A Survey On Efficient Human Fall Detection System

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ABSTRACT: Falling is among the most dangerous events that often happen among senior people, patients and may need immediate medical care. Automatic fall detection systems could help old people and patients to live independently. A real-time fall detection system may help us to detect fall events among elderly people in time and reduce the overall casualty rate. The proposed system uses the accelerometer and tilt sensors to design a real-time fall detection system that not only can distinguish up to 4 different kinds of fall events (forward, backward, rightward and leftward), but is also portable,wearable, low-cost and with high accuracy rate. Because the waist is the centre of gravity in the human body, the system is used more effectively when placed at the waist. The system includes an automatic real-time fall detection device, and GSM instant messaging function which can transfer fall alert, send emergency help messages.

I INTRODUCTION

Falls are the most widespread domestic accidents among the elderly people, disabled persons and patients. Their consequences often give rise to impairments to the health and lifestyle of the victims. In many cases, physical after-effects and other injuries are direct consequences of these accidents and result in significant medical costs. Furthermore, it frequently happens that elderly people who have previously experienced a fall, fear a new fall and sink gradually into inactivity and social isolation. Therefore, it is important to detect fall and send out alert to call for help. But if a fallen person is unconscious and unable to call for help it can lead to irreversible maim and even death. Therefore there is a need of autonomous fall detectors that are capable of triggering an alarm automatically without any intervention of the victim and transferring this information to a remote site .So that the fallen person should get immediate medical aid. Basedon these problems. The main goal, of the proposed system is to develop a small, comfortable, and user friendly device, as well as an automatic fall detection algorithm that will help elderly people to handle this problem. The fall detector that we will develop is a real time working model for detecting the fall, using accelerometer and tilt sensor. It will be capable of automatically detecting various body falls and sending an alarm to a remote terminal. The user can manually generate the alarm signal in case of necessity or, inversely, he can cancel an automatically generated alarm in case of false fall detection .It will consist of GSM Technology attached with this system for sending the real time status to the respective places (Family Doctor, Relatives etc.) It will also consist of a GPS system for locating the position of the user.

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The center of gravity is the balance point for any object. When people are standing up, the body's center of gravity is near the waist. It generates power to move and rotate, so the research into the center of gravity is very useful. The wearing position is the setting at the waist for the device. Another reason why we are not wearing it on a hand or a foot is because the acceleration value would change too intensely if we placed the accelerometer there.

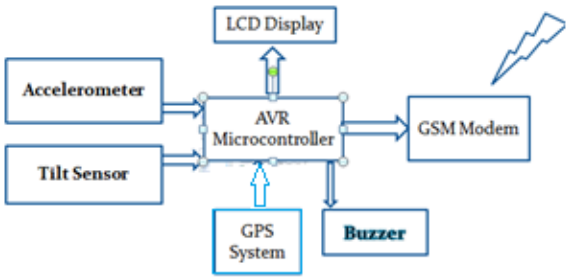
II RELATED WORK:-

The fall detection system that has been employed till now can be classified into two categories: wearable and ambience devices. Ambience devices uses camera and vibration or pressure sensors that are installed in the floor or under the bed. They can detect the presence and position of the person. These devices are cheap and do not disturb the user; but they produce a lot of false alarms .In order to reduce false alarms some research works proposed to integrate information from different sensors. To overcome the shortcomings of the previously mentioned systems, several attempts have been done in recent years to use these systems. BehzadMirmahboub,proposed to use variations in silhouette area that are obtained from only one camera using a simple background separation method to find the silhouette. He showed that the proposed feature is view invariant. Extracted feature is fed into a support vector machine for classification. Simulation of the proposed method using a publicly available dataset shows promising results [1]. Visual systems have the advantage of not disturbing the normal life of the user but the disadvantage of collecting information about one's private life. The individual's personal privacy prevents nurses from recording and watching original outputs of these visual systems. Therefore,wearable automatic detection systems are needed. Woon-Sung Baek, proposed a new fall detection system using one sensor node which can be worn as a necklace. The proposed necklace-shaped sensor node includes tri-axial accelerometer and gyroscope sensors to classify the behaviour and posture of the detection subject [2]. WuttichaiPutchana,proposed a simple wireless intelligent system prototype for fall detection and movement classification for real-time monitoring of the elderly. The portable sensor unit acquires data from a tri-axial accelerometer and sends the data wirelessly to a computer using Zigbee technology. Alternative to classic methods, the movement data is analyzed using a fuzzy inference system [3]. Ying-Wen Bai, use the accelerometer of a smart

