Indian Institute of Information Technology Una

GroundShield: Smart Earthing Safety System

By:-
Sanuj Bhagat(22248)
Shagun Yadav(22249)
Tisha Singh(22256)

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01 INTRODUCTION

•**Electrical safety is crucial** in public installations like parking lots and station areas.

•**Manual earthing inspections are inefficient** and require significant manpower.

•**GroundShield: A Smart Earthing Safety System** that continuously monitors earthing parameters.

•**Utilizes IoT and sensors** to detect earth leakage, continuity issues, resistance variations, and environmental factors.

•**Provides real-time alerts** via **buzzer, LED, mobile notifications**, and a **web dashboard**.

•**Enhances safety and maintenance efficiency** by enabling **remote monitoring and automated fault detection**.

02 MOTIVATION

•**Preventing Electrical Hazards:** Unsafe earthing can lead to fatal electric shocks, fires, and equipment damage. A **real-time monitoring system** ensures early fault detection, preventing accidents.

•**Limitations of Manual Inspection:** Traditional earthing checks require **significant manpower** and are not **continuous**. An **automated system** reduces dependency on manual labor and increases reliability.

•**Integration of Smart Technology:** With the rise of **IoT and AI-driven solutions**, leveraging **sensor-based monitoring** brings intelligence to electrical safety, making it more **efficient and proactive**.

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PROJECT OBJECTIVES

- Monitor **leakage current, overvoltage, short circuits, and earth continuity** to prevent electrical hazards.
- Provide **real-time alerts** (LED, Buzzer, IoT notifications) for immediate action.
- Track soil moisture, soil temperature, air quality, and ground vibrations for better **environmental assessment**.
- Transmit real-time data to a **web-based dashboard** for remote access.
- Ultimate goal is to to develop a smart, automated, and reliable Earth Monitoring System that enhances safety, efficiency, and **real-time decision-making**.

04 INNOVATIONS IN THE PROJECT

•**Dual Monitoring System:** Combines electrical and environmental monitoring in one unit.

•**Wireless Data Transmission:** Uses web-based dashboard for real-time updates.

•**Remote Access & Control:** Allows monitoring and control from a mobile app or web dashboard.

•**Cloud-Based Data Logging:** Stores historical data for trend analysis and improved safety.

•**Modular & Expandable Design:** Can be upgraded with additional sensors for more functionalities.

•**Energy Efficient:** Optimized power usage with smart sleep modes for low power consumption.

05 CURRENTLY AVAILABLE SOLUTIONS

❑ **Earth Leakage Circuit Breaker (ELCB) & Residual Current Circuit Breaker (RCCB):**

•Detects leakage current and trips the circuit to prevent electric shocks and fires.

•**Limitation:** Does **not provide continuous monitoring** and may fail silently over time.

❑ **Ground Resistance Measurement Devices (Earth Testers):**

•Uses **earth resistance meters** to manually test the grounding system at regular intervals.

•**Limitation: Manual, time-consuming, and periodic**—faults may go undetected between inspections.

06 WORK PROGRESS AND DEMONSTRATION

- Conducted a literature survey to understand existing solutions.
- Understood the necessary components required for purchase.
- Worked on the initial setup of the web dashboard.
- Designed the circuit virtually and completed the component connections.

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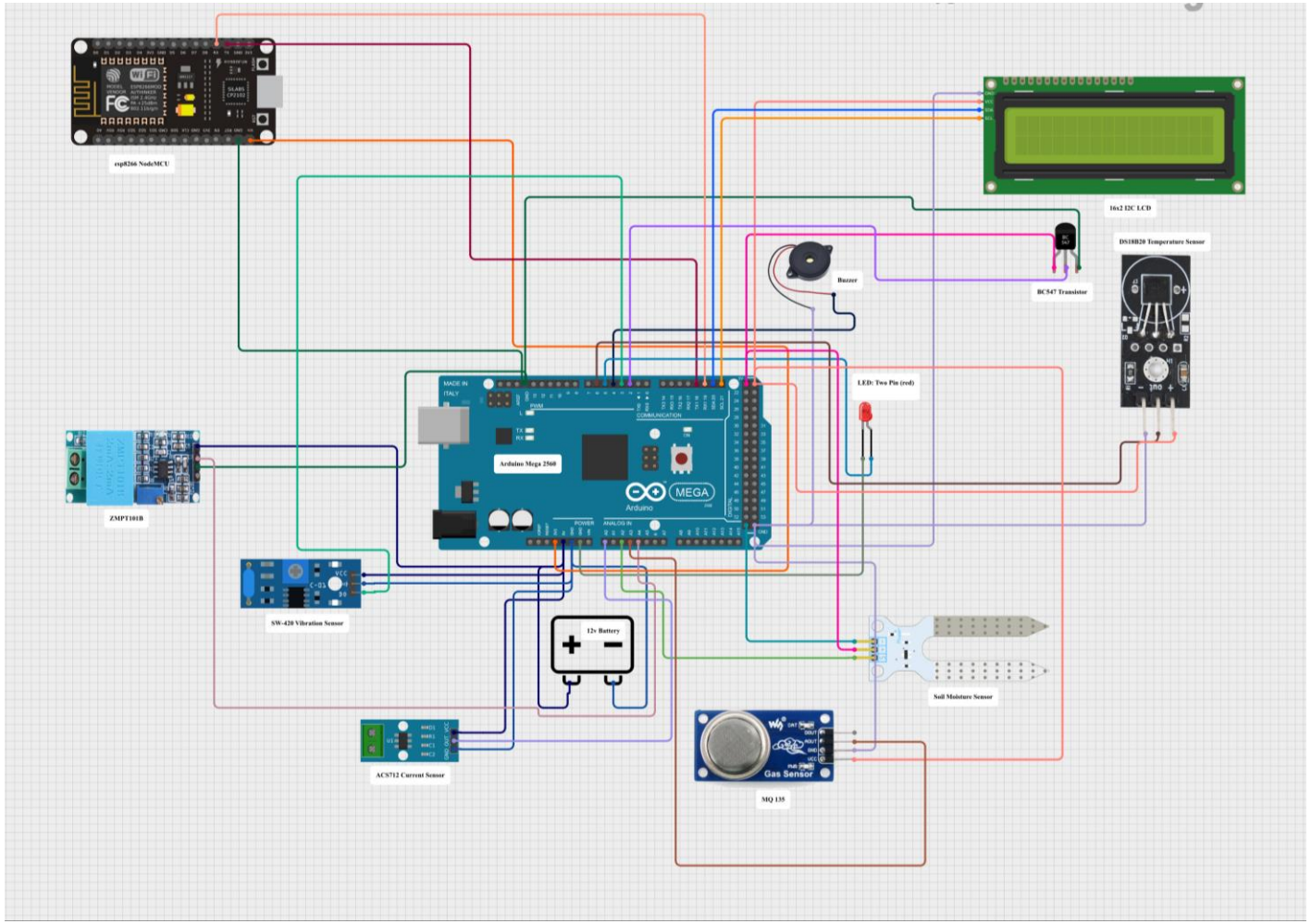
CIRCUIT DIAGRAM



Thanks!
Questions and Answers