Indian Institute of Information Technology Una Himachal Pradesh

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Review I
Project Phase – II (ECL702)

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Batch No.	13	**Semester**	VI
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1. Title of the Project

GroundShield: Smart Earthing Safety System

2. Introduction

Electrical installations in public areas such as parking lots and station premises require a reliable earthing system to ensure safety and prevent electrical hazards. While earth leakage protection switchgear is installed, it may malfunction over time, creating risks for the public. Additionally, manual inspections of the earthing system are time-consuming and inefficient. This project introduces a sensor-based system that continuously monitors earth leakage current, earthing continuity, and earth resistance to provide real-time alerts in case of faults, enhancing safety and maintenance efficiency. By implementing an IoT-based remote monitoring solution, this system will reduce the dependence on manual inspections and improve the overall efficiency of electrical safety measures. The proposed solution ensures that any deviations in earthing parameters are detected at an early stage, preventing accidents and potential system failures. The system will be equipped with a real-time alert mechanism to notify the maintenance team instantly whenever a fault or anomaly is detected.

3. Problem Definition

- Electrical pole lights and station areas depend on earthing systems to prevent hazardous electrical faults.
- Malfunctioning of earth leakage protection devices can lead to risks like electric shocks and fires.
- Manual inspection of earthing systems is labor-intensive and inefficient for large-scale installations.
- A need exists for an automated, real-time monitoring system to detect and report faults instantly.

4. Objectives

- Develop a sensor-based system for continuous and automated earthing health monitoring.
- Measure and analyze earth leakage current, earthing continuity, and earth resistance to assess system health.
- Implement a real-time alert system that can detect any fault and notify the maintenance team instantly.
- Integrate IoT for remote monitoring, enabling centralized data access and analysis.
- Enhance safety measures by reducing the risks associated with electrical faults and system failures.

5. Skillset additionally required to solve/address the problem

- **Embedded Systems:** Implementing microcontrollers like Arduino and NodeMCU for sensor interfacing.
- **IoT and Wireless Communication:** Establishing remote connectivity for real-time monitoring.
- **Web Dashboard Development:** Creating an intuitive dashboard to display system data.
- **Frontend Technologies:** Using HTML, CSS, and JavaScript for a responsive user interface.
- **Backend Development:** Setting up databases and API integrations for data storage and retrieval.

6. Timeline to achieve the skillset

- **Week 1-2:** Learn embedded systems fundamentals, including Arduino and NodeMCU programming.
- **Week 3-4:** Develop IoT and wireless communication skills for data transmission.
- **Week 5-6:** Gain expertise in web dashboard development (HTML, CSS, JavaScript).
- **Week 7-8:** Work on backend development for data storage and API integration.
- **Week 9-10:** Optimize and test UI/UX for real-time monitoring and alerts.
- **Week 11-12:** Implement database management and ensure cloud integration.
- **Week 13-14:** Debug system errors, enhance performance, and ensure stability.
- **Week 15-16:** Conduct final testing, prepare documentation, and project presentation.

