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ELDER SUPERVISING SYSTEM

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1. ABSTRACT

By the use of this system the older people are taken care since these systems are reliable in any situation. The elder Ambience Tracking System is a device that has minimizes the risks of living alone. Since the older people percentage is high this project will create a big demand in the market. The technology is upgraded which makes this project to be implemented in a wireless manner. It intimates the person that his relative is at risk or in an emergency situation so that necessary actions are to be taken. We propose the fusion of both force sensor measurements and the accelerometer sensor decisions. It is said to be an embedded system since it is being used only for this purpose and various changes can be made according to technology.

Keywords-.Arduinouno, Accelometer, Force sensor, BP Sensor, ECG Sensor , IOT , GSM,GPS,LCD.

2. INTRODUCTION

This paper describes the ongoing work of detecting falls in independent living senior apartments using force sensors and 3-axis accelerometers concealed under intelligent tiles. The force sensors permit detecting elders' falls, locating, tracking and recognizing human activities (walking, standing, sitting, lying down, falling, and the transitions between them). However, the detection accuracy on real data contains false alarms coming from falling and lying postures.

To solve this issue, we propose the fusion between the force sensor measurements and the accelerometer sensor decisions. As a consequence, the system accuracy is satisfactory and the results show that the proposed methods are efficient, and they can be easily used in a real elder tracking and fall detection system.

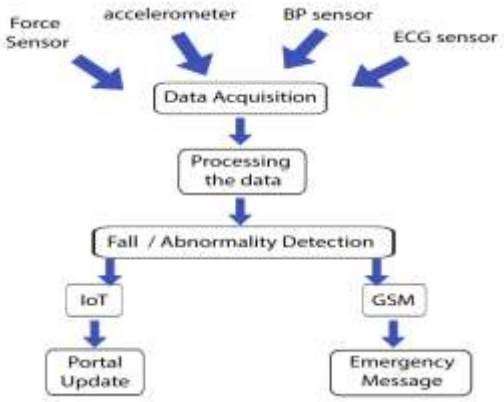

Fig.1 General Framework of data detection and processing

3. PROCESSING METHODS

The arduino accepts the analog signals like the physical value from the force sensor, ECG sensor, BP sensor and the person who is to be intimated is done through GSM, IOT, and GPS. The arduino is the main processor and act as the interface between the processing of the analog value and the displaying of the output. The necessary parameters related to the patient such as ECG, BP, POSITION, FORCE are being sent to the person who is to be intimated. The data generated by the floor can be passed to data processing software either as a recorded .txt file and it is sent to the iot module which sends the signal to the GSM module for communication purpose. This is done through the communication interface card.

The software treats the data packets sent regularly by the tiles every 30 milliseconds. Data is finally converted to .mat file, which is readable by Matlab. The system has been implemented using Arduino Mega Platform. The system has employed a sensor to monitor heart beat ,accelerometer of a human to find position of elder whether they fall or not and give the command to LCD.

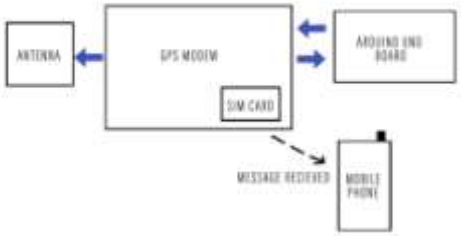

Fig.2 Processing of data by GPS Module

According to the command given by microcontroller will send the message to authorized person. All information update in IOT, GPS automatically track the elder location and send alert system.

4. SENSING FLOORS

Force sensors cannot differentiate between falling and lying down postures because they have the main characteristics in term of the load exerted on tiles, tiles proximities, and the duration .so the threshold value is set to avoid this problem based on the value the situation is detected.

The tiles have also embedded accelerometers that detect human fall. The accelerometer is an 3-axis model system and the position is marked with respect to the axis and this conveyed through the GPS module Generally when an sensor is implemented in a tile there will a normal pressure of the tile which is to be eliminated. The force sensor is implemented in the tile whereas the accelerometer is wearable which gives the position.

