Automatic Fall Detection System For Monitoring Of Elderly Person

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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. The Heart beat sensor is utilized to measure the pulse rate and Mems sensor is to sense the movement of the person. The proposed system consists of ARM processor. This also alerts the victim's neighbouring people in assisting the victim by producing a beep sound. An SMS message with the current location of and consciousness of the victim is sent to the physician and to the registered contacts. This system is connected to GSM for communication purpose which is unique. When the fall is detected, GSM modem is used to transmit the message to the mobile phone of caretakers/relatives of the fallen subjects. This alert message helps to provide immediate assistance and treatment. The obtained sensor values are displayed on the LCD display.*

KEY WORDS: Fall Detection system, patient monitoring, Body positioning, GSM, ARM Processor.

I.INTRODUCTION

Among all the fall detection approaches, automatic fall event detection has pulled in research consideration as of late, for its potential application in fall disturbing framework and fall affect avoidance framework. In any case, the current methodologies have not fulfilled the exactness and power prerequisites of a tasteful fall discovery framework. All things considered, existing fall detection system is confronting three noteworthy issues. The primary issue is worried about Location execution, all the more particularly the harmony among detection and false cautions. All of the current fall recognition strategies are confronting this issue to a shifting degree. The second issue is that the objective of recognition is vague. Distinctive gadgets may really recognize the effect of a fall, the inadequacy to rise/recoup after a fall from the viewpoint of forestalling fall wounds straightforwardly utilizing a wearable insurance framework. Last but not least, most fall detection methods were developed using simulated falls. As a result, they need to be urgently transported to the hospital, where they will be observed and provided with medical help if health condition is at risk. At the same time, the amount of elderly people choosing to maintain their independent lifestyles is growing rapidly, which makes it harder for medical professionals to follow changes and trends in patient's health conditions outside hospital environment.

Therefore, there is a clear demand in reliable multi-functional remote monitoring systems for elderly people, which collect and combine different sources of medical data corresponding to everyday routine of the monitored patient. In many cases, different components comprising the systems are disintegrated and operating separately from each other. In any case, on the off chance that we consolidate checking segments (e.g. sensors, actuators) into savvy situations, we will have the capacity to do perceptions for individuals with numerous incessant conditions at home. It will enhance elderly patient's dimension of opportunity and security, which is one of the principle

issues in human services industry. In the meantime fall episodes are viewed as a standout amongst the most widely recognized and risky dangers among elderly populace, with almost 50% of nursing home occupants and 30% of freely living individuals falling every year. Accordingly, present day medicinal services frameworks will in general incorporate solid fall recognition usefulness into general observing system. With the ongoing advancement on ICT advertise wearable sensors are regularly conveyed related to ecological gadgets to enhance fall location rates and limit false cautions. For this situation a multi-modular framework requires a unique combination calculation to consolidate all the dynamic parts. Another wellspring of inspiration is an absence of relevant information in a lion's share of present day human services frameworks.

Therefore, smart homes, with a capability to unobtrusively collect contextual data (e.g. radio-frequency identification (RFID) tags, pressure mats, switcher sensors and etc.) are essential sources of information. These data can be processed afterwards and infer real activities (e.g. cooking, sleeping, exercising), giving an extra insight on physiological processes happening with elderly. However, there are no obvious solutions for integrating medical sensors into a smart home environment, which makes this area open for further research investigations. Fall detection is urgently demanded. Most fall detection system requires numerous sensors, for example, the spinner and accelerometer cooperating to make a forecast. Nonetheless, dealing with different sensors' data makes these calculations excessively perplexing and the discovery method vitality expending. It has turned into a test when coordinating different sensors into wearable items. The proposed ongoing fall location framework depends on our low-multifaceted nature fall discovery algorithm to execute. The framework just uses speeding up, which requires less vitality utilization contrasted with other different sensor-based fall detection systems. The sensor information are gathered and prepared progressively.

II. RELATED WORK

Falls are among major problems in modern healthcare and a serious threat for elderly population. As a result, most of the wireless monitoring systems tend to include automatic fall detection into their functionality. Modern smart phone are often equipped with a set of powerful sensor technology and start to play a significant role in healthcare development. Alternatively, some of the studies propose algorithms where contextual or visual data collected by environmental sensors is deployed to detect a fall. In this case obtrusiveness of the process is relatively low since patients do not require wearing any devices. At the same time, these types of systems are often facing privacy issues and require additional ethical approve. Due to these reasons and complexity of the fall process in general several attempts were made to combine both types of data to improve overall performance of fall detection systems. In the following section we provide main fall characteristics, describe popular approaches and explain how fall detection can be included in a general monitoring model implemented in a smart home environment.

Latest wearable medical devices often operate in conjunction with smart phones, which are playing a major role in the modern healthcare systems. Modern smart phones, operating as wearable sensor can also be deployed as a communication entity for other medical devices providing a link between different types of data sources. This particular idea was implemented and described in an article by Kohei Arai, where blood pressure, body temperature, pulse rate EEG, calorie consumption and other sensors are attached to the human body. Measured data are transferred to mobile devices

through Bluetooth and further to the Information Collection Center with the help of Wi-Fi or Wireless LAN. Alternatively, we can establish connection to a smart phone device via ZigBee, which is a standard communication protocol for low-cost, low-power, wireless sensor and control networks.