7. Block schematic/algorithm/coding/testing metrics/experiments/result graphs/technical papers

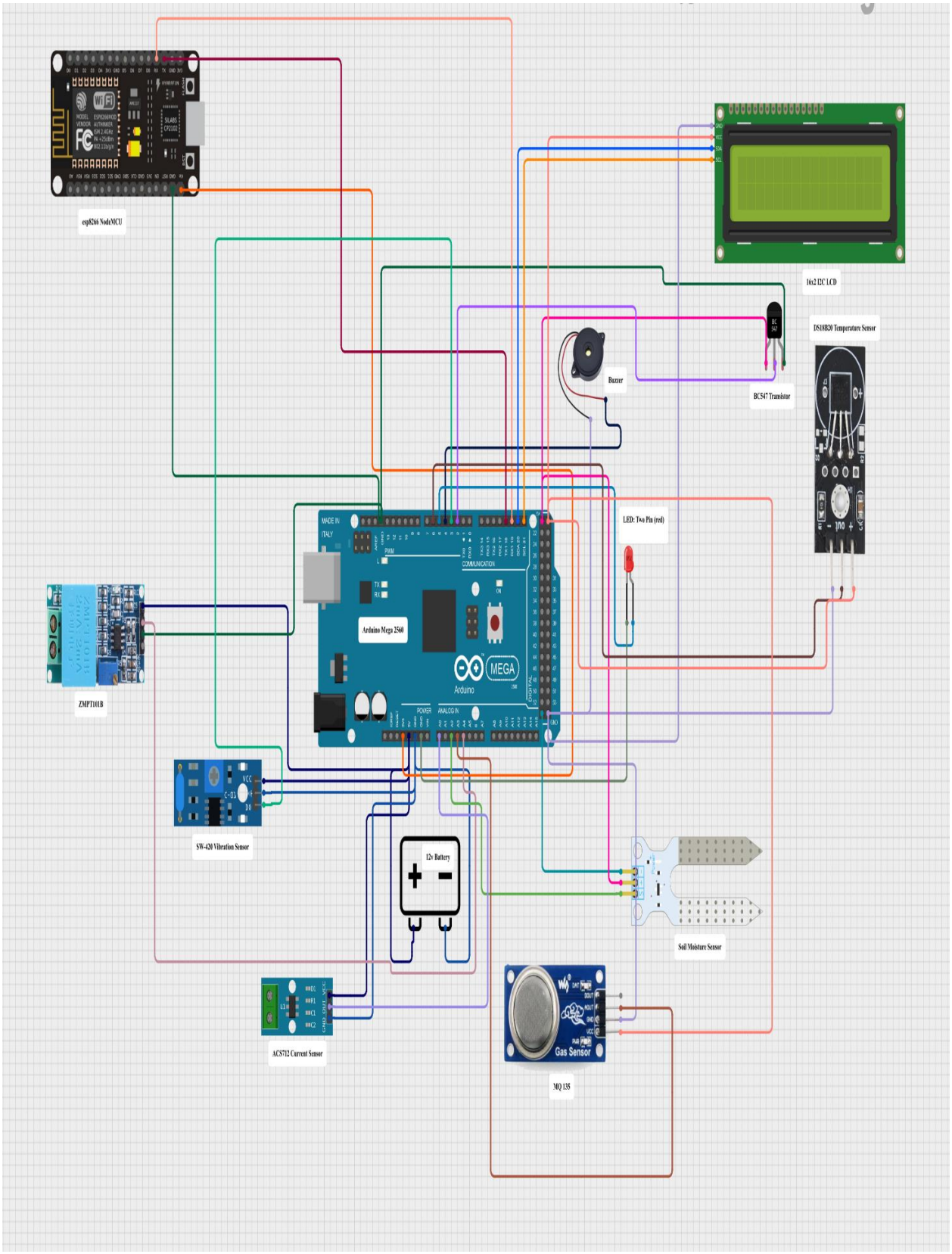

Figure 1:Circuit Diagram of GroundShield

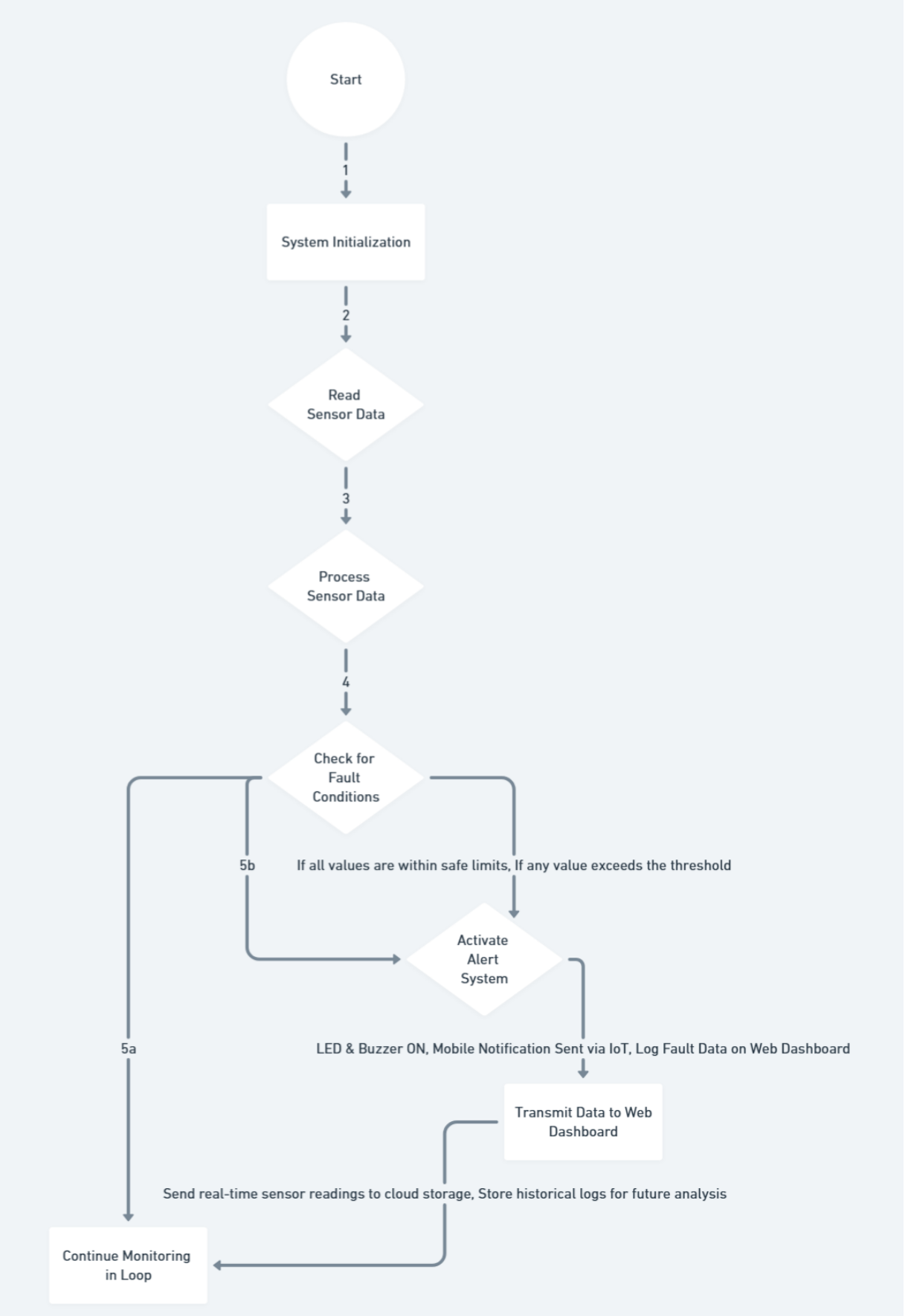

Figure 2:Block Diagram of GroundShield

8. Weekly Milestones

Week	Major Activities to be Completed
Week 1	Define project scope and objectives.
Week 2	Create a detailed project plan and timeline.
Week 3	Conduct literature survey and study related research papers.
Week 4	Understand the necessary components and finalize the list for purchase.
Week 5	Procure and assemble required components.
Week 6	Work on the initial setup of the web dashboard.
Week 7	Continue refining the web dashboard and integration.
Week 8	Implement IoT data transmission for remote monitoring.
Week 9	Develop a basic web dashboard for real-time data display.
Week 10	Optimize UI/UX for a better user experience.
Week 11	Implement alerting mechanisms (buzzer, LEDs, mobile notifications).
Week 12	Test the system under different failure conditions.
Week 13	Improve backend functionality and ensure stable data logging
Week 14	Conduct extensive performance evaluations.
Week 15	Finalize documentation and prepare reports.
Week 16	Conduct final review and presentation of the project

9. Completed Milestones

- Conducted a literature survey to understand existing solutions.
- Understood the necessary components required for purchase.

- Worked on initial setup of the web dashboard.

10. Milestones to be Completed

- Procurement of remaining components and full hardware setup.
- Full integration of hardware and software components.
- Testing system performance under real-world conditions.
- Completing cloud integration for real-time monitoring.
- Finalizing documentation and submitting the complete project.

11. Expected Challenges

- Ensuring stable and uninterrupted data transmission.
- Optimizing UI responsiveness for real-time updates.
- Minimizing false alarms while maintaining high sensitivity.
- Enhancing system durability under various environmental conditions.

12. References

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Name and Signature of Student **Name and Signature of Supervisor**