Wearable Computing Device for Automated Health Alerts and Smart Security Solution

Shital Patil[1] , Arvind Jadhav[2], Shruti Havele[3]

[1]*Professor, Computer Department, Savitri Bai Phule Pune University, Maharashtra, India*
[2]*Computer Department, Savitri Bai Phule Pune University, Maharashtra, India*
[3]*Computer Department, Savitri Bai Phule Pune University, Maharashtra, India*

Abstract

Smart phones have become very popular these days. They provide lot of features and functionalities which makes day to day life more organised, easier and safe. Taking advantage of this, we have developed a system with an application which needs real time and fast data processing. This system will help especially those people who are suffering from heart related problems and the womens who are trapped in a threatening condition. For people who have heart related problems the system will detect heart beat by pulse sensor and will send notification to nearby hospitals and their relatives through application. For women in a threatening condition this system can help her, when the women touches the pressure sensor, the system will immediately notify to nearby police stations and her relatives through KNN algorithm. Hence this computing device is proposed which has the potential to produce cheap and off-the-shelf solution.

Keywords - touch pressure, accelerometer sensor, threatening conditions, heart rate sensor, women's security, wearable computing device, KNN.

I. INTRODUCTION

Wearable computing devices are extension to smart phones and wristwatches. They can be used as a fitness tracker, sleep tracker, for health monitoring purpose and so on. They can be made of using various types of sensors like such as accelerometer sensor, thermometers, pulse sensor, touch pressure sensors etc. It is the new big invention after the invention of smart phones. The data coming from these sensors can be stored into cloud system which can be accessible to user anytime. We developed a system where users have to login through the application to track the health. This system has a band like structure. This system is a combination of hardware and software with advance technologies and a great user interface. This system has a notification system which will notify to the relatives, nearby hospitals and police stations when user is in a threatening condition. In a step aimed is help peoples who suffering heartbeat problem and make people life easier we built this system which could play an important role in Indian society as a whole.

II. LITERATURE SURVEY

To detect the occurrence of a fall and alert care providers of this event, provide information on the causes and circumstances of this event and to aid clinical diagnosis and targeting the action taken to improve the medical disorder, using Wearable sensors [1]. Establishing

statistical methods for the analysis of categorical data to identify optimal combinations of sensor locations, tasks, and feature categories. A meta-analysis on sensor-based features to identify a set of significant features and their pivot values is also conducted. The results demonstrated that with a walking test, the most effective feature to assess the risk of falling was the velocity with the sensor placed on the shins [5]. To produce the experimental proof regarding inertial sensor based fall risk assessment and prediction in order to identify optimal combination of sensor placement, task and features is primary aim.

In conclusion, it demonstrates that there are high and significant interactions among sensor placement; task and feature category to assess the risk of falling and it also represents a promising technology for preventing and mitigating effect of falls.

Also an intelligent security model is proposed to minimize security risk, which discusses how different innovations such as big data, ambient intelligence, and wearable's can be leveraged in a health care context. It addresses various IoT and eHealth policies and regulations across the world to determine how they can facilitate economies and societies in terms of sustainable development [3]. It presents eHealth and IoT policies and regulations for the benefit of various stakeholders interested in assessing IoT-based healthcare technologies which can provide following features,

1. BLOOD PRESSURE MONITORING
2. BODY TEMPERATURE MONITORING
3. GLUCOSE LEVEL SENSING
4. OXYGEN SATURATION MONITORING

In sum, the results of this survey are expected to be useful for engineers, health professionals, policy makers, and researchers working in the area of the IoT and healthcare technologies.

Instead of a single person we can also continuously monitor our home for the purpose of assessing early health changes. Sensors installed in the environment capture activity patterns and behaviours. Changes in patterns are considered as potential signs of changing health conditions. Clinicians analyse each alert and provide rating accordingly. These ratings are then used as ground truth for training and testing classifiers [4]. This system of sensors and algorithms for automated health alerts provides a way for detecting health problems very early so that early treatment is possible. This method of passive in-home sensors lessens the compliance issues.

