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REVIEW ON BODY PARAMETERS MONITORING USING WEARABLE WIRELESS SENSOR NETWORK

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Abstract: Remote monitoring technique that could precisely monitor human body parameters is useful in applications such as medical science, sports science, rehabilitation, virtual reality and surveillance. Most of the existing systems used for monitoring human body parameter require wiring that restrains the natural movement. To overcome this limitation, a wearable wireless sensor network using accelerometer, temperature sensor and heart rate sensor have been developed for monitoring physiological human body parameters. Using several sensors to measure different vital signs, Based on the analysis a simple, comfortable, low cost gadget to monitor elder health and report any critical condition is proposed. The person is wirelessly monitored within his own home. The device can be easily adapted to monitor athletes and infants. The wireless feature enables the unrestrained motion of the human body as opposed to a wired monitoring device and makes the system truly portable, fast and reliable. The lightweight and compact size of the developed sensor node makes it easy attachment to the body.

Keywords: Wireless sensor network, Wearable system, Temperature sensor, Heart rate sensor, Fall Detection.

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INTRODUCTION

Tracking of human body parameters has attracted significant interest in recent years due to its wide-ranging applications such as rehabilitation, virtual reality, sports science, medical science, surveillance, in recent times, wireless sensors and sensor networks have become a great interest to research, scientific and technological community. Though sensor networks have been in place for more than a few decades now, the wireless domain has opened up a whole new application space of sensors. Wireless sensors and sensor networks are different from traditional wireless networks as well computer networks and, therefore, pose more challenges to solve such as limited energy, restricted life time, etc.

Many new research is focused at improving quality of human life in terms of health by designing and fabricating sensors which are either in direct contact with the human body (invasive) or indirectly (noninvasive). One of the reasons for more development in this area is the global population and rise in ageing population, one statistic provided by the U.S. Department of Health that by 2050 over 20% of the world's population will be above 65 years of age. This results in a requirement for medical care, which is expensive for long-term monitoring and long waiting lists for consultations with health professionals. The cost of hospitalization is ever increasing,

So is the cost of rehabilitation after a major illness or surgery. Hospitals are looking at sending people back as soon as possible to recoup at home. During this recovery physiological parameters need to be continuously measured. Hence, telemedicine and remote monitoring of patients at home are gaining added importance and urgency. Patients are being monitored using a network of wireless sensors. Many elderly people dread the idea of being forced to live with their adult children, or in a rest home or in other sheltered living arrangement. They want to live independently and keep control of their own lives. Yet at the same time they know there is a high risk of injury or even death because of a fall or stroke. Such people need to be monitored continuously and provided with immediate medical help and attention when required. We seek to come up with solutions, which help to remove anxiety. As a result, there is a need for an accurate, flexible, noninvasive, comfortable, reliable, and low-cost monitoring unit that unites all these demands.

The objective is to allow the patient to be monitored in a natural environment. For monitoring outside the clinical laboratory, a wearable system must not only record data, but also proficiently process data on-board based on the analysis report is report any critical condition is proposed. The proposed approach uses the wireless sensor network concept with all the sensor

nodes communicated to the coordinator wirelessly using TCP/UDP network protocol. The small form factor and lightweight feature of the sensor nodes also allow easy attachment to the body. This technology also used in sports technology, in this field we know about the player's behavior. In this project the MEMS sensors and FLEX sensors will be introduced in to medical and sports applications. The wireless feature enables the unrestrained motion of the human body as opposed to a wired monitoring device and makes the system truly portable.

