# SMART HOME FOR ELDER CARE

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***Abstract*— Today, technology is growing rapidly and providing all essential and effective solutions for every requirement. Now a day's Elders care is an important area of concern. The population of elder people is growing quickly and more ever the elderly people are choosing to stay alone and independently instead of old age homes in these days. This paper is developed to rectify the worries of care takers regarding their elders safety. Developing a smart home system for such elder people to help them ease their work and provide them safe, sound and secure living. Our system ensures maximum security through the sensors like 3-axis accelerometer, temperature sensor, LPG gas sensor are proposed to be deployed for fall detection, fire Detection, gas leakage detection and live tracking of their elders can be done through GPS. In case of any emergency, a warning message will be generated, and push notification will be sent to the care takers to take preventive action.**

***Keywords*— 3-axis accelerometer, LPG gas sensor, smart home system, temperature sensor.**

## I. INTRODUCTION

Today, technology is growing rapidly and providing all essential and effective solutions for every requirement. Now a day's Elders care is an important area of concern. The population of elder people is growing quickly and more ever the elderly people are choosing to stay alone and independently instead of old age homes in these days. This paper is developed to rectify the worries of care takers regarding their elder's safety. Developing a smart home system for such elder people to help them ease their work and provide them safe, sound and secure living.

Nowadays, WSNs has become an attractive field for research as well as scientific and technological developments. WSNs are different from traditional wireless networks and hence, pose more challenges like limited energy, restricted life time, limited security, etc. with the benefit of easy installation, low maintenance, etc. Wireless Sensor Networks (WSNs) comprise of a large number of tiny devices equipped with one or more sensors, some processing circuits, and a wireless transceiver. Such devices are called sensor nodes or motes. These sensor nodes are densely deployed either inside the phenomenon to be sensed or very close to it. The size of a sensor node is small enough to allow easy and random deployment of a large number of motes into remote and inaccessible environment.

Parameters like temperature, LPG leakage, and fall detection are constantly reported by these systems. As age of people increase, they tend to forget basic things like switching off of an LPG, Lights etc. They may forget to switch off cylinder gas causing LPG gas leakage.

There are many wearable devices to track the location and sense the elders. But there is no system to know their elder's detailed behavioral status through internet. In case of any emergency there is a need of such device which notifies care taker about their elder's. Thus, the objective of the proposed system is to build an application to effectively deal such problems. Our system ensures maximum security through live tracking for their elders through GPS and used the sensors like 3-axis accelerometer, temperature sensor, LPG sensor are proposed to be deployed for fall detection, fire Detection, gas leakage detection. In case of any emergency, a warning message will be generated, and push notification will be sent to the care takers to take preventive action.

Hence, we propose a Smart Home system for safety of such people. In a Smart home sensors are used for monitoring general parameters like temperature, fall detection, LPG leakage, etc. Thus, with the development of wireless network technology, we prefer low data rate, long battery life, less complex protocols, for such applications as an alternative to wasting bandwidth of high data rate protocols. Short distance wireless communication technologies mainly include Wi-Fi.

Most of care takers care about their elder's safety, so we propose an idea to solve this problem. This paper proposed a model for elder's safety through smart phones that provides the option to track the location, 3-axis accelerometer observes the fall detection of their elders, as well as in case of emergency like fire and LPG leakage an push notification will be sent to the respective care takers so that they can take care of them safely and securely. This proposed system is validated by testing on the Android platform.

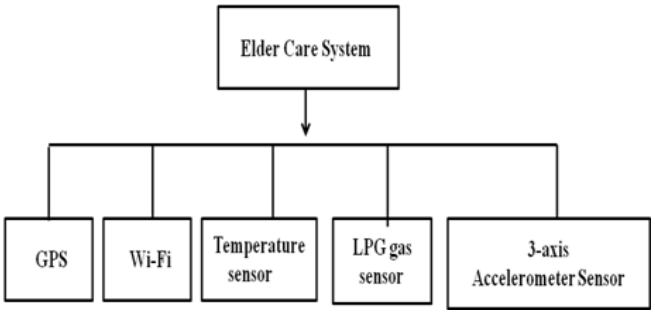


**Fig.1 Contents of Application**

## II. EXISTING SYSTEM

Multipurpose Elder Tracking System Design and Implementation at the same time. Developing a tracking system for care takers with multiple elder could greatly decrease their stress and giving them more freedom during excursions with their elder. The top level view of this paper has been designed with two distinct modules; elder module and care taker module. The elder module is attached to each elder. Its primary role is to periodically receive messages and in response send messages to the care taker module and alert them if the elder is in danger. Also, it has a buzzer alarm that sounds whenever the elder is in an alarmed state. This allows a parent to more easily locate the troubled elder. Elder module has the ability to connect different sensors; however, sensors number can increase as necessary with a slight modification. In this work, smoke, temperature and water sensors are used.