The pressure sensors measure the load exerted on the floor that can be used to determine, you stand. It can also be implemented to determine the posture of the monitored person (walking, sitting, standing, falling, etc.) by the pressure amount, the pressure duration on a tile.

From the signals generated by the force sensors and the accelerometers under the tiles, a set of parameters has been extracted to build together our database.

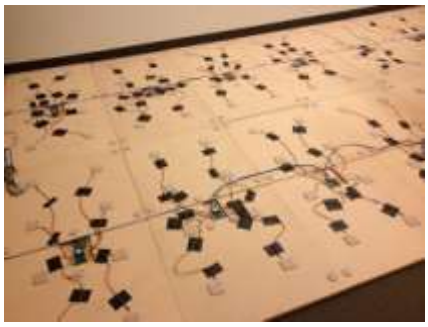

Fig.3 Force Sensor – to be placed under the tiles

5. DIFFERENT POSTURE

Regarding the scenarios of all occurrences, we observe the characteristics of each activity and we can note the following

The threshold that is set in this circuit depends on the force exerted by the person and the position in which they fall.

There is up and down of the pressure level of pressure when the person is walking. in the case of sleeping the wearable accelerometer is removed and there is no need of tile. If you fall down while working your body rest on the tile and the sensing tiles measure the pressure and the position which is intimated in case of running you abnormal pressure values.

The various positions are being monitored by the accelerometer. This accelerometer is more useful and precise when it comes to outdoor situation than inside the house. The accelerometer is used to differentiate the state of the person.

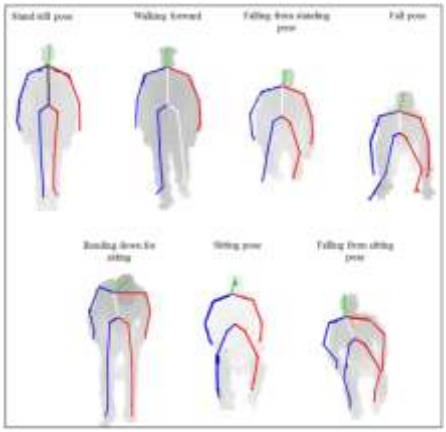

Fig.4 Different postures exhibited by the person

6. EXTRACTING DATA FROM THE FORCE SENSORS

The forces are calculated from the person on the tile and the force sensor takes the physical value eliminating the noise from the external factors. So when the person walks on the tile the accelerometer monitors the position

and there is an uneven distribution of the pressure in the tile. If the person falls then the pressure is uniformly distributed in the tile and the alarm works as per its command.

These pressure sensing are implemented according to the usage of the old person in the house. Then the data is given to the IOT for further processing.

The force value can be displayed in the LCD and can also be conveyed through the GSM, which consist of the GPRS module for high transmission of the data.

When an sensor is implemented in a tile there will a normal pressure of the tile which is to be eliminated. This force sensitivity is optimized for use in human touch control of electronic devices such as automotive electronics, medical systems, and in industrial and robotics applications. Fig.6 Decision making algorithm

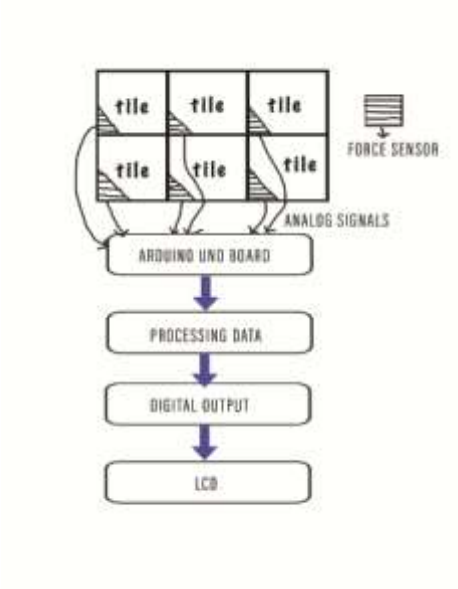

Fig.5. Extracting the data

7. ALGORITHM

The message is passed to the person by the IOT so that the aged person can get out of the risk situation. When the person is walking or standing up, so we choose the threshold 75%. Whereas these values are lower in other postures because the load force is distributed on different tiles, so we choose the threshold 25%.

