# IOT BASED OLD AGE WEARABLE BAND FOR HEART RATE MONITORING AND FALL DETECTION WITH EMERGENCY ALERT

[1]Subashni S, [2] Sufrin Sarifa S, [3]Siva Surya S, [4]Pradheep T Rajan
[1,2,3] UG Students, [4]Assistant Professor, [1,2,3,4] Department of ECE
[1,2,3,4] Francis Xavier Engineering College

*Abstract-* **Most of old age now a days are left alone in their house. Many of the people among them don't require medical attention from the hospitals all the time. In this project, the concentration is mainly made on such old age people. The main goal is using barometric pressure sensor for fall detection than the typical accelerometric sensor .the accuracy of fall detection using the barometric pressure sensor is usually high. The second goal is using pulse sensor and alerting the nearby neighbours using the blynk server. The circuit is in the form of wearable band which is connected to the android phone using the blynk (the iot app).**
*Index terms:* **barometric pressure sensor, pulse sensor, fall detection, heart rate variability, internet of things.**

## I.INTRODUCTION

In this decade there have been many chronic and critical health issues. Thus there is a high demand for timely medical attention. Failure of which shows a fatal result.But the old age people should have a proper medical attention in time exactly. Failure in this might end up taking the life of the old age people. The basic attentions that ought to be given in an old age people are heart rate monitoring, temperature and fall detection. In people, fall makes it tedious once they didn't get medical attention at a proper time. A fall might even be caused due to the heart attack. Fall due to heart attack can be sensed using the pulse sensor. But most cases fall is caused due to tripping or slipping in the level surface within bedrooms or other common rooms. If the medical attention is not given at the right time, the fall might become a 'long lie'. 'Long lie' is caused due to the fall without being seriously injured but are unable to get up. A 'long lie' may cause many negative psychological and physical effects in the person. Falls also constitute significant health care cost. A study among Medicare shows 29% higher cost for the old people with one fall than the old people with no fall. It is also anticipated that fall injury costs will increase twice over the next 50 years. Of many other health issues, Hypertension has become a common yet serious issue and it is main suffers from cardiac arrest and heart attacks. According to the Global Burden of Disease Study 2013, Hypertensive heart disease has topped the table for its death rate in India. Hence it is also an important parameter to be monitored in the patients of old age. Medical attention by using server by the hospitals and always monitoring the old age people by the hospital is unnecessary since many of the old age people are not so serious that they require 24hours monitoring by the hospitals. Thus the project that is going to be designed is a wearable band that helps in alerting in case of fall detection or sudden variation in the pulse.

## II.RELATED WORK

The related work in this area concentrates mainly either in fall detection or in heart rate monitoring using pulse sensor with the help of IoT. The fall detection in the previously purposed system depends mainly on the usage of the accelerometric sensor. But the usage of it alone with no consideration of the surrounding

pressure will have no accuracy. The other system purposed with both fall and heart rate involves the usage of patches. The patches are always compactable in case of bed ridden patients and not for the old age people in most of the cases. The serve used in the existing systems are MQTT (Message Queuing Telemetry Transport) server. To capitalize the potential of a dynamic system that is proposed, the Quality of Service (QoS) and security in the wireless transmission of data needs to be taken care of by MQTT server.The existing systems are the remote HRV analysis systems for hypertensive patients available to help doctors track the progression of the patient's condition and serve as an alert system prior to critical medical events. These systems also use the servers that are complex in their operations. But those servers are unnecessary for monitoring the one person. The related work also shows the importance of using the miniature sensors in the monitoring of the people through either wearable bands or rings or shirts. But all these are connected to the centralized server and then it is being maintained. This system is the best for the patients who require medical attention always.Most of the mortality nowadays is caused due to the cardiac arrest and heart attacks. This defect is ageless; people of any ages can suffer from it. Thus the system we are going to create will concentrate mainly on the old age people who are alone.

## III.ARCHITECTURE

The architecture of the system proposed consists of the following modules in it. These modules are very important in the functioning of the system.

### ARDUINO PRO MINI:

The arduino pro mini is a microcontroller board based on the ATmega328.It has 14 digital input/output pins(of which ^ can be used as pwm outputs),^ analog inputs, an on-board resonator, a reset button.The Arduino Pro mini is intended for semi-permanent installation in objects or exhibitions.

The Arduino Pro mini can be used at the minimum power supply which is the basic phenomenon in many wearable bio circuits. It can be run at the 3.3V and 8MHz.