The care taker module sends requests to each elder asking the status of them. The care taker module is the computational brain of the entire system. It is responsible for communication with the entire elder and calculating their distance. It also analyzes incoming packets to see if any elder has been in an alarmed state or not. Finally, if any elder stops sending packets, the parent assumes it is out of range and also triggers an alarm. Every time the parent module cycles through the entire elder, it packs the status of every elder and displays information on LCD.


**Fig.2 Wearable Watches**

## III. PROPOSED SYSTEM

The proposed system emphasizes the probability of monitoring the elder's movements and with the help of a few sensors mounted on the device on which the elder is wearing this device its convenient to track the elder without the necessary boundaries that limits the tracking device previous versions of the device had limited access with respect to distance this distance criteria is the main factor that over comes the distance barrier the readings that cross the threshold level to the sensors are read and sent to the server from which an IOT based system calibration takes place and sends notification through the app of the admin so that they can monitor the elder's movement whether it is in danger or any kind of emergency.

The proposed system solves the following problems:

- **GPS:** They can be track through the GPS.
- **Temperature:** Sense the high temperature.
- **Fall detection:** 3-axial accelerometer will sense the person in case of fall down.
- **LPG Gas Sensor:** It will sense the LPG leakage, if there is a leakage then intimate to the care takers.

## IV. SYSTEM ARCHITECTURE

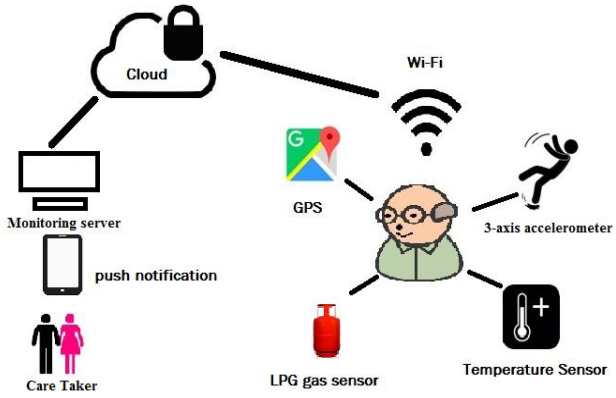


**Fig.4 System Architecture**

The above system is divided into four components:

### i. 3-Axis Accelerometer

Accelerometers will measure vibration, shock, acceleration, and motion for monitoring, control, and testing applications. ICP®, PE, MEMS and Capacitance sensing technologies are used to fulfill a wide assortment of measurement requirements. Accelerometers has 3 directions namely X, Y, Z, suppose if a person falls on direction X then drastic changes occurs in movement of body so the accelerometer will detect the value in the direction X & same as for Y, Z also. Drastic movement of the body in these directions represents like the person has fallen.

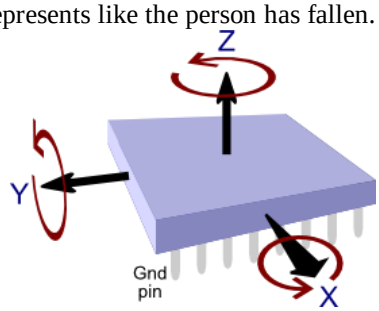


**Fig. 4.1 3-Axis accelerometer**

### ii. Temperature Sensor

The most commonly used type of all the sensors are those which detect Temperature or heat. These types of temperature sensor vary from simple ON/OFF thermostatic devices which control a domestic hot water heating system to highly sensitive semiconductor types that can control complex process control furnace plants. There are many different types of Temperature Sensor available and all have different characteristics depending upon their actual application. A temperature sensor consists of two basic physical types are Contact temperature sensor and Non-contact temperature sensor.