The predefined threshold values are set in such a way that it compares it with the practical scenario such as walking, standing, sitting. So if it is the case of standing or walking it just eliminates the value in the case of sleeping there won't be any wearable material so there is no physical value from it. Only in the case of fall the physical value (force value etc) are being compared with the threshold value. If it reaches or goes beyond the threshold value then the alarm starts its operation.

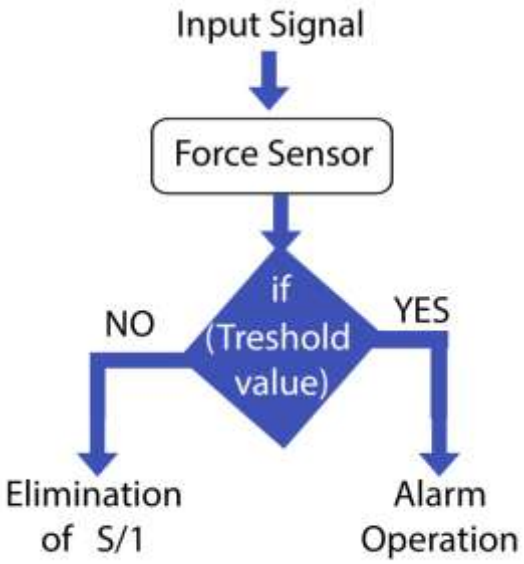

Fig.6 Decision making algorithm

The force sensors were reset to zero where no person exists on the tiles. We developed a simple algorithm to detect the characteristic change of a signal and notice that a person is falling down after he/she was walking, sitting, or standing. The characteristics of all the postures is defined ,by which the accelerometer comes to a conclusion of the position of the person and state of the person.

8. ACCELEROMETER DATA

If fall in a random position your accelerometer will judge the position and your force won't be even in this case. In case of non-falling there will be an abrupt change in the pressure and the value of the accelerometer keeps changing The arduino accepts this physical value and the o/p is displayed in the LCD and in the GPS.

Since the accelerometer is wearable, when moving outside your position is indicated in a three dimensional manner. A 3 dimensional accelerometer is used which makes the current position of the aged person. So if a fall is detected, the alarm starts to make a sound and the position of the fallen person is detected.

The pressure sensors measure the load exerted on the floor that can be used to determine, you stand. It can also be implemented to determine the posture of the monitored person (walking, sitting, standing, falling, etc.) by the pressure amount, the pressure duration on a tile.

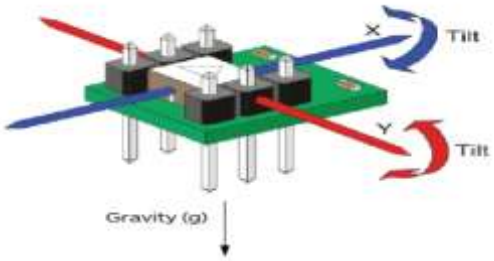

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Fig.7 Axes of an Accelerometer

9. REAL TIME APPLICATION.

This is project is not only for study purpose but also implemented in real time by wearing the sensor in the form of chain. During sleep this sensor is removed, the accelerometer is used to enforce the differentiation between the falling and the lying down posture. The tiles are being fixed with the sensors and the accelerometer. Since MEMS are being used this is cost efficient and user friendly and the performance obtained from these are very precise. Our challenge is to offer a usable system with maximum privacy within a reliable, efficient and affordable framework. Using a simple accelerometer data, we can easily differentiate between falling and non-falling states. For a practical purpose the signals from various actions are obtained and we extract some useful parameters from the original signals that can be used in our system in order to improve the performance.The next contribution of this work is to fuse the dataset collected from the accelerometers with force sensors data sources to get profit in determine the all ADL states.

Fig.8 Real Time Application

10. RESULTS AND DISCUSSIONS

Fig.9 LCD Displaying the fall message

In the existing system there is no system to monitor the health care fall detection for elder people. But man power is required. And there is no device to display or send the information i.e; People didn't get any alert. But the project developed by us will monitor Patient through a sensor to Peasant data is displayed in the LCD and also send to IOT.