A fall is commonly defined as "unintentionally coming to rest on the ground, floor, or other lower level". Most of the wearable fall detectors are based on accelerometer data and operating with posture and motion of the patient's body. They can additionally be subdivided into thresholding or machine learning methods according to the processing algorithm they deploy. Acceleration data collected during the fall in different directions is demonstrated. Each line represents raw, pitch or yaw of the smart phones coordinate axis, has its unique variation and can distinctively depict three different phases of every fall motion: (1) pre-fall, (2) impact, (3) after-fall phase.

Alternative fall detection methods are based on contextual data and deploy modern vision or ambient techniques to detect a fall. In this case collected measurements (video stream, sound etc) are transferred to a remote device and inspected for possible emergency situations associated with falls. In the vast majority of the context-aware or vision-based systems falls are detected off-line with the help of statistical or machine learning algorithms.

Each of the presented approaches still gives a significant amount of false positive alarms while operating independently. It is therefore important to integrate additional sensor functionality in order to improve reliability of fall detection systems. This trend is becoming popular and addressed as multi-sensor fusion based fall detection. In this case, several sensor channels are deployed to collect data which is later fused on a processing level. In the following sections we continue to describe each type of fall detection approach in particular and discuss possible solutions for a multimodal framework fusing both techniques.

III. EXISTED SYSTEM

Falls have remarkable examples and qualities that can be misused to identify and foresee them. For instance, the falling pace rises relatively with the inertial qualities of the falling subject. The increasing speed is one-sided to its negative segment along the hub opposite to the ground. There is additionally an adjustment toward the path after a fall pursued by a time of the subject's inertia.

Fall detection (FD) and fall prevention (FP) frameworks have been examined for over 10 years, the previous the most researched. They share numerous things in like manner, for instance, they both utilize detecting gadgets to achieve their errands. Also, they comprehend the gathered information through PC vision, information mining and machine learning strategies. These frameworks need to conquer numerous difficulties with the end goal to plan and execute a successful FD or FP framework. A portion of the issues they confront are the accompanying: prominence, impediment, different individuals in the scene (camera-based framework), maturing (kinematics qualities change after some time), security, computational multifaceted nature, cost, clamor, characterizing an edge (limit based frameworks).

Fall discovery and anticipation frameworks have been planned utilizing either outer sensors or wearable sensors. Outer sensors are conveyed in the region of the subject of intrest (SOI), and wearable sensors are appended to the SOI. There have been likewise different methodologies that utilization a mix of the two kinds of sensors, known as half and half frameworks. This sort of frameworks won't be shrouded in this audit. Camera-based sensors are maybe the most widely

recognized sorts of sensors utilized in outside detecting. One or numerous cameras are put in predefined settled areas where the SOI will play out his/her every day movement. The fundamental downside of these sensors is their powerlessness to track the client out of the cameras' scope of deceivability. Another essential reality about outside detecting is its staggering expense, as various sensors must be acquired to expand the framework's inclusion.

Nearness sensors are another common case of the outside sensors utilized in fall discovery frameworks. A significant number of these sensors are normally connected to a mobile guide gadget, for example, a stick or a walker. A fall is identified by estimating sudden changes in the SOI's developments and his/her separation from the nearness sensors. One of the issues these sensors have is their short nearness go; if a man steps from the walker, the SOI will be out of the sensors' range, which can be confused as a fall. Additionally, some closeness sensors can be essentially costly.

Wearable sensors are an option in contrast to outside detecting. They are habitually utilized in FD and FP frameworks. Wearable sensors are joined to the SOI's body, wiping out the space restriction forced by outer detecting. What's more, wearable sensors are for the most part less expensive than outside sensors. The primary weakness of wearable sensors is their abnormal state of prominence. Accelerometers are a kind of wearable sensors that are broadly utilized in fall location frameworks. They are shoddy and can be worn on various parts of the body. They are generally implanted in different gadgets, for example, watches, shoes, belts, and so on. With this single sensor a large portion of the SOI's development attributes can be separated and used to distinguish falls. Fall aversion frameworks likewise exploit outside sensors and wearable sensors. Additionally, extraordinary movement attributes are extricated from the gathered information, which are utilized to appraise the probability of a fall and alarm the client continuously.

Among these accidents, falls is a major public health problem that affects every ten year of millions of worldwide elderly people, yielding psychological and physical consequences. As we know that some of the elderly people are not able to lift themselves on their own after falling; it is important to detect such types of events as soon as possible. Hence such type of problems problem is related to researchers in the field of health technologies.