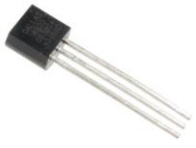

**Fig 4.2 Temperature sensor**

**iii. GPS (Global Positioning System)**

The Global Positioning System (GPS) is a space-based radio navigation system owned by the US government and operated by the United States Air Force. It is a global navigation satellite system that provides geo location and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.

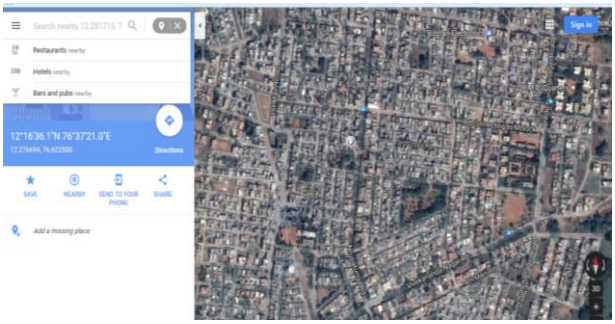

**Fig.4.3 GPS**

**iv. LPG Gas Sensor(MQ2)**

The Grove - Gas Sensor (MQ2) module is useful for gas leakage detection (home and industry). It is suitable for detecting H2, LPG, CH4, CO, Alcohol, Smoke or Propane. The sensitivity of the sensor can be adjusted by potentiometer. The sensor value only reflects the approximated trend of gas concentration in a permissible error range; it DOES NOT represent the exact gas concentration. The detection of certain components in the air usually requires a more precise and costly instrument, which cannot be done with a single gas sensor. If your project is aimed at obtaining the gas concentration at a very precise level, then we don't recommend this gas sensor.

**Fig.4.4 Gas Sensor**

## V. RESULTS

The elder monitoring system is implemented successfully. Fig.5.1 shows the start screen of the system. Fig.5.2 shows the Main screen and it consist of options to create the user for elder monitoring then we set up the threshold value for fall detection as shown in Fig.5.3. Finally we will select a user for elder Monitoring from the registered users list as shown in fig.5.4 and the monitoring process is shown in the Fig.5.5, Where we can see the 3-axis namely X, Y, Z values and the graph to represent those values graphically, LPG Gas leakage values, User name and the Temperature values. If any of those above safety measure values exceeds more than expected one an emergency push notification will be sent to the respective care takers as shown in Fig.5.6.