This system the health condition will automatically updated to the internet for analysis. So No man power needed and this system will automatically transmit the values. If the patient condition increases people will get alert. During the upcoming generation the system components will become wireless and efficiency of the system is increased to a greater height. The next up gradation of MEMS may be implemented.Furthermore, merging multi-sensing data with prediction technologies such as artificial intelligence and machine learning will encourage developing intelligent fall prevention system

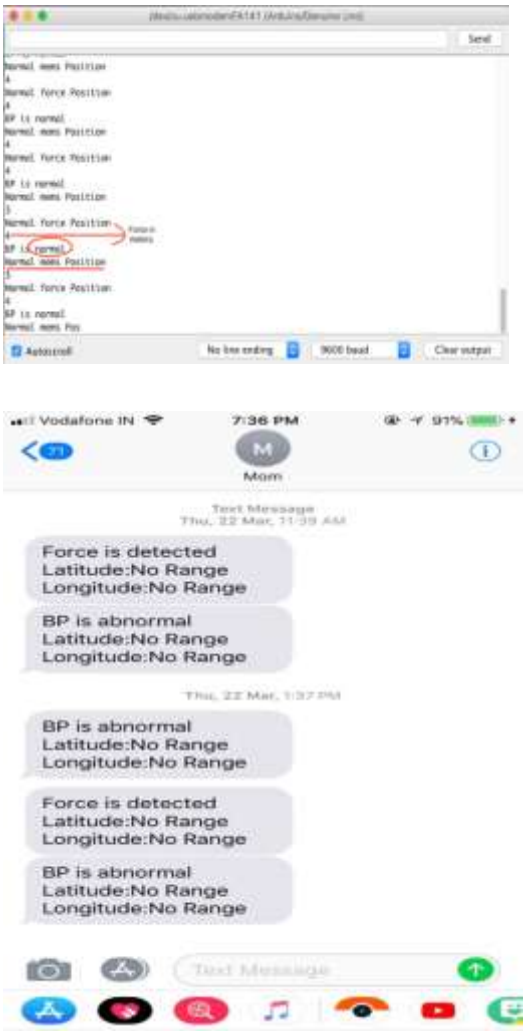

Fig.10 Message alert to phone.

11. OVERVIEW

The accuracy of our module overcame the odds where the implementations were done and tested. As we know our module includes arduiouno which holds all the process together in the board Atmega328p. You can assume the monitoring to fail at certain times. Our module has overcome the extremities of the existing systems where no man power is needed, device to send the information and the important of all “people do get alerts" ie. Doctor, maid, siblings etc.

If the particular patient is standing on a particular tile for a longer time say 2-3seconds, the message will not be passed to the lcd or the iot where the delay is provided in the “microcontroller software part “ where it can be given as 4-5 seconds depending upon their age. So of they are standing for 3 seconds message is not sent to the controller part.

IOT or the internet of things will provide the total health guidance to the data base where it pings the monitor. Here too, false data can be acquired where it can be rectified by reconfirming it again and providing to the monitor or the data base. The alternatives are always provided if one goes wrong i.e If IOT information goes wrong then the LCD and the aurdino part rechecks and reconfirms with the output sector window. Also the ECG and the blood pressure sensors are used to boost our module to the next level of ambience and health care.

12. CONCLUSION

This paper intimates about the elder ambience monitoring system made up of force sensors, accelerometer and the iot which includes the GSM,GPS.the proposed system has a little high cost especially for the old apartment, but the price of sensors is rapidly decreasing, making it feasible to implement such system. we proceeded to the accelerometer signals to differentiate between the falling and the various postures.

The various processing methods were also discussed. To conclude the embedded system designed is efficient, reliable and eliminates the the drawbacks of the previous system. The situation is conveyed from a distant location through the LCD.

The motive of minimising the risk of the age people through this embedded system was discussed. Next we showed the algorithm and how the sensors are being implemented. The great challenge of this project is to provide a friendly-user and effective system that doesn’t affect elderly daily living patterns. The sensing mechanism of the accelerometer was given.

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