Long Term Monitoring System of Aged People Using Radar Technology in Home Environment

S. Sola Subbu[1], G. Dhivya Bharathi[2], M. Keerthana[3]

Assistant Professor, Department of Biomedical Engineering, Adhiyamaan College of Engineering, Hosur, India[1]
UG student, Department of Biomedical Engineering, Adhiyamaan College of Engineering, Hosur, India[2]
UG student, Department of Biomedical Engineering, Adhiyamaan College of Engineering, Hosur, India[3]
solasubbu@gmail.com[1], dhivyabala94@gmail.com[2], keerthanabmem@gmail.com[3]

Abstract **- The aged members of the society over 60 years of age are consistently increasing worldwide. This whereabouts resulted in a growing need for routine long-term home monitoring. In this paper, radar technique is used for fall detection of aged people. Contactless device is placed for health monitoring in home environment. It is the combination of heart beat, radar, wireless communication, data processing and microcontroller. Zigbee is used for data transfer to the physician in order to provide a prompt alert in the event of emergencies. In this radar technique, ultrasonic sensor is user because it works in any lighting conditions, making this a good choice to supplement infrared object detector and non-contact distance measurement.**

Keywords**: Fall detection, health monitoring, radar remote sensing, heart beat sensor, wireless communication.**

I. INTRODUCTION

Several studies have presented the issue of population ageing and also the need of emerging smart home technologies [2]. Since the turn of 20th century the population will cause sudden increases with the average age of 65. So the physical situation (position) in relation to the surroundings has resulted in the growing need for new technologies that enable routine long term monitoring for elderly people [1]. In the past decades they used to place a device on the patient body (worn as a necklace).So it may cause uncomfortable for the patient to wear and also cause some irritation to the patient [1].It is a contactless health monitoring system [1]. In this project we are using radar technology in order to monitoring the patient [1]. It consist of ultrasonic sensor which has both transmitter and receiver part. In the last two decades they used to measure only heart beat and respiration rate [1]. Ultrasonic sensor work on a principle similar to radar or sonar. It is used to generate high frequency sound wave. Hence, the sensor (PIC) is used to calculate the time interval between the transmitted signal and the received signal in order to determine the distance of the object. Ultrasonic ranges above 20,000Hz by turning electrical signal into sound signal. In this system often it may cause false trigger in order to avoid this heart beat sensor is used. So it can able to avoid the false trigger.

II. METHODOLOGY

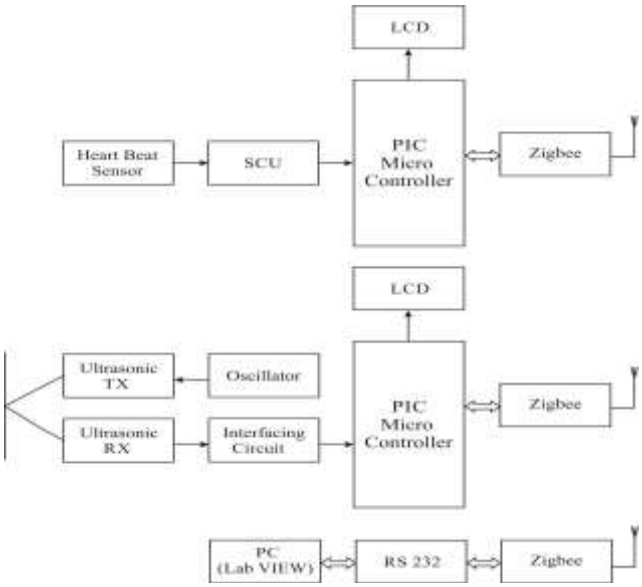

Fig.1: Block Diagram: Monitoring section of fall detection system.

A. *Overview:*

Heart beat sensor is placed on the user's fingertip and it measures the heart rate by sensing the change in blood volume in a finger, while the heart is pumping the blood then it is given to signal conditioning unit which converts one type of signal to another type. Now it is connected to the PIC microcontroller. It uses separate bus for instruction and data allowing simultaneous access of program and data memory. PIC controller sends the data to display in LCD and data is transmitted through the Zigbee to ultrasonic part.

The data is received by the oscillator, which acts as a wireless receiver and transmitter and used to generate signals in computer. The received data is hits the object by ultrasonic transmitter, then the signal is reflected and it is received by the ultrasonic receiver. Interfacing circuit, this is used for connecting the device. RS232 is a standard for serial binary data interconnection between a DTE (data terminal equipment) and a DCE (data circuit – terminating equipment).

