IMPLEMENTATION OF ELDER PEOPLE BODY POSITIONING AND HEART BEAT MONITORING SYSTEM

Dr. N. Venu [1], U. Raju [2]

[1] Ph.D, Professor, Balaji Institute of Technology and Sciences, Laknepally, Narsampet, Warangal Rural, Telengana, India. Email ID: venunookala@gmail.com

[2]M.Tech , Balaji Institute of Technology and Sciences, Laknepally, Narsampet, Warangal Rural, Telengana, India. Email ID: uraju1993@gmail.com

I. ABSTRACT

Fall-related accident and injury are a standout among the most widely recognized motivations to a reason for death and hospitalization between elderly. Falls among older people become a major problem facing hospitals and nursing homes. The eldercare problem becomes important due to the population aging. An enhanced fall detection system is proposed for elderly person monitoring that is based on-body sensor. Falls can achieve physical and mental damage, especially for the elderly. To upgrade the individual fulfillment of these patients this work displays the change of a fall revelation and body arranging with a heart rate checking structure.

In this proposed system accelerometer measures overall vibration by means of using Signal Magnitude Vector and trunk angle. Here Signal Magnitude Vector is used to calculate the acceleration caused due to movement of the body with respect to xyz axis and trunk angle is used to calculate the posture of the elderly person during fall event. Pulse sensor is used to measure the pulse rate.

Keywords:- *Microcontroller, MEMS, Zigbee, Bluetooth etc.*

II. INTRODUCTION

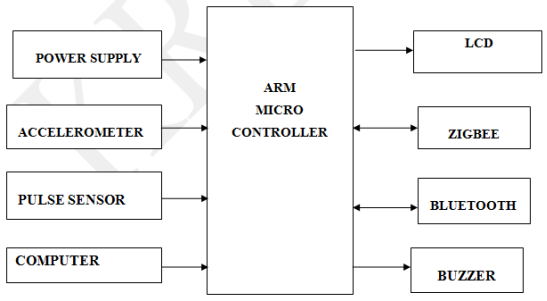
The World Health organization indicated that falls are the second leading cause of unintentional injury, deaths in worldwide. Non-fatal injurious falls can not only cause disability or functional impairment, but also have psychological effects that reduce the range of activities of daily living. Monitoring of elderly people has drawn attention of healthcare and medical professionals. Various health problems have been attributed to fall in the context of elderly people. Falling problems on a long term basis could eventually lead to sharp deteriorate in health, poor state of health and high cost for covering their health care.

The proposed system is composed of data acquisition, fall detection and database for analysis. Tri-axial accelerometer is used for

human position movement tracking and fall detection. The system is capable of monitoring patients in real time and on the basis of results another important parameters of patient can be deducted the quality of therapy, the time spent on different activities, the joint movement, etc.

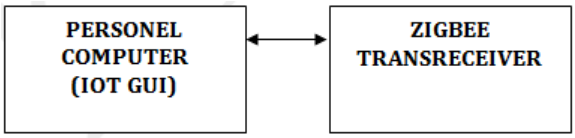
III. BLOCK DIAGRAM

PATIENT SECTION:



Fig(3.1) Block diagram of patient section

MONITORING SECTION:



Fig(3.2) Block diagram of monitoring section

SYSTEM OVERVIEW

Power Supply:

This section is meant for supplying Power to all the sections mentioned above. It basically consists of a Transformer to step down the 230V ac to 9V ac followed by diodes. Here diodes are used to rectify the ac to dc. After rectification the obtained rippled dc is filtered using a capacitor Filter. A positive voltage regulator is used to regulate the obtained dc voltage.

Microcontroller:

This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

LCD Display:

This section is basically meant to show up the status of the project. This project makes use of Liquid Crystal Display to display / prompt for necessary information.

ZIGBEE:

Zigbee is new wireless technology guided by IEEE 802.15.4 Personal Area Network standard. It is primarily designed for the wide ranging controlling applications and to replace the existing non-standard technologies. It currently operates in 868MHz band at a data rate of 20Kbps in Europe, 914MHz band at 40kbps in USA, and the 2.4GHz ISM bands Worldwide at a maximum data-rate of 250kbps.

MEMS:

Accelerometers are acceleration sensors. An inertial mass suspended by springs is acted upon by acceleration forces that cause the mass to be deflected from its initial position. This deflection is converted to an electrical signal, which appears at the sensor output. The application of MEMS technology to accelerometers is a relatively new development.