Along with monitoring user for health condition providing him/her with security is also necessary, for this an application is programmed and loaded with all the required data which includes Human behavior and reactions to different situations like fear, anxiety and anger. It produces a signal which is transmitted to the smart phone. The application has access to Messaging services and GPS which is programmed in such a way that whenever it receives emergency signal, it can send help request along with the location coordinates to the nearest Police station, relatives and the people in the near radius who have application[2].A device is proposed which continuously communicates with Smart phone that has access to the internet .It can make use of number of sensors to precisely detect the real time situation of the user in critical threatening situations. This type of an idea being the first of its kind plays a crucial role towards ensuring users Safety in the fastest way possible automatically.

This systematic review provided a framework for future study design, highlighting dependencies among those factors. In addition, the review generated a comprehensive inventory of the features reported so far from sensors for fall risk assessment, monitoring health conditions, monitoring threatening conditions.

III. PROPOSED SYSTEM ARCHITECTURE

A person's heartbeat is the sound of the valves in his/her heart contracting or expanding as they force blood from one region to another. The number of times the heart beats per minute (BPM), is the heart beat rate and the beat of the heart that can be felt in any artery that lies close to the skin is the pulse. Using a sensor: Heart Beat can be measured based on optical power variation as light is scattered or absorbed during its path through the blood as the heart beat changes.
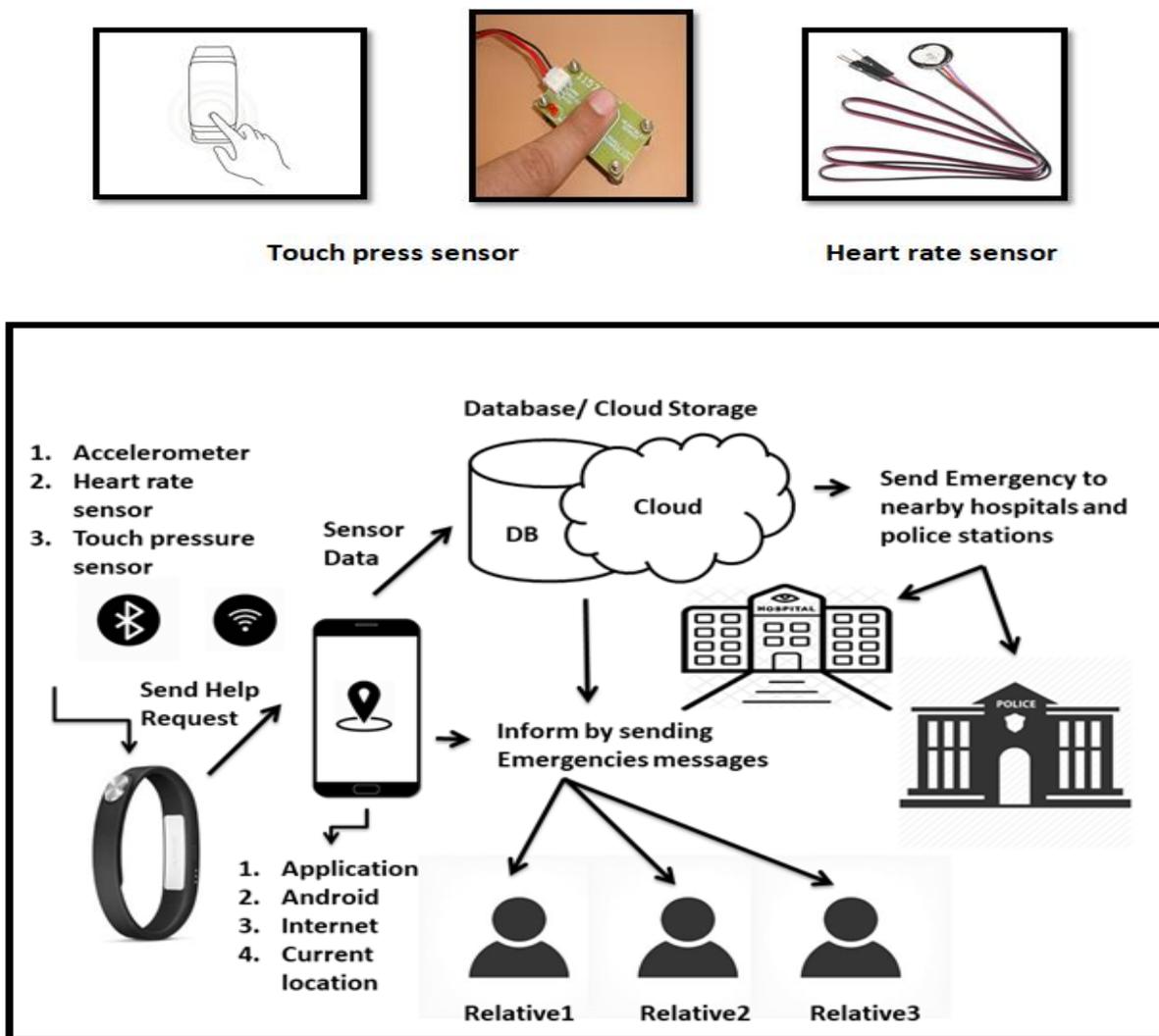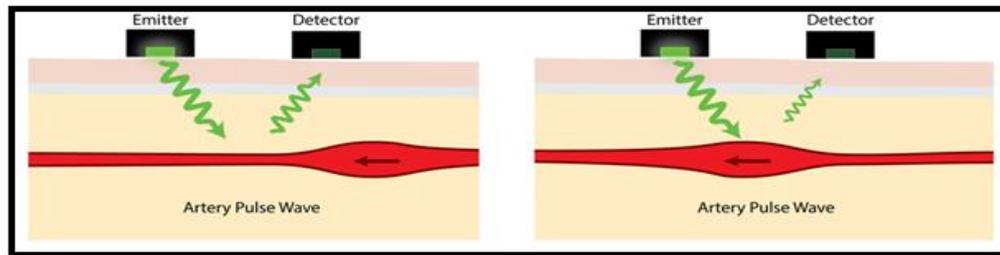

