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**SUKKUR IBA UNIVERSITY**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**FINAL YEAR PROJECT PROPOSAL**

**Real Time and Online Monitoring System for Microphysiological Sensor Integrated System**

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**Submission Date: 15/07/2024**

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| --- | --- | --- | --- | --- |
| **Project Title:** | Real Time and Online Monitoring System for Microphysiological Sensor Integrated System | | | |
| **Main Subject Area/s:** | Bio Medical  Agriculture  Power Sector  IOT Robotics   * Artificial Intelligence | | | |
| **Nature of Project:** | Research, Development, and Engineering (RD&E) leading to production capability  Application oriented Research, Design & Development (R, D&D) having production potential  Basic R&D | | | |
| **Students:** | **Name** | | **CMS ID** | |
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| **Wakeel Ahmed** | | **033-19-0026** | |
| **Contact Information of Group Leader** | **Mobile No: 03463201220**  **Email Address: wakeel.beef19@iba-suk.edu.pk** | | | |
| **Supervisor:** | **Dr. Fida Hussain** | **Co-Supervisor**: | |  |
| **Is this project a part of vertical integrated project?** | | Yes  No | | |
| If yes, please give title of previous project: | | | | |
| **Funding availability for the project:** | | Yes  No | | |
| If yes, please give details from which funding agency: | | | | |
| **Industrial collaboration for this project:** | | Yes  No | | |
| If yes, please give details:  **Name of Collaborator:**  **Designation:**  **Company/Industry:** | | | | |
| **Is this project targets to solve any industry/society related problem in particular?** | | Yes  No | | |
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# Project Overview

The proposed project aims to develop an advanced monitoring system that integrates real-time physiological sensor data acquisition. The system will focus on monitoring glucose levels using microphysiological sensors integrated with myRio, LabVIEW, Firebase, and Android technologies.

The integration of these technologies facilitates continuous and real-time data collection and analysys capabilities. Microphysiological sensors are embedded in the system to ensure monitoring of materials.

By leveraging advanced biosensing techniques, the system will provide robust and precise data. The integration with LabVIEW offers a user-friendly interface for data visualization and analysis, while Firebase ensures secure and scalable data storage and real-time access. The Android application enhances the accessibility of data for healthcare professionals and patients.

The comprehensive monitoring capabilities of this system align with the current advancements and challenges in MPS, aiming to improve the reproducibility and variability control in MPS development and operation. This project stands to significantly impact healthcare management by providing a reliable and efficient monitoring solution for microphysiological systems.

# Aims and Objectives

* **Develop an Integrated Monitoring System**: Design and develop a real-time and online monitoring system that integrates glucose monitoring biosensors into Microphysiological Systems (MPS).
* **Online Sensor Data Monitoring:** Implement a system for real-time monitoring and remote access to sensor data using LabVIEW, with data acquisition through myRIO connected to a PCB board via UART, ensuring continuous online availability.
* **Real-Time Monitoring for Continuous Experimental Phase:** Develop a framework for real-time data acquisition and visualization from glucose sensors connected to the PCB board, enabling immediate feedback and adjustments during experiments, with data represented as Sensor Data vs. Time graphs.
* **Sensor Data Logging for Drug Proposing:** Create a comprehensive data logging system that captures and stores glucose sensor data in CSV files, providing a reliable dataset for drug proposal and development analysis.
* **Wireless Monitoring Using Mobile App:** Facilitate wireless monitoring and visualization of sensor data through a mobile application, allowing real-time data access and graph plotting remotely over the internet.
* **Integration of System Using Network Protocols:** Ensure seamless integration and secure data transmission from the glucose sensors to an online database via network protocols, supporting backend connectivity and remote data accessibility.

# Budget Description

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Item Number** | **Description** | **Quantity** | **Unit Cost** | **Total Cost** | **Supplier** | **Justification** | **Category** |
| **1.** | myRIO | 1 | PKR 70,000 | 70,000 | National Instruments | Data acquisition and control system | Hardware |
| **2.** | PCB Board | 2 |  |  |  | Interface for connecting sensors and myRIO | Hardware |
| **3.** | Glucose Sensors | 8 |  |  |  | For measuring glucose levels from MPS system | Hardware |
| **4.** | LabVIEW Software License | 1 | 0 (provided) | 0 | Institution | For accessing labview features | Software |
| **5.** | Data Storage (Cloud) | 1 | 0 (Trial free) | 0 | Firebase | For storing and accessing data remotely | Software |
| **6.** | Miscellaneous Components | -- | 5000 | 5000 | Online Electronics shops | Different cables and wires for interface | Hardware |

# References

[1] A. T. Young, K. R. Rivera, P. D. Erb, and M. A. Daniele, “Monitoring of Microphysiological Systems: Integrating Sensors and Real-Time Data Analysis toward Autonomous Decision-Making,” *ACS Sensors*, vol. 4, no. 6, pp. 1454–1464, 2019, doi: 10.1021/acssensors.8b01549.

[2] F. Hussain Memon *et al.*, “A Comprehensive Review of Biosensor Integration in Microphysiological Systems for Online Monitoring: Current Challenges and Future Advancements,” *ChemBioEng Rev.*, vol. 10, no. 5, pp. 817–828, 2023, doi: 10.1002/cben.202200066.

**Signature of Students:**

1. **Muhammad Saqlain**
2. **Faizan Ahmed**
3. **Wakeel Ahmed**

# Supervisor’s Comments

Take recommendation of your supervisor for your project work here.

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# FYP Evaluator Remarks:

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Project Evaluator:

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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Final Year Project Coordinator

Dr. Nabeel Siddiqui