HEALTH STATUS MONITORING FOR HUMAN FALL

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Abstract–***This paper presents a design anddevelopment of human fall detection and pressure range measuring using tri-axial accelerometer and pulse oximeter. This paper will be very useful for the elder people. When the old people fall down the blood pressure rangemay vary. It leads to the critical situation. The ultimate aim of the paper is to sudden detection of human pulse level when the person fall down when they are in unconscious state. The main use of accelerometer is to comparing the angle and horizontal plane with threshold value to determine the people fell down or not, sensed by the accelerometer. The faint is may caused by the abnormal heart function. So there is need to check the pressure range of a person. The pulse oximeter is used to monitor the pulse level. By using the ARM processor(LPC 2148), GSM, and alert system the message passed to near by the patients.***

Keywords: ARM processor(LPC 2148),pulse oximeter, Tri-axial accelerometer.

I INTRODUCTION

The world's costliest thing is human live.but in this recent world there is no time to spent in take caring of own health itself. So we have the responsibility to protect our elders. In the article ―Global aging: the challenge of success - Kinsella and D. R. Phillipsstated the difficulties faced by the elders. By 2050, nearly 1.2 billion population will comes under the age of 65 years old. So whenever the aging people ratio gets increases they supporting people ratio must be increased. But the real thing is no one have time to care the old patients. The elders may fall down when their blood pressure range varies or otherwise they fall down due to some health issues. In the article ―Falls in older people:epidemiology, risk factors and strangegies for prevention - Laurence Z. Rubensteinstatedthetragedy caused by the falls by older people. These human falls may cause mortality, morbidity etc. So the premature nursing home admissions are needed to protect the old people who are in the risk condition. In the embedded system there is a system implemented called accelerometer based fall detection system. In the article ―Evaluation of accelerometer-basedfall detection algorithm in real-world fall -.F. Bagalà, C. Becker described the fall detection and its algorithm. The existing system contains only detection of fall system. In this proposed system we have implemented the pulse detection along with that the existing system. The fall detection system may contains different methods by using sensors and the gesture control based on image processing. The using of sensors is one of the cheap and effective method to detect the fall down easily.

The accelerometer sensors are used to detect the fall down by measuring the angle. In this article ―A posture recognition-based fall detectionsystem for monitoring an elderly person in a smart home environment - M. Yu, A. Rhuma, S. Naqvi stated the posture recognition based detection of fall in home.The posture also measured by this sensors and it gives the output 97.08% effectively and very low false detection range is 0.8% . This can effectively used in home also. Then the pulse detection is done by the pulse oximeter sensor. In the article ― A wrist-worn integranged health monitoring instrument with a tele-reporting device for telemedicine and telecare stated the pulse detection using sensor and transferring the data using GSM. The (Spo2) pulse oximeter is mainly detect the pulse level. The device like wrist watch can also measure the pulse range. The pulse oximeter sensor is made of a concentric backside Silicon photodiode with a hole in the middle for the two light sources. This makes it suitable for reflectance pulse oximeter.

In our blood, oxygenated hemoglobin (Hb) and deoxygenated hemoglobin (deoxy-Hb), which can be used to measure human blood oxygen level, have stronger absorbers of light with wavelength in the range of 650 nm-1000 nm. Based on the oxygen saturation the photo detector. Blood pressure can be seen as two variation systolic blood pressure (SBP) and diastolic blood pressure (DBP), systolic pressure is the maximal pressure and the diastolic pressure is the minimal pressure. The normal blood pressure range is approximately 120/80mm hg. The pressure range increases or decreases across the level may cause abnormal situation. These data are analyzed and monitored by the processor.

II EXISTING SYSTEM

In the existing system the human fall detection only observed. The pulse is not determined. But the actual fact is, if person falls down and went to the unconscious state the pulse range may vary. If pulse range gets increased or decreased leads to the critical situation. Based on the pulse level we can predict the condition of a patient. Here the essential thing is to measure the pulse. In this proposed system we have implemented this.

III METHODOLOGY

A Power source

There are two types of power supply required for this product. One is the 12V dc power supply which powers the microcontroller. This can be supplied using portable batteries. The other is a 230V ac power source which powers the electrical appliances.

B. Sensing Unit

This unit comprises of different sensors connected to a controller to perform different tasks. For instance, an accelerometer sensor is used to detect the angle continuously so as to determine whether the patient fall down or not. A digital computer system cannot directly measure the physical parameters such as angle, blood rangepressure, etc., For this purpose sensors are used. Sensors act as an interface between the real world and the PC. To be more precise sensors are the input devices for the monitoring system.

C. Data acquisition unit

As mentioned earlier the sensors will sense the physical parameters and the output will be in the form of analog signals or electric impulses. But a computer cannot process analog signals directly. Henceforth an additional kit is required to link the sensor output with the system. As we are using the microcontrollers for data acquisition. This will cost very less amount .

D. Monitoring unit

ARM processor performs the monitoring process. For the monitoring unit we set a limit to the microprocessors. After reaching the limiting or threshold value. The alert system gets on and the sends the information through the GSM. The combination of sensors and alert system wireless transceiver monitoring unit is performed.