IV. PROPOSED SYSTEM

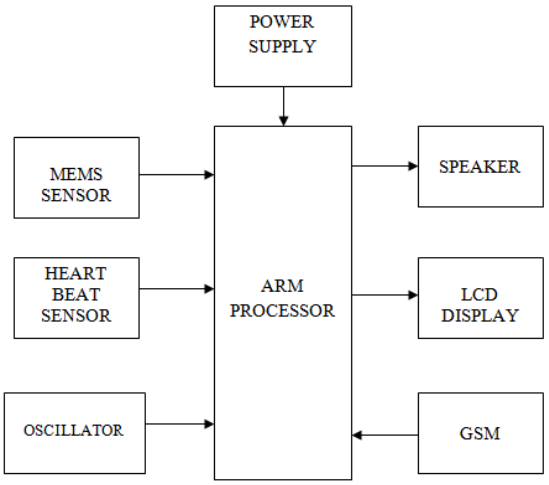

Fig. 1: proposed system

From above figure (1) we can observe the block diagram of proposed system. The devices used in proposed system are MEMS sensor, heart beat sensor, oscillator, ARM processor, speaker, LCD display and GSM. The descriptions of these devices are given below. Firstly oscillator will oppose the error signals and transmits the pure signals into the system. Power supply gives sufficient power to operate the system. As we know that ARM processor is one of the family of CPU. ARM processor can operate at a higher speed, performing more millions of

instructions per second. From LCD display we can observe the output.

Heartbeat Sensor is an electronic gadget that is utilized to gauge the pulse i.e. speed of the heartbeat. Checking body temperature, pulse and circulatory strain are the essential things that we do with the end goal to keep us solid. With the end goal to quantify the body temperature, we utilize thermometers and a sphygmomanometer to screen the Blood Pressure. Pulse can be observed in two different ways: one route is to physically check the beat either at wrists or neck and the other path is to utilize a Heartbeat Sensor

(MEMS) are a procedure innovation used to make little incorporated gadgets that join mechanical and electrical segments. They are manufactured by utilizing integrated circuit (IC) cluster handling methods and can extend in size from a couple of micrometres to millimetres. These gadgets (or frameworks) can detect, control and incite on the micro scale, and produce consequences for the macro scale. The PS arrangement are high performance speakers that utilize piezoelectric components and are intended for simple joining into different circuits. They highlight to a great degree low power utilization in contrast with electromagnetic units. In our undertaking we are utilizing the ringer type PS19 type because of the reality, it has a low frequency tone of 2 kHz and piezoelectric material is covered with water and dust resistive material.

GSM (Global System for Mobile communication) is an open, advanced cell innovation utilized for transmitting voice and information services. GSM utilizes a variety of Time Division Multiple Access (TDMA) and is the most broadly utilized of the three advanced remote phone innovations (TDMA, GSM, and CDMA). At last it can say that compared to existed system, proposed system gives effective results.

V. RESULTS

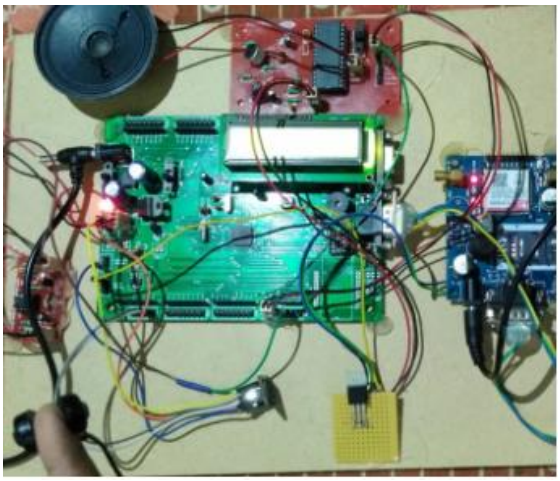

Fig. 2: OUTPUT-1

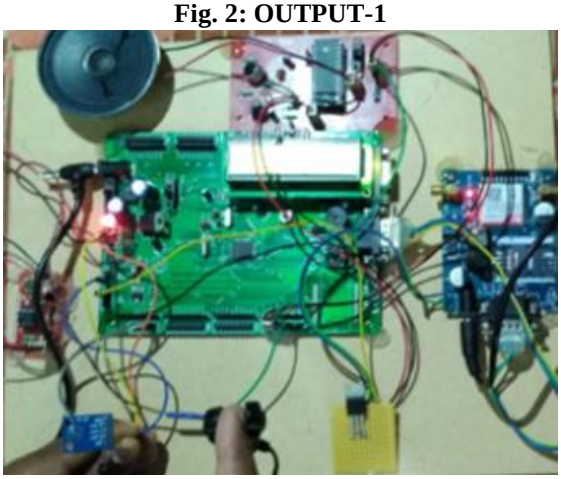

Fig. 3: OUTPUT-2

VI. CONCLUSION

Aging is inevitable, whether it ends with no, mild or severe pathologies, it is always decent to age with good quality of life. Efforts to reach this objective do not lie on the medical force alone; it is therefore the joint effort between health professionals and scientists to address public health issues. Fall detection systems were summarized and organized with respect to their sensor deployment and their data processing techniques. However more details were accorded to existing solutions given the current efforts in this research track. Future directions in fall-related systems may consider exporting gait and balance assessment tools into homes while providing reliable and low cost solutions

for the elderly. Moreover, these systems must be able to contextualize the problem of falling in real life situations. Future solutions must also consider merging systems for indoor and outdoor protection with minimum obtrusiveness to the patients

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