2. LITERATURE REVIEW

A Zigbee-Based Wearable Physiological Parameters Monitoring System can be used to monitor physiological parameters, such as temperature and heart rate, of a human subject. The system consists of an electronic device which is worn on the wrist and finger, by an at-risk person. Using several sensors to measure different vital signs, the person is wirelessly monitored within his own home. An impact sensor has been used to detect falls. The device detects if a person is medically distressed and sends an alarm to a receiver unit that is connected to a computer. This sets off an alarm, allowing help to be provided to the user. [1]. Measurement of Elder Health Parameters and the Gadget Designs for Continuous Monitoring Improving the quality of life for the elderly persons and giving them the proper care at the right time is the responsibility of the younger generation a simple, compact and user-friendly electronic gadget for continuous monitoring of elder health parameters is the need of the hour. Day by day the menace of weakening health and chances of skin related problems, bed sores etc are becoming critical in case of bed ridden patients. This paper analyses the old age diseases and the parameters to be monitored. [2]. some of the elder care systems as mentioned in [3] monitor activities of the elders in their home. They embed a video system in the living environment of elders and continuously monitor their activities at home. However, this system doesn't measure any of the vital parameters of the elderly patient. Measuring the vital parameters is inevitable if the elder person suffers from any sort of heart ailments, which are very common in individuals aged above 60. In [4] mobile devices like Caalyx (Complete Ambient Assisted Living Experiment) which can measure vital signs like ECG, pulse, Blood pressure, Movement and Fall detection. However, the design we have proposed can monitor vital parameters and fall detection along with tilt monitoring for the bed-ridden patients to monitor any case of bedsore. Some devices as in [4] monitor only fall detection for the elderly patients based on the sensor readings from accelerometers and microphones attached to the body of the patients. The system proposed in [5] is applicable to patients. And elders for activity monitoring and fall detection and also sports athletes' exercise measurement and pattern analysis.

3. SYSTEM ARCHITECTURE

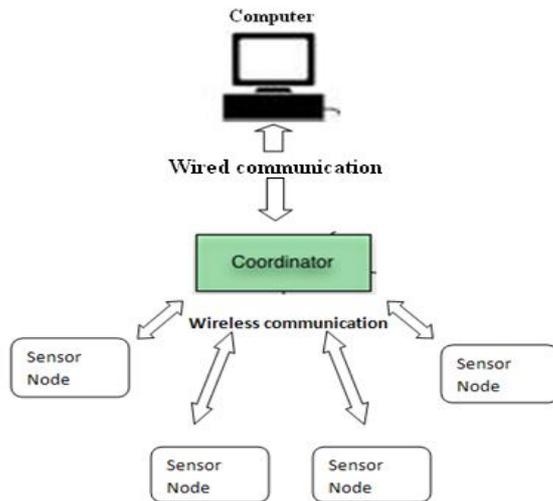
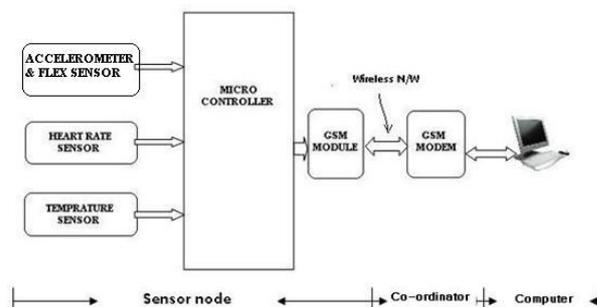


Fig. 1 General configuration of the System

Fig. 1 shows the configuration of the system. It is observed that the system consists of a number of sensor nodes that wirelessly communicate to a central coordinator in a star network topology. Wireless sensor network is a promising field that integrates sensor technologies, embedded system and wireless communication together to produce small, low cost, low power and reliable system capable of monitoring specific events. For this system, wireless [protocol suite](#) used because it provides end-to-end connectivity. The coordinator is in turn connected to a PC via data bus. Each sensor node is may equipped with a capacitive micro machined accelerometer, temperature sensor and hart rate sensor. The sensor nodes are attached to the human body and operate completely untethered. They are powered by battery.

4.2 FUNCTIONAL block diagram



In the human body parameter monitoring system, the name itself indicates the physical state of the patient which can be sensed by the sensors as shown in the diagram above. Figure shows the functional block diagram of the system hardware. The system has been designed to take several inputs to measure physiological parameters of human such as temperature for body temperature, heart rate for monitoring patient hart rate, and accelerometer that can be used to detect tilt angle of up to three axes which help for detection of any fall. The inputs from the sensors are integrated and processed by microcontroller. The results are sent through the GSM Module to a host computer, which stores the data into an Access Database. The values can then be displayed on the Graphical User Interface (GUI) running on a computer. If it is inferred that the person is medically distressed, an alarm may be generated. The mobile application has the feature to make an automatic urgent call to a specific number incase if any parameters exceed the critical value. There is also an option to send the message to the care taker or the concerned doctor about the patient's condition periodically. The program is a user interface, allowing a report on the current status of the individual. Once the user has connected to the receiver unit, data is automatically updated on the screen. Beat per minute (BPM), body temperature, and position are given on the display. The data are also plotted on a time graph which can be customized to show data received from any of the sensors. The design is modular which makes it rather easy and straight forward to add extra sensors for measuring and monitoring other parameters.