phone to design and implement a fall monitor with mobility detection function for the user [4]. Chien-Cheng Lan, proposed a home-based, real-time fall detection system that not only can distinguish up to 4 different kinds of fall events (forward, backward, rightward and leftward), but is also portable, low-cost and with high accuracy rate. The system includes a real-time fall detection band, a home server, and GSM instant messaging function which can transfer fall alert, send emergency help messages[5]. Y. Yang, and X. Zhao, proposed a fall detection algorithm that uses accelerometer signals as input signals and classify them accordingly as falls. They showeddevelopment of a fall detection algorithm based on a tri-axial accelerometer .

III PROPOSED WORK:-

The proposed monitoring system shown in fig 1.consistsof a hardware unit attachable to the waist of the user and a computational-logic microcontroller for classifying user's movements and detecting any possible falls. In case of the falls, the system also sends out an alarm to the appropriate response unit.



Block diagram of the proposed system

1] The first part of the system includes a fall-detecting band for extracting and processing signals obtained from the tri-axial accelerometer and the tilt sensors. According the block diagram, an accelerometer ADXL335 will be used for detection the fall in a x, y and z axis. It will also consisting of a tilt sensor for detecting the bending movement of the body . Here these two sensor will send the analog signal to the microcontroller for its logical manipulation for detecting the real time status of the body.to the home server to update the display information. The device also includes an emergency help button display the fall alert and emergency signal.

2] The second part of the system consists of a GSM modem and a GPS system that will be attached with the microcontroller for sending the message to the respective places along with the location of user. The system updated users' moving status every 10seconds. The server first received a fall alert, then itImmediately give an event acknowledgement back to the fall detection band. Meanwhile, the buzzer fall alert on the fall detection band sounds to warn the user of a possible fall event. If the user did not cancel the fall alert, it would mean that the fall event did occur. When the GUI was informed of a fall event or received an emergency alert, it immediately updated users' status and sent instant messages (SMS) to emergency contacts through global system for mobile communications (GSM) system.

3] FALL DETECTION TECHNIQUE The extracted acceleration values by the tri-axial accelerometer and tilt sensors will be input to AVR microcontroller to compute its signal vector magnitude .The three axes i.e. x, y, z will each produce a different acceleration value,based on these,we will use stage analysis to evaluate users' movement signals. Movements will be classified into normal movements and abnormal movements. According to acceleration signals, normal movements will be continuous and cadent movement signals, while abnormal movements shall be recognized as fall signals. Fall often happens unexpectedly and is difficult to predict. When falling, the user's body can hardly hold on to its usual place and the user himself cannot help but stumble onto the ground. According to directional difference, falls can be further classified into forward fall, backward fall, rightward fall and leftward fall.

IV CONCLUSION:-

There are various fall detection systems which perform well for the detection, but not suitable for real time applications because of the larger number of sensor nodes attached to human body and uncomfortable wearing condition. The proposed system will be a wearable, portable device mounted on the waist of user, having sensors consisting of accelerometer and tilt sensors and a simple algorithm using posture classification fall detection. The propose fall detection system can be regarded as alternative device to the existing detection approaches, since the device provides the comfortable wearing, is less complex as compared to other devices, fast fall response and will be more accurate and economical.

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