B. *Heart beat sensor*

A heart rate monitor is a personal monitoring device that allows one to measure one's heart rate in real time or record the heart rate for later study. It is largely used by performers of various types of physical exercise.

C. *Ultrasonic sensor*

Ultrasonic sensor work on the principle similar to radar or sonar, which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

III.EXPERIMENTAL SETUP

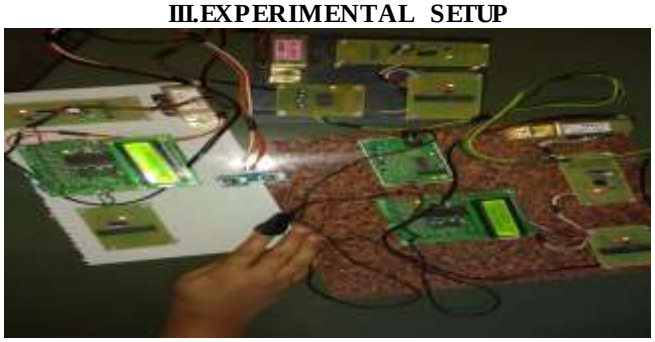

Fig. 2: Experimental setup of fall detection system

This is the experimental setup of ultrasonic and heart beat sensor. It is used for monitoring of aged people. It consist of ultrasonic sensor, heart beat sensor, ZigBee, PIC. In this setup ultrasonic sensor is used to calculate the distance of the patient and heart beat sensor is used to detect the heartbeat of the patient.

IV. RESULT

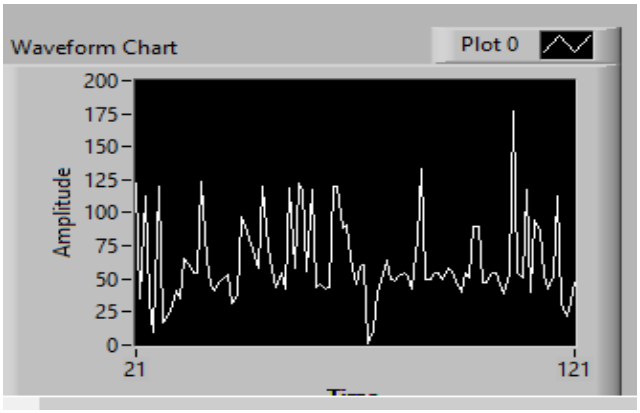

Fig. 3: Waveform of ultrasonic sensor.

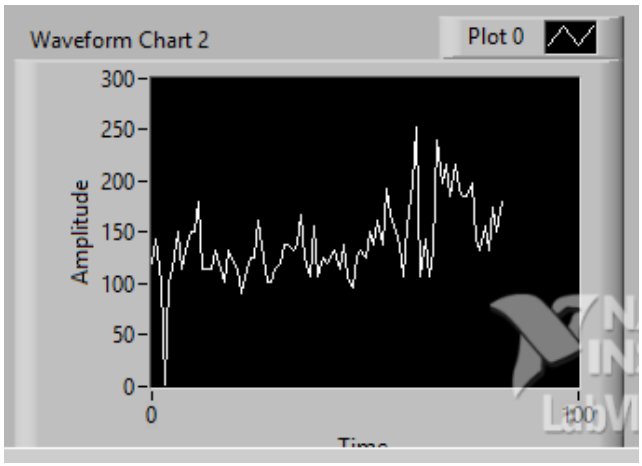

Fig. 4: waveform of heartbeat sensor

This paper has implemented a systematic design for development of fall detection system using sensor. This system works satisfactorily for recording the value of heart beat, distance of the object and transmitting the data to the physician by using Zigbee.

V. CONCLUSION

It is low interference wireless sensor network. Here we consider two factors, it makes the process high accuracy and easy to handle. It is graphical monitoring using LABVIEW. Nowadays, it is applicable to home environment. In future, by using many sensors, it can monitor many patients.

REFERENCES

[1] Paul leroux and Dominique schreurs,"Analysis of an Indoor Biomedical Radar – Based system for health Monitoring" IEEE transaction on Microwave theory and techniques, Vol. 61, No.5, May 2013.

[2] E. Kantoch, J.Jaworek, and P. Augustyniak, "Design of a wearable sensor network for home monitoring system" in proc. Federated conf. Comput. Sci. Inf. Syst., pp. 401- 403, Sep. 18-21, 2011.