Bluetooth:

AUBTM-22 is a Bluetooth v1.2 module with SPP profiles. The module is intended to be integrated into another host system which requires Bluetooth functions. The HOST system could send commands to AUBTM-22 through a UART. AUBTM-22 will parse the commands and execute proper functions, e.g. set the maximum transmit power, change the name of the module. And next the module can transmit the data receive from the UART with SPP profiles.

Pulse sensor:

Heart rate data can be really useful whether you're designing an exercise routine, studying your activity or anxiety levels or just want your shirt to blink with your heart beat. The Pulse Sensor Amped is a plug-and-play heart-rate sensor. Simply clip the Pulse Sensor to your earlobe or finger tip.

Buzzer Section: This section consists of a Buzzer. The buzzer is used to alert / indicate the completion of process. It is sometimes used to indicate the start of the embedded system by alerting during start-up.

Computer Section:

This section basically contains a PC with Serial communication associated hardware. Apart from this, the web cam is also connected to the PC. The serial communication associated hardware circuitry includes the bus (DB 9) connector from PC to Microcontroller.

IV. RESULTS:

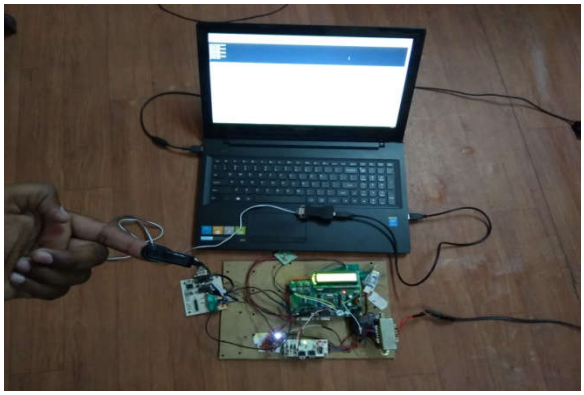


Fig (4.1): system hardware

V. CONCLUSION

Design and implementation of monitoring system architecture for monitoring elderly people activity both during day and at night was presented. The system implementations, i.e. fall detector, were explored and it turned out to be successful. Most of the existing implementation has custom made devices which turned out to be expensive to build a prototype, but the focus of

this work is to have a reasonable priced device that can is readily available.

VI. REFERENCES

[1] M. A.Hossain, D. T, Ahmed, "Virtual Caregiver: An Ambient-Aware Elderly Monitoring System" IEEE
Trans. Biomed., pp 102-103,1 Eng., vol 16, 6 Nov. 2012.

[2] Y-T. Peng, C-Y. Lin, et.al. "Multimodality Sensor System for Long-term Sleep Quality", IEEE Trans. Biomed Circuits and System, pp, 217- 227, 3, Sept. 2007.

[3] F. Sposaro and G. Tyson. "iFall: An Android Application for Fall Monitoring and Response", IEEE Conf.
Publications, pp 6119- 6122, 3 – 6, Sept. 2009.

[4] M. Prado-Velasco, D. Rio-Cidoncha, et.al. "The Inescapable Smart Impact detection System (ISIS): an ubiquitous and personalized fall detector based on a distributed "divide and conquer strategy"", 30th Annual Int. Conf. of th IEEE, p 3332 – 3335, 20-25 Aug. 2008

[5] Ran Cao, Ying Chen, et.al. "Failure Mechanism Analysis of Quartz Accelerometer Under Vibration Condition", IEEE Conf. Publications, pp 1-5, 2011

[6] M. Alwan, P. J. Rajendran, et.al. "A Smart and Passive Floor-Vibration Based Fall Detector for Elderly", IEEE Conf. Publications, pp 1003- 1007, 2006.

[7] C. Soaz, C. Lederer, et.al. "A New Method to Estimate the Real Upper Limit of the False Alarm Rate in a 3 Accelerometry-Based Fall Detector for the Elderly" IEEE Conf. Eng. In Med., pp. 244 - 247 28, Aug. 2012 – 1 Set. 2012.

[8] G. Rescio, A. Leone, et.al. "Support Vector Machine for Tri-axial Accelerometer-based Fall Detector", IEEE Conf. Publications, Pg 25- 30, 2012.

[9] Scholz U., Bianchi A.M., Cerutti S., Kubicki S. Vegetative Background of Sleep: Spectral Analysis of the Heart Rate Variability, Physiol. & Behaviour, 62: 1037-1043, 1997.

[10]M. A.Hossain, D. T, "Ahmed, Human Caregiver Support System in Elderly Monitoring Facility", IEEE Trans. Biomed. Eng., vol 16, Nov. 2012