LiPo Battery A lithium polymer battery, or more correctly lithium-ion polymer battery (Abbreviated as LiPo,LIP,Li-poly) is a rechargeable battery of lithium ion technology using a polymer electrolyte instead of a liquid one.

The usage of this battery has an advantage over its size and its life time. The size places a major role in the bio circuit that are connected to the human body for collecting the biological data.

### BAROMETRIC PRESSURE SENSOR:

The barometric pressure sensor is the sensor that helps in determining the pressure of the atmosphere.The calculated atmospheric pressure helps in obtaining the altitude accurately.

From the altitude the sudden variation can be made to alert the neighbour for the possibility of fall through Blynk.

### BLYNK

Blynk is a Platform with iOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet.It's a digital dashboard where we can build a graphic interface for your project by simply dragging and dropping widgets. Blynk is not tied to some specific board or shield. Instead, it's supporting hardware of our choice. Whether our Arduino or Raspberry Pi is linked to the Internet over Wi-Fi, Ethernet or Bluetooth.

Blynk Server is an Open-Source Netty based Java server, responsible for forwarding

messages between Blynk mobile application and various microcontroller boards and SBCs (i.e. Arduino, Rasberry Pi, etc.).

Blynk server directly sends the message to the Blynk app without the need of the computer or other PCs. This is one of the major advantages of the Blynk.

## PULSE SENSOR

The Pulse Sensor is a plug-and-play heart-rate sensor for Arduino. It can be used by students, artists, athletes, makers, and game & mobile developers who want to easily incorporate live heart-rate data into their projects. It is an integrated optical amplifying circuit and noise eliminating circuit sensor.

Pulse sensor can be clipped into the earlobe or finger tip for measuring the heart rate. Heart rate measurement indicates the soundness of the human cardiovascular system.

The pulse sensor is used to detect the heart beat by the method of Photoplethysmograph(PPG). PPG illuminates the skin optically and measures the pulse as a variation of resistance to blood flow in the skin. The sensor could be attached to the finger/earlobe. The variation is obtained as a fluctuation in the analog values from the pulse sensor. As the heart pulse is detected, heart rate and Inter Beat Interval (IBI) are calculated alongside.

*We are using the pulse sensor for monitor the heart beat and alerting in case of emergency.*

## EMERGENCY BUTTON

There is an emergency button in our project that the person can press it in the situation were he/she needs an immediate medical attention or help assistance, then the band sends the alert to the caretaker's and the nearby ones.

## BLUETOOTH MODULE

Compared to the WLAN technologies presented the Bluetooth technology discussed aims at so-called ad-hoc piconets, which are local area networks with a very limited coverage and without the need for an infrastructure. This is a different type of network with a very limited coverage and without the need for an infrastructure. This is a different type of network is needed to connect different small devices in close proximity without expensive wiring or the need for a wireless infrastructure.

Using wireless piconets, a mobile phone can be connected to a PDA or a laptop in a simple way. Mobile phones will not have full WLAN adapters built in, but could have a Bluetooth chip. The mobile phone can then acts as a bridge between the local piconet and, e.g, the global GSM and forward it to the laptop which is still in a suitcase. Via a piconet, a file server could update local information stored on a laptop or PDA while the person is walking into the office.
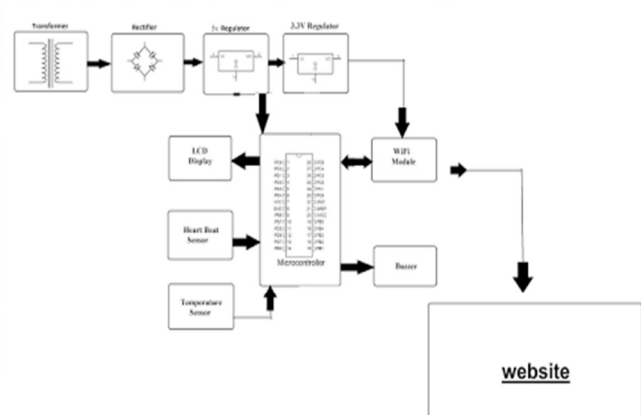


*Fig: General block diagram*

## IV. IMPLEMENTATION AND RESULT

The system we have created uses all the components that are described above. At first the circuit get the biological data from the

sensor and it send the data through the blynk server to the blynk app installed in the android mobile.

In case of any fall detection and changes in the pulse, or in case of activation of the emergency button the neighbours are being alerted.

Fall is detected by the sudden altitude variation with in a given time whereas the pulse is alerted with the comparing with high and lower rate.

Temperature is also monitored using BMP180 and alerted in case of emergency.

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