

## **Title: Health tracker**

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**Github link:**

**[https://github.com/samu7988/ECEN5823\\_Project\\_Health\\_tracker](https://github.com/samu7988/ECEN5823_Project_Health_tracker)**

## Project overview

The goal of this project is to emulate a health tracker to monitor the **pulse rate (heart beat)** and **free fall detection**. Free fall event is generated when a person falls unconscious. The captured heart rate and free fall is then sent to smartphone application via Bluetooth low energy protocol. The pulse rates are captured using pulse rate sensor from Sparkfun and the free fall is detected using accelerometer.

The values of heart beat and free fall are sent to smartphone every 10 seconds.

## High level requirements

1. System shall comprise the pair of server and client : server-> Blue Gecko, Client -> Mobile phone
2. The Blue Gecko Board should implement and advertise GATT services.
3. The service shall have two characteristics- one for the Free fall detection (Accelerometer) and other for the heart beat sensing(pulse rate sensor).
4. Every 10 seconds should send the values to the cellphone(client).
5. The server shall establish the encrypted link with the cell phone via bonding.
6. The server shall send the values to the client after each 10 seconds and should go to the sleep thereafter.
7. The server should be in the lowest possible energy mode.
8. The values would be communicated to the client using BLE.
9. The client(cell phone) shall display values to the user.
10. The server LCD should display the values of free-fall and heart rate.
11. The LCD should display the following :
  - a. Connection status : Advertising/Connected/Bonded
  - b. Current indications enabled: Indications enabled
12. Client should display the free fall and pulse rate values.

## High level design requirements

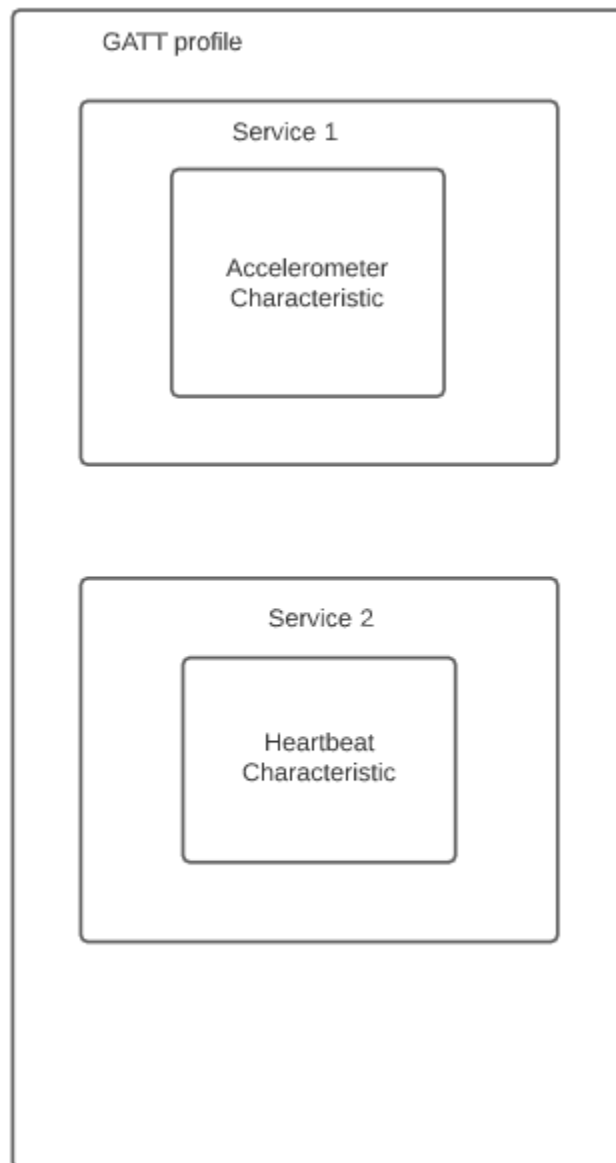
The entire system consists of server part (blue gecko board) and client which is a Bluetooth based application running on mobile phone. The server will measure the free fall (accelerometer value) and heart beat values (pulse rate sensor) which are then communicated to client via BLE protocol.

The client has provision to enable server indications and receive the indications every 10 second. On reception, the client will display the values on the mobile application. Simultaneously, the server LCD will also display the values for both the services.