Touch press sensor   **Heart rate sensor**

Fig. 1 Smart Band Architecture

The heartbeat sensor is based on the principle of photo phlethysmography. The change in volume of blood through any organ of the body is measured which causes a change in the light intensity through that organ (a vascular region). Applications where heart pulse rate is monitored, the timing of the pulses is more essential. The flow of blood volume is decided by the rate of heart pulses and since light is absorbed by blood, the signal pulses are equivalent to the heart beat pulses.

Sensors used:-
1. Accelerometer which is used to count number of footsteps or the speed of user.
2. Heart rate sensor used for heart beat calculation.
3. GPS is used to detect the location of user.
4. Touch pressure used for instant message sending on a single click.
Suppose user is doing work out that time user's speed and heartbeat will high that time our system will send notification message (example-user is doing workout)to particular nearest peoples. But user speed is low and heartbeat is high that time system will send notify to nearest people that something happen wrong to particular place and user.

The pressure sensor is also mounted on a wearable computing device, such that in case of threatening conditions the victim don't have to dial the numbers to ask for help, she can directly press the device and her information and location will be quickly sent to nearest police station, family and friends so that she can get help from anyone as soon as possible, which will help her to survive in that situation.

IV. CONCLUSIONS

This type of an idea plays a crucial role in safety of human in fastest way possible automatically. The project is beneficial in areas of security and surveillance. The aim is to provide a more general, primitive, human centric application, especially in behaviour monitoring, surface identifying and healthcare. In a step aimed to help people who are suffering from heartbeat problem and make people life easier and safer, we have built this device which could play an important role in Indian society.

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