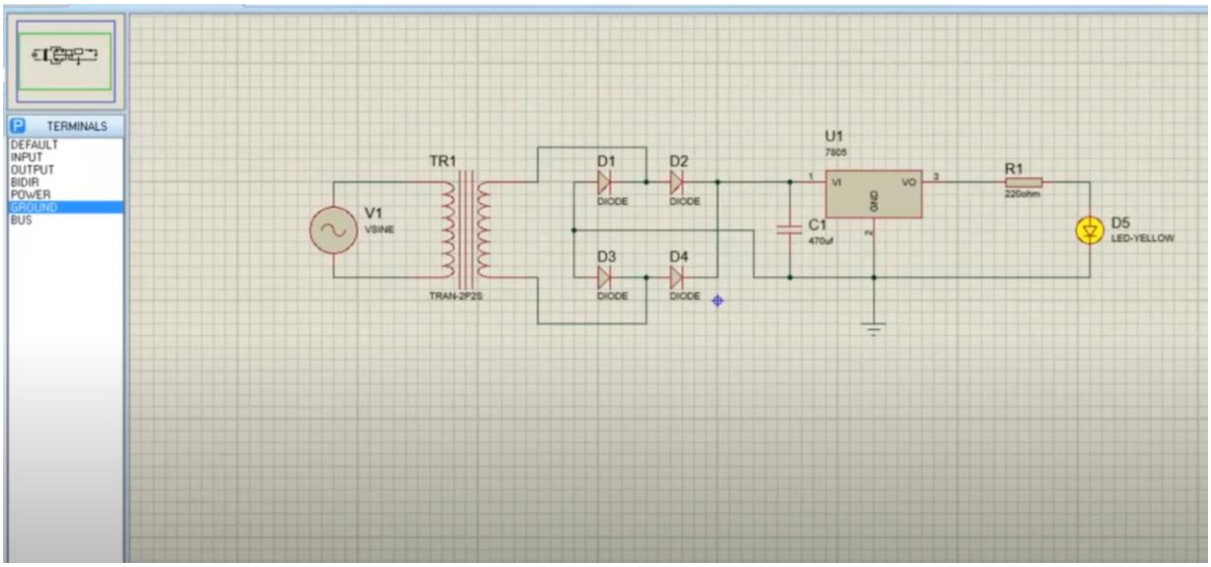

Fig 4.1. Simulation of Power Supply

5. ADVANTAGES

1. This circuit will help to reduce the accidents caused due to leakage current.
2. Same system can be used for higher leakage current as protection provided by intellectual kit.

6. APPLICATIONS

1. It is use in industrial applications.
2. It is use in distributions substation.
3. It is used in traction subsystem.
4. It is use in commercial application

7. CONCLUSION

The Intellectual Earthing System is more effective than the conventional earthing system. This system is purely made to deal with leakage current. It provides the maximum results and also helps to protect the devices from getting damaged.

8. ACKNOWLEDGMENT

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