4.2.1 Parameters to Be Monitored

The numbers of parameters a gadget monitor at a time matters a lot while designing it. All the measurements should be of non-invasive since the monitoring has to occur in 24*7 hours. After researching through various articles related to elder health, certain health parameters, when monitored continuously, can avoid critical situations. It includes body temperature, tilt of body, fall of body and heart rate.

Body Temperature

Body temperature is a basic parameter, which has to be monitored in any individual. Body temperature sensor fixed at a particular location of body measures the temperature and transmits the value to the main coordinator.

The fall of the body

Another serious issue related to Elders is fall detection. Falls can be markers of poor health and declining function, and they are often associated with significant morbidity. More than 90

percentages of hip fractures occur as a result of falls, with most of these fractures occurring in persons over 70 years of age.

The tilt of the body

The most grave and gruesome problem faced by bedridden elders is the formation of bedsores. They develop quickly, progress rapidly and are difficult to heal. Monitoring of bed ridden elders thus becomes very crucial issue in maintaining proper health condition. Thus it requires that the caretaker to monitor the elder at regular intervals. If the caretaker fails to keep track of the elder posture it could lead to a case of bedsore. Thus a system is necessary to keep track of the elder posture continuously and assist the caretaker in taking timely action in order to avoid the cases of bedsores.

Heart rate

A poorly pumping heart is major issue in elderly community. The overall activeness of heart reduces since all the nerves and arteries get weaker. More than 83% of the people who die of heart disease are older than 65 years. So, it is compulsory required to include the heart rate monitoring in gadget.

5. CONCLUSION

A new approach for remote measurement and monitoring of the human body parameters based on a wearable wireless sensor network has been presented. The proposed design will be able to effectively measure body parameters of an elderly person and if needed alert the caretaker which can help to prevent unexpected fatal medical conditions. The system uses TCP/UDP standard communication protocol for data transfer between the sensors node and coordinator which connected to the PC for analysis and gadget.

6. REFERENCES

1. Karandeep Malhi, Subhas Chandra Mukhopadhyay,, "A Zigbee-Based Wearable Physiological Parameters Monitoring System" IEEE sensors journal, vol. 12, no. 3, march 2012.
2. R K Megalingam, Goutham Pocklassery, Galla Mourya, Ragavendra M Prabhu, "Measurement of Elder Health Parameters and the Gadget Designs for Continuous Monitoring" 3rd International Conference on Advancements in Electronics and Power Engineering (ICAPEP'2013) January 8-9, 2013 Kuala Lumpur (Malaysia)

3. Zhongna Zhou, Wenqing Dai, Jay Eggert, Jarod T. Giger, "A Realtime System for In-home Activity Monitoring of Elders", 31st Annual International Conference of the IEEE EMBS Minneapolis, Minnesota, USA, September 2-6, 2009, Digital Object Identifier: 10.1109/IEMBS.2009.5334915 .
4. Doukas, C. Samos Maglogiannis, "Advanced patient or elder fall detection base on movement and sound data" Proceedings of the 2nd International Conference on Pervasive Computing Technologies for Healthcare 2008, Page: 103 – 107.
5. Youngbum Lee YonseiUniv, "Implementation of Accelerometer Sensor Module and Fall Detection Monitoring System based on Wireless Sensor Network", Engineering in Medicine and Biology Society, 2007. EMBS2007. 29th Annual International Conference of the IEEE, 22-26 Aug. 2007, Page:2315 – 2318
6. Analog Devices, "Small, Low Power, 3-Axis +/-3g Accelerometer," ADXL335 datasheet, 2009[Revised 2010].
7. A. Dasthagiraiah, N. Viswanadham & K. Venkateswarlu "Patient Monitoring By Using Wearable Wireless Sensor Networks with Zigbee Module", International Journal of Computational Engineering Research (ijceronline.com) Vol. 3 Issue. 2.
8. Guo Xiong Lee; Kay Soon Low; Taher, "Unrestrained Measurement of Arm Motion Based on a Wearable Wireless Sensor Network" IEEE Transactions on vol.59, no.5, pp.1309,1317, May 2010
9. SIMCOM Limited. 2005, Sim300 data sheet, Revised 2005-12-27.