A Smart Healthcare Surveillance and Fall Detection System for Elderly People

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Abstract:
In spite of the improvement in communication link and despite of all progress in advanced communication technologies, there are still very few problems which elderly people are facing just because there is no one to look after. Therefore there is a strong need to develop a wireless system which monitors the elderly people from time to time. The proposed system provides most secure system to elderly people. This also alerts the victim’s neighboring people in assisting the victim by producing a beep sound. A SMS message with the current location of and consciousness of the victim is sent to the physician and to the registered contacts. Immediate protection is provided to the victim with the implementation of air bag which opens up automatically when any sudden movement has been detected.

Key Words: wireless system, strong authentication, conscious detection, airbag, GSM.

I. INTRODUCTION

With the increased changes in living habits of the person there arises multiple problems in health, mostly for the elderly ones. The proposed system assists elderly people when they move out of secure zone. Now a days the elderly people need more assistance for better surveillance. The System offers faster, reliable and effective processing in assisting elderly people. Proposed system provides three key aspects: accessibility to information, convenience of use and cost effective. The designed product is positioned on victim’s body to monitor the following body parameters like heartbeat rate and moving directions of the person. From these sensors the signal is transmitted to microcontroller. The wired transmission is used for communication between sensors and microcontroller. The consciousness of the person can be detected with the help of the conscious switch which is supposed to be operated by the victim. When a person fall is diagnosed, the victims location is acquired by the global positioning system (GPS) and sent to the rescue center via the global system for mobile communication so that the end user can get immediate medical assistance. The collected signal are transmitted to doctor or hospital and to the pre-defined contacts with the current location and conscious data of the victim is sent for further analysis and accordingly medical treatments are given to victim. Power consumption will be low and lifetime of devices will be more. Moreover the system supports security and privacy concern as victim’s health records contain sensitive data and they are to be stored securely. The victim’s data will be maintained by the doctor and the victim’s guardian.

II. RELATED WORK:

K.C. Kavitha, A.Bazila Banu published that the primary function of this system is to constantly monitor patient’s physiological parameters such as pulse rate, breathing rate, blood pressure rate and patient’s body movement, and display the same information to the doctor. In this proposed system transmitting module continuously reads patient’s pulse rate or heart beat rate, breathing rate, patient body movement and blood pressure rate through a pulse sensor, airflow sensor, accelerometer and sphygmomanometer [1]. According to Sunil L. Rahane, Prof. Ramesh S. Pawase The paper presents monitoring system to monitor the physiological parameters such as Blood Pressure (BP), ECG, Body Temperature and Respiration etc. The wireless sensors send this signal to base station or control room of physician. The sensing data of each patient are stored in back-end server with each having its own ID. The system can detect abnormal condition of patients and send the SMS or e-mail to the physician [2].

III. EXISTING SYSTEM:

With the arrival of population aging society, the health care of the elderly becomes more important. The fall detection algorithm is the core of the fall detection alarm system, so it is the key for the research and development of the fall detection system to analyze and select the appropriate algorithm for the detection of falling. It is one of the most important indicators of elder health monitor that it can quickly detect, alarm and shorten the time of rescue when senior falls down. Through analyzing the related fall detection algorithm to monitor the health of the elderly home or outside, and comparing their practicalities and pertinences.

IV. PROPOSED SYSTEM:

A smart healthcare surveillance and fall detection system for elderly people provides a flawless security and a support for the elderly people. The proposed system is a novel algorithm as well as architecture for the fall accident recognition and corresponding wide area rescue system based on the third technology (3G) systems. When a land accident event is diagnosed, the user's location is acquired by the global positioning system (GPS) or the assisted GPS UNIT (A-GPS), and sent to the rescue center via the 3G communication network so that the end user can get medical assistance.
immediately. Together with the proposed cascaded classification architecture, the computational burden and power intake issue on the smart phone system can be alleviated. This system provides an indication if the heart beat level of the person suddenly raises or gets lower, through a buzzer to the nearer person so victim gets a primary treatment. MEMS are used to detect the movement of a person if the person falls. Buzzer produces a beep sound. A conscious switch is also implemented to find whether the person is conscious enough. GSM is used to send a SMS message to the predefined contacts and doctor. Airbag is used to prevent from accident based MEMS.

V. ARCHITECTURE:

Figure.1. System architecture for a smart healthcare surveillance and fall detection system

_Micro-electro-mechanical systems or mems:_
MEMS accelerometers can alert medical professionals when a patient falls. Elderly patients, in particular, may suffer serious injuries from an unobserved fall. Wearable, intelligent devices equipped with MEMS inertial sensors can be used to detect and assess the severity of a fall and signal for help, aided by a GPS to provide location information.

_Buzzer:_
A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows.

_Heartbeat sensor:_
When the heart beat detector is working, the beat LED flashes in unison with each heartbeat. This digital output can be connected to microcontroller directly to measure the Beats per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

_GPS tracking unit:_
A GPS tracking unit is a device, normally carried by a moving vehicle or person that uses the global positioning system to determine and track its precise location. The recorded location data can be stored within the tracking unit.

_Global system for mobile communication:_
GSM is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA).

Atmega328:
The Atmel 8-bit AVR RISC-based microcontroller combines 32 k8 ISP flash memory with read-while-write capabilities, 1 k8 EEPROM, 2 k8 SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz.

_Conscious switch:_
It is a manual on and off switch. It is operated by victim. The victim should press the switch for every specified limited time.

_Airbag:_
Airbag will be open automatically when the person falls. Airbag is used to prevent the person from injuries.

VI. IMPLEMENTATION:

HARDWARE IMPLEMENTATION:
All the components are to be connected with Arduino board. The vcc from the heart beat sensor is to be connected with the 5v pin of ATmega328 board. Output pin from heartbeat sensor is connected to analog pin of ATmega328. Gnd pin of heartbeat sensor is connected to be with gnd pin of ATmega328. The buzzer is connected to the 9th pin of ATmega328. It will be activated based on the heartbeat sensor. The MEMS has three pins which is connected to the analog pins(A3,A4,A5) of ATmega328 which it is used to detect the movements of the person. The DC motor is used here in place of airbag. Airbag is little difficult to show in real-time. So we used DC motor here to run instead of airbag.

SOFTWARE IMPLEMENTATION:
The Arduino IDE is an open source software to write and upload a code easily to the microcontroller. It runs on Windows, Mac OS X, and Linux. This software can be used with any Arduino board.
Figure 3. The source code to run this smart healthcare surveillance system for elderly people.

VII. RESULTS:

With the help of smart Healthcare surveillance and fall detection System for elderly person using GPS with GSM we monitor the patient’s movements and consciousness from anywhere with the help of GSM.

Figure 4. The consciousness, heart rate and moving directions are to be displayed with the help of serial monitoring of Arduino ide.

Figure 5. The location and consciousness of the victim is sent to the predefined contacts.

VIII. CONCLUSION:

Therefore the development of the health care monitoring system and fall detection system for elderly people has been implemented and developed. The paper has reviewed the reported literature on wearable sensors and devices for monitoring human activities. The human activity monitoring is a vibrant area of research and a lot of commercial development are reported. It is expected that many more light-weight, high-performance wearable devices will be available for monitoring a wide range of activities. The challenges faced by the current design will also be addressed in future devices. The development of light-weight physiological sensors will lead to comfortable wearable devices to monitor different ranges of activities of inhabitants. Formal and Informal survey predicts an increase of interest and consequent usages of wearable devices in near future, the cost of the devices is also expected to fall resulting in of wide application in the society.

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X. REFERENCES:


