

PROJECT PROPOSAL

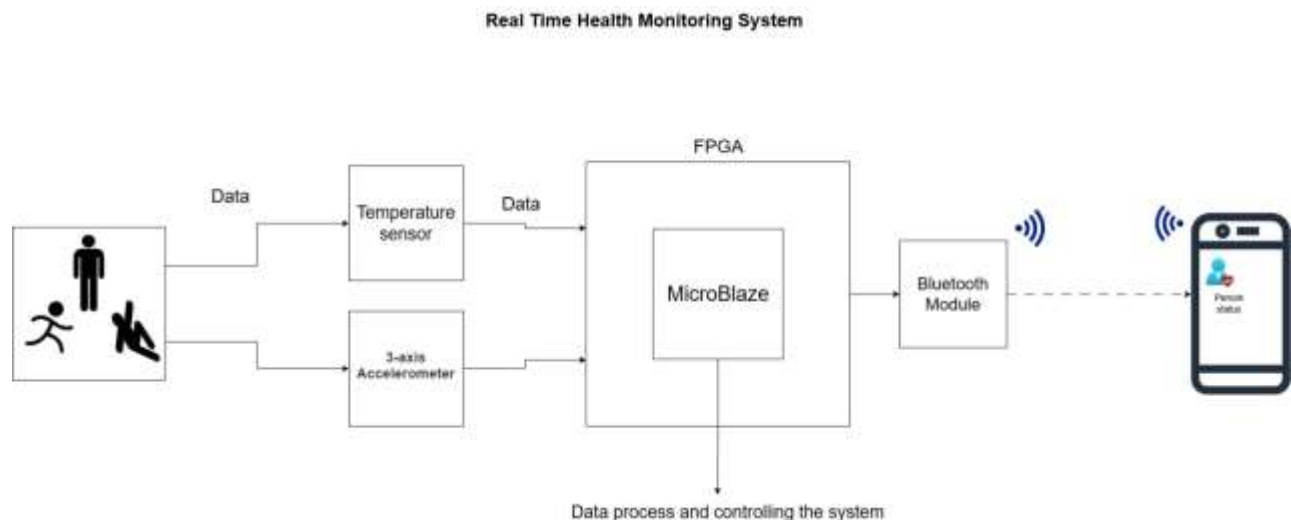
Project Title:

Real-Time Health Monitoring System Using Nexys A7 FPGA.

Project Overview:

This project aims to design and implement a real-time health monitoring system leveraging the capabilities of the Nexys A7 100T FPGA board. The system will utilize multiple PMOD modules, including a temperature sensor for health vitals and an accelerometer to monitor a person's activity (e.g., standing, moving, falling). Processed data will be transmitted wirelessly to a mobile device using a PMOD BLE (Bluetooth Low Energy) module for real-time monitoring. The system integrates custom IPs for signal processing, managed by a Microblaze processor, and offers scalability for additional sensors and features.

Block Diagram:



Objectives:

- Health Data Acquisition: Measure body temperature and detect movement or falls using PMOD sensors.
- Signal Processing: Implement custom IPs to process and filter raw sensor data in real-time.
- Data Communication: Transmit the processed health data to a mobile device via the BLE module.
- User-Friendly Monitoring: Display data in a user-friendly mobile application for real-time health insights.
- Scalability: Ensure the design can accommodate additional sensors or modules for future expansion.

Project Scope:

The system is designed for use in healthcare monitoring applications, with potential uses including elderly care, fitness tracking, and post-recovery monitoring. The project will focus on:

- Integrating PMOD modules (temperature sensor, accelerometer, BLE) with the Nexys A7 FPGA board.
- Developing custom VHDL IPs for real-time data acquisition and processing.
- Implementing a Microblaze processor to manage system operation and data communication.
- Transmitting the data wirelessly to a mobile device using Bluetooth.
- Using a basic mobile application or interface to visualize the transmitted data.

Tools and Technologies:

Sensors:

- PMOD Temperature Sensor: For real-time temperature monitoring.
- PMOD Accelerometer: To detect activity states such as standing, moving, or falling.

Processing and Communication:

- Nexys A7 FPGA Board: Core platform for data acquisition and processing.
- Custom IP Blocks: VHDL-based IPs for filtering and analyzing sensor signals.
- Microblaze Processor: Embedded processor for system control and communication.

Wireless Transmission:

- PMOD BLE Module: For transmitting health metrics to a mobile phone.

User Interface:

- Mobile App: A simple app to display temperature and activity status in real-time.

Software:

- Xilinx Vivado Design Suite (for hardware design and IP integration).
- Xilinx Vitis (for software development on the Microblaze processor).

Expected Outcomes:

- A functional real-time health monitoring system that acquires and processes data from a temperature sensor and accelerometer.
- Wireless transmission of health metrics to a mobile phone for real-time monitoring.
- A mobile app that displays temperature and activity status in a clear and intuitive manner.
- Scalability for additional sensors or functionalities in future iterations.