TITLE HERE.. TITLE HERE.. TITLE HERE..

**Example.**

RECENT ADVANCEMENTS IN MACHINE LEARNING USING EDGE AI

Report submitted to GITAM (Deemed to be University) as a partial fulfillment of the requirements for the award of the Degree of Bachelor of Technology in (write your respective branch)



DEPARTMENT OF ELECTRICAL, ELECTRONICS AND COMMUNICATION ENGINEERING

GITAM SCHOOL OF TECHNOLOGY

GITAM (DEEMED TO BE UNIVERSITY)

BENGALURU -561203

NOV 2025

**Name**

**Regd. No. : 000000000**

**DECLARATION**

I/We declare that the project work contained in this report is original and it has been done by me under the guidance of my project guide.

Name:

Date: Signature of the Student

**Department of Electrical, Electronics and Communication Engineering GITAM School of Technology, Bengaluru-561203**

****

**CERTIFICATE**

This is to certify that (Student Name) bearing (Regd. No.:) has satisfactorily completed Mini Project Entitled in partial fulfillment of the requirements as prescribed by University for VIIth semester, Bachelor of Technology in “Electrical, Electronics and Communication Engineering” and submitted this report during the academic year 2025-2026.

[Signature of the Guide] [Signature of HOD]

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**Chapter 1: Introduction**

* 1. Overview of the problem statement

Biosensing technologies offer transformative potential in healthcare by enabling real-time monitoring and early detection of diseases. This project initiates the development of a comprehensive biosensor platform that seamlessly integrates optimized hardware with a cross-platform application for efficient data monitoring and analysis. The hardware is designed to minimize electrical noise and interference through refined PCB layouts and advanced signal processing techniques, thereby improving the accuracy and reliability of sensor outputs.

Complementing the hardware, the software component is being developed as an intuitive mobile and desktop application capable of live data streaming, secure storage, and cloud connectivity, facilitating remote monitoring. The application emphasizes user-friendly interfaces to ensure that both patients and healthcare providers can easily visualize, interpret, and interact with the data. Additionally, advanced analytics are incorporated to detect abnormal patterns, providing opportunities for early disease identification and enhanced clinical decision support.

The platform also focuses on implementing wireless data transmission for seamless connectivity and establishing a scalable framework adaptable to a variety of biosensing applications. By combining hardware optimization with intelligent software integration, this project aims to create a reliable, accessible, and intelligent biosensor system that supports personalized healthcare and proactive disease management.

* 1. Objectives and goals

**Main Objectives:**

* **Analyse and Mitigate Noise in PCB:** Systematically identify, analyse, and regulate electrical noise sources in the existing PCB to enhance signal accuracy and reliability.
* **Develop a Cross-Platform Application:** Design and implement a user-friendly application with an intuitive interface to facilitate seamless interaction across multiple platforms.
* **Enable Real-Time Data Handling:** Implement capabilities for live data streaming, efficient storage, and cloud connectivity to support remote monitoring of biosensor outputs.
* **Integrate Advanced Analytics:** Incorporate intelligent data analytics for early disease detection, enabling proactive healthcare interventions.

**Additional Goals:**

* **Wireless Data Transmission:** Facilitate robust and reliable wireless communication between the biosensor hardware and the software platform.
* **Enhanced User Experience:** Ensure the interface is accessible and user-friendly to simplify interaction and improve usability.

**Chapter 2 : Literature Review**

Recent advances in biosensor technologies have emphasized the importance of integrating high-performance hardware with intelligent software platforms to achieve reliable real-time monitoring and early disease detection. Non-invasive wearable biosensors, as reviewed by Wu and Liu, provide a robust framework for monitoring inflammation biomarkers, demonstrating the critical role of accurate signal acquisition and sensor sensitivity in healthcare applications.

A major challenge in biosensor development is mitigating electrical noise and interference in the hardware. Shamkhalichenar et al. highlighted the role of PCB technology in electrochemical sensors, emphasizing design strategies that enhance signal fidelity and sensor reliability. Chen et al. demonstrated techniques for common-mode noise reduction in non-contact biopotential circuits through electrode-body impedance imbalance cancellation, underscoring the importance of circuit-level noise management for precise measurements. Furthermore, high-density CMOS-based biosensors have been explored to dynamically overcome noise in multimodal neural recordings, indicating the potential of advanced hardware designs for high-accuracy biosensing.

The role of electrochemical methods, such as cyclic voltammetry and chronoamperometry, has been widely documented, with Analog Devices providing comprehensive guidelines on measurement principles and techniques. Additionally, resources from National Instruments outline best practices for low-noise PCB layout and instrumentation, which are essential for designing sensitive biosensor circuits. Existing implementations, including Microchip’s AN1258 potentiostat design and Maxim Integrated’s AN-5126 noise reduction techniques, offer practical insights into circuit design, filtering strategies, and biasing methods for electrochemical sensors.

Collectively, these studies and resources demonstrate that achieving high-performance biosensor platforms requires careful optimization of PCB design, noise mitigation strategies, and advanced analytical integration. They provide a strong foundation for developing a biosensor platform that combines reliable hardware, wireless data transmission, and an intuitive cross-platform software interface for real-time monitoring and early detection of diseases.

**Chapter 3 : Strategic Analysis and Problem Definition**

* 1. SWOT Analysis
  2. Project Plan - GANTT Chart
  3. Problem statement

**Chapter 4 : Methodology**

* 1. Description of the approach
  2. Tools and techniques utilized
  3. Design considerations

**Chapter 5 : Implementation**

* 1. Description of how the project was executed
  2. Challenges faced and solutions implemented

**Chapter 6: Results**

* 1. outcomes
  2. Interpretation of results
  3. Comparison with existing literature or technologies

**Chapter 7: Conclusion**

Here write Suggestions for further research or development and Potential improvements or extensions

**Chapter 8 : Future Work**

Here write Suggestions for further research or development Potential improvements or extensions

**References**

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