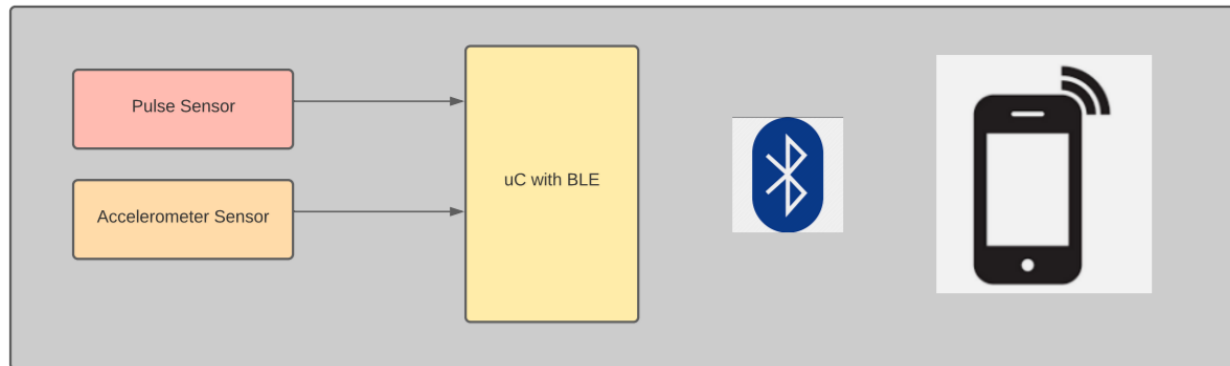
### Data types table:

Measurement	Unit	Datatype
Heart rate	bpm	uint16_t
Axis orientation(free fall)	milliG	uint16_t

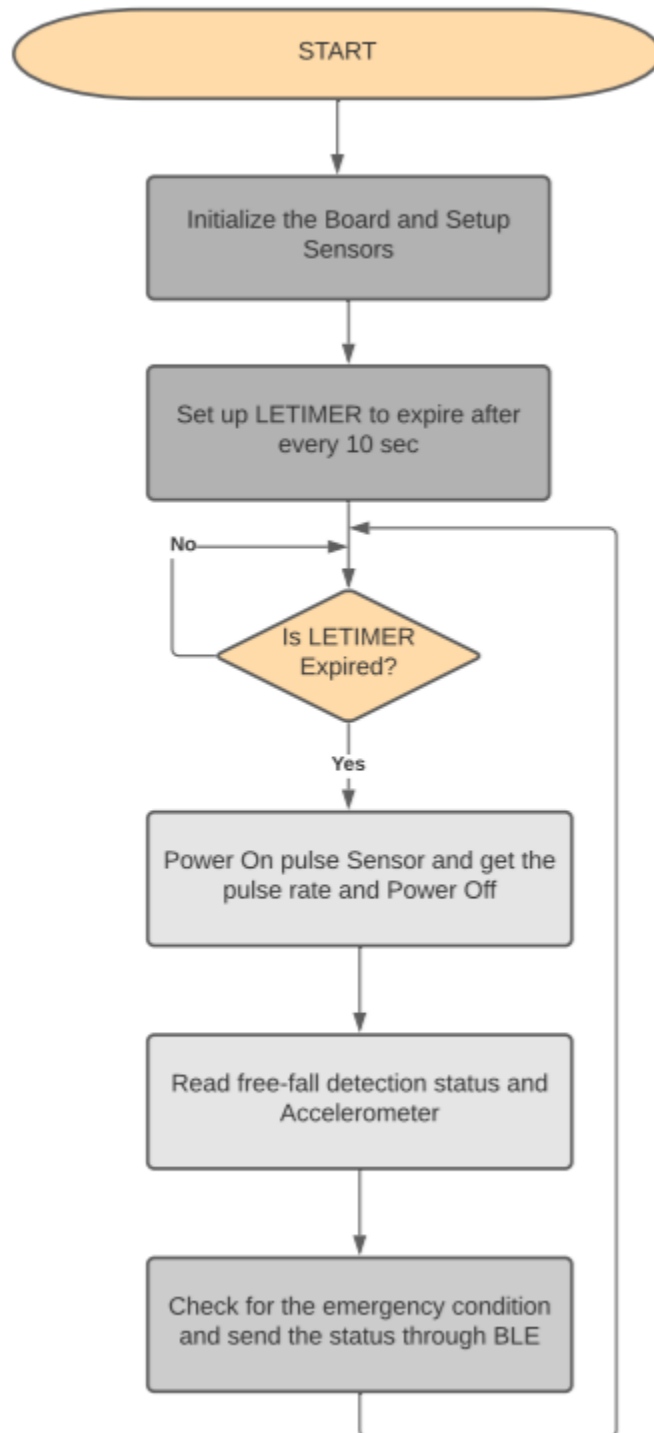
## Wireless communication details:



## Hardware block diagram:



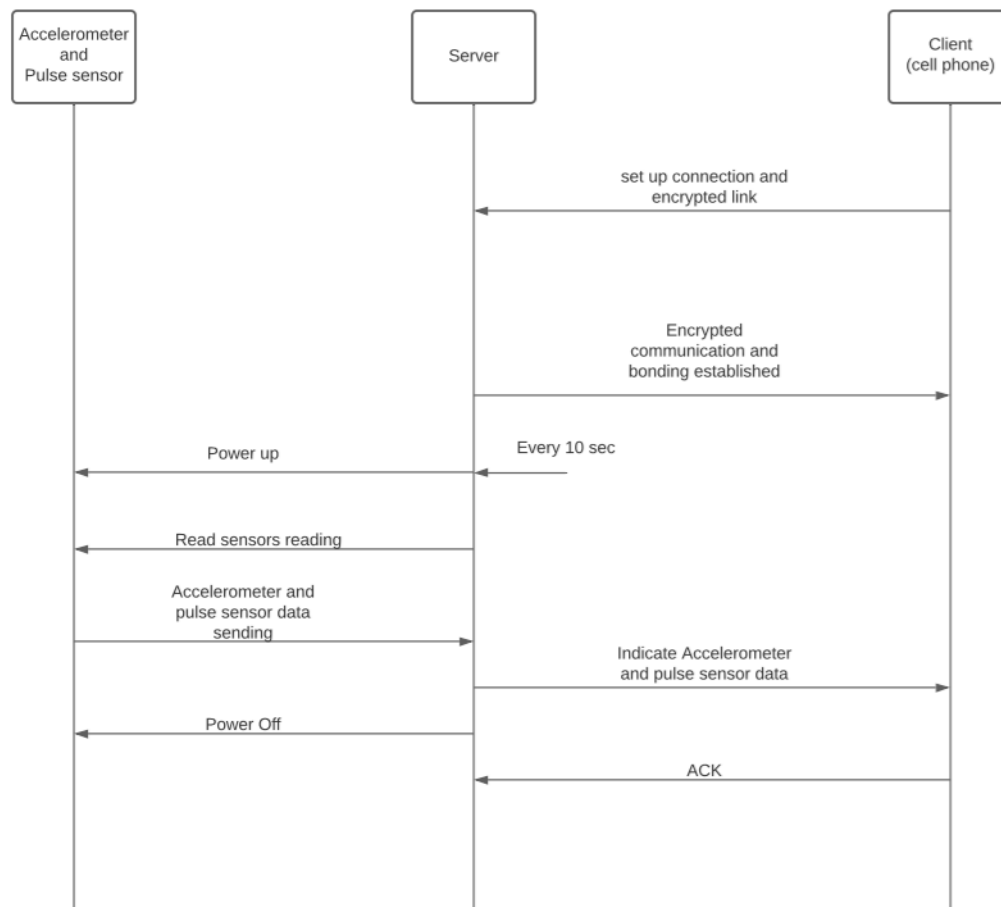
## Software block diagram:



## Division of labor

The hardware components (blue gecko board, sensors) are bought off the shelf. Development related to this is limited to 5%. Majority of the efforts are concentrated towards software design and implementation. Firmware implementation for sensor reading and BLE send/receive is the most critical part of this project.

## Data flow diagram



## Subsystem summary

The project will consist of blue gecko server and a client (mobile phone application). The system is combination of hardware and software. The server will be in lowest possible energy mode for most of the time. The values are communicated to the client every 10 seconds. The values of both the GATT services will be displayed on server on LCD and on mobile application on the client end.

# Test plan spreadsheet

I have included the test verification excel file in the github url

## Proposed schedule

Task	Target Completion Date	Expected Date
LETIMER Implementation and testing	11/12/2021	
Accelerometer I2C read write	11/15/2021	
Heart pulse sensor implementation and testing	11/18/2021	
LCD Display	11/19/2021	
Radio Transmission	11/25/2021	
Final Integration and testing	11/30/2021	