

EEE1018- Biomedical Instrumentation

Project Title: Dynamic monitoring of the Health using a Smart Health Band.

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Objective:-

Smart Health Band is an innovative solution for detecting and locating a person who's health in grave danger. It is also a smartphone synced mobile health monitoring bracelet capable of reading a human's vital signs (pulse rate and body-temperature). In this busy world, where the duties of human are restricted to sitting at one place and working on their desktops for the whole day long will be obvious to create a lot of problems including obesity, Heart problems, no exercise so respiratory problems, and lot more.

This smart health band is actually an “Activity Tracker” which is basically a device which helps for monitoring and tracking fitness-related metrics such as distance walked and heartbeat.

So with this innovation, we aim to build a health simulator which will help one to detect with their regular heart pulse trajectory, body temperature, humidity in the surrounding area and all at an affordable cost.

We intend to connect the whole system with the real time data analysis by using different applications like “Thingspeak” which will transfer the data at your device so you can detect the history of how your body speaks throughout the time.

We also intend to add safety activities like Alarming Systems which will be described in the methodology.

Methodology:

The microcontroller used for this project is **Arduino Pro Mini**. The reason why we are using this microcontroller is because it's small size and low power consumption.

The facilities which we will be providing are as follows:

1. Pulse rate monitoring using PPG –

Pulse rate monitoring is the main feature of our project. With each cardiac cycle the heart pumps blood to the periphery. Even though this pressure pulse is somewhat damped by the time it reaches the skin, it is enough to distend the arteries and arterioles in the subcutaneous tissue. If the pulse oximeter is attached without compressing the skin, a pressure pulse can also be seen from the venous plexus, as a small secondary peak. A photoplethysmogram (PPG) is an optically obtained plethysmogram, a volumetric measurement of an organ. A PPG is often obtained by using a pulse oximeter which illuminates the skin and measures changes in light absorption.

The change in volume caused by the pressure pulse is detected by illuminating the skin with the light from a light-emitting diode (LED) and then measuring the amount of light either transmitted or reflected to a photodiode. Each cardiac cycle appears as a peak. This signal will be conditioned with the help of the conditioning circuits.

2. Drowsiness Alarming system –

If the device is on Car mode it will analyse the photoplethysmogram (PPG) signals and inform whether the user is fit to drive or not with the help of the alarm.

3. Real time data transfer using Wi-Fi module ESP8266 –

The human data will also store in the cloud through Wi-Fi module ESP8266. The data will help the doctor to analyse the patient's condition on the daily or weekly basis.

We will use "ThingSpeak" because "ThingSpeak is an open source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. ThingSpeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates.

4. **Atmospheric Temperature and Pressure –**

The sensor used for this purpose is BMP180 which help user to know the Temperature and Pressure.

5. **Body Temperature –**

The body temperature is found out using LM35.

Expected Output:

The project isn't only limited for tracking fellow individuals. The project can still be developed to meet medical standards. Once it does, hospitals can use the Smart Health Band project to monitor their outpatients. Patients who are at risk of unpredictable health conditions such as having Seizures, Stroke, Cardiac Arrest and Heart Attack. We will also try to make an app to get the patient data in smart phone through Wi-Fi. If an incident does occur, the Smart Health Band can predict it before it even occurs, the Smart Health Band system would be able to notify the nearest hospital by sending the exact GPS coordinates of the person in need.