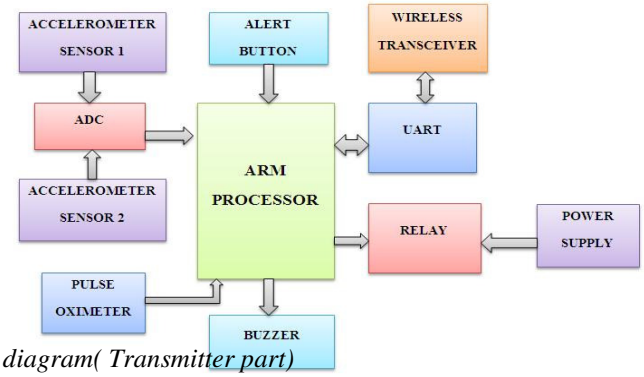

Fig 1. *Block diagram(Transmitter part)*

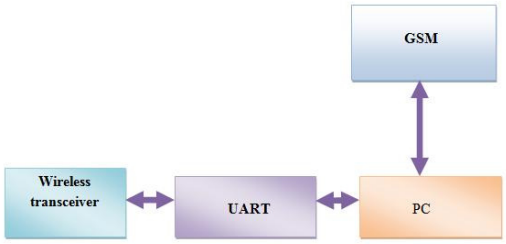

Fig 2.*Block diagram(Receiver part)*

F. Communicating system

All the above units put together will form the transmitter circuit of the monitoring system. The receiver will be the smartphone of the user. As the user needs to monitor patient remotely (i.e. without physical contact with the house) wireless communication needs to be implemented. This is done using GSM module.

Thus by integrating all the above units we will be able to design the basic block diagram for the security system which is shown in the Fig 1.

As mentioned in the title this monitoring system uses multiple sensors to read the health parameters. This is done to ensure that the status of the patient is well secure and safe. The various components (used in this product) and its application are listed below.

I **Accelerometer sensor**: Normally the accelerometer sensors used to find the angle, speed, and depth. Here the accelerometer sensors is used to find the angle.

II **Pulse oximeter sensor**: As the name suggests this sensor is used to detect the pulse of a patient.

III **ADC**: The digital to analog conversion is done by using the ADC. The sensors got the analog output. It is converted in to digital form by using the ADC.

IV **UART**: It is the asynchronous transmitter or receiver. It is the microchip with programming that control's the computer interfaced serial data from the devices.

According to the flow chart, the system is starts with an initial process of sensing from accelerometer sensor. The fall detection is detected by the accelerometer based on the angle. If the angle goes in to below the threshold level.Then the human fall detection is sensed and the processor gets on.

Then the pulse oximeter sensor sensed the pulse level of the patient. Incase the patient fall down the alert system gives the alarm sound through the buzzer. Then the pressure level is abnormal then it is detected and sends a message.

In this fig.3 explaining about the flow of working and controlling of hardware.

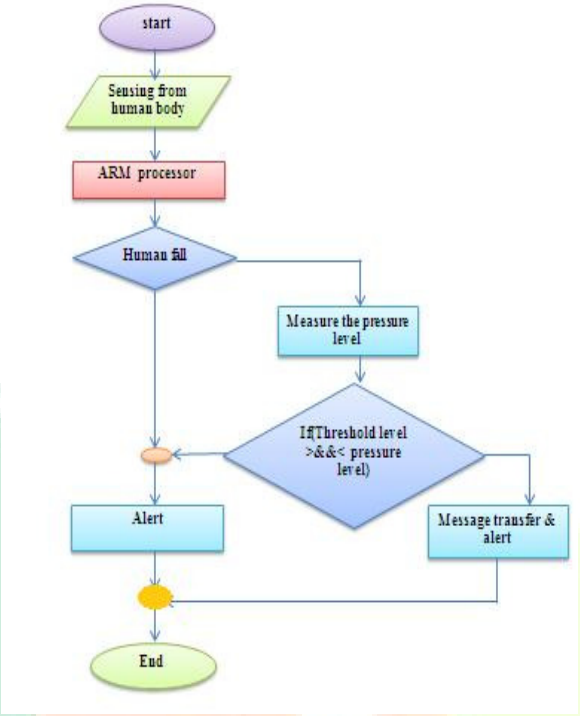

Fig.3 *flow chart for working principle*

IV RESULTS AND DISCUSSION

The outcome of this project is to detect the human fall detection based on the angle measurement by the accelerometer sensor. If the human fall is detected and the pressure is measured by the pulse oximeter. Then the message is passed to the cell phone through the GSM modem. The alert system also gives alarm through the buzzer.

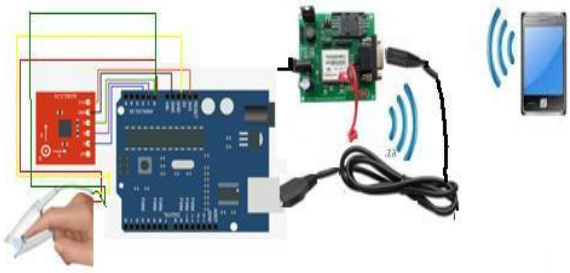

Fig .4 *Hardware output*

V CONCLUSION

In this paper, human fall detection system based on on-body smart sensors was proposed,implemented, and deployed that successfully detected accidental falls in a consumer home application.By using information from an accelerometer, pulse oximeter sensor. the impacts of falls cansuccessfully be distinguished from activities of daily lives reducing the false detection of falls. From thedataset of 30 participants, it is found that the proposed fall detection system achieved a high accuracy of 97.5%, and the sensitivity and specificity are 96.8% and 98.1% respectfully. The proposed system isready to be implemented in a consumer device.

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