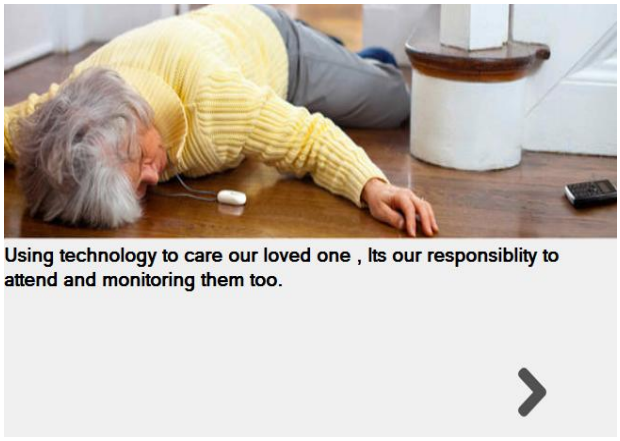


**Fig.5.1Start screen**

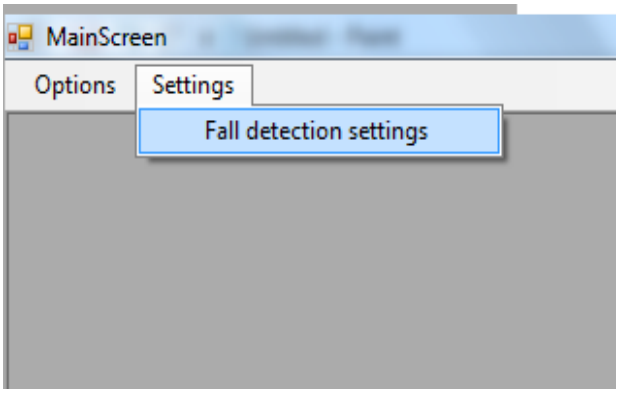


**Fig.5.2 Main screen**

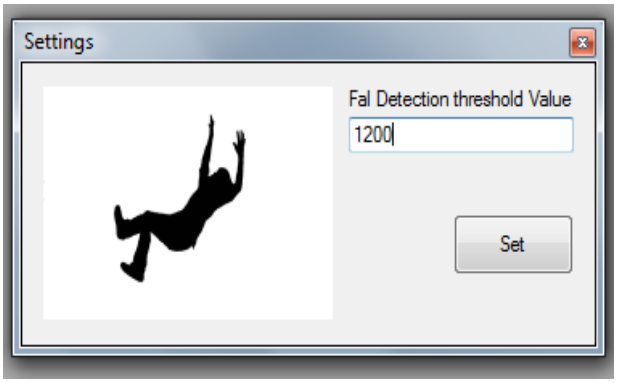


**Fig.5.3 setting up values for fall detection threshold**

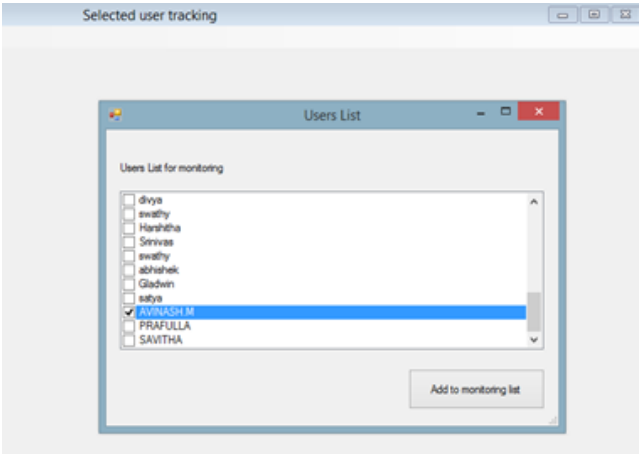


**Fig.5.4 selecting the user monitoring**

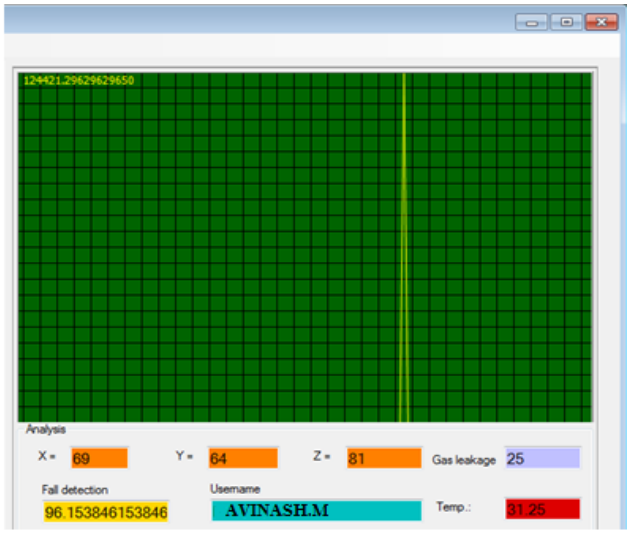


**Fig.5.5 monitoring process**

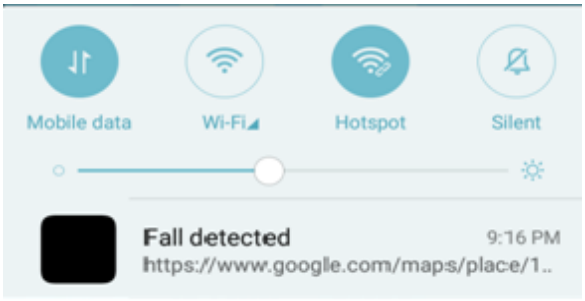


**Fig.5.6 Push notification to care takers**

## VI. CONCLUSION

In this paper, a system for monitoring is explored so as to avoid hazards mainly in a compact environment like home. This project takes the advantages of Arduino board, smart phones which offers rich features like Google maps, GPS, SMS, and GCM etc. The Proposed System solves the problems like 3-axis accelerometer helps to detect whether or not a fall has occurred, Gas sensor detects if there is any LPG gas leakage ,temperature sensors will sense whether any kind of fire and using GPS elders can be tracked through Global Positioning System with the support of Internet. And in case of emergency push notification is sent automatically to the respective care takers to take preventive measures.

Some of the best works implemented in past relies on SMS based tracking which is not helpful to get an accurate location in our proposed system we have provided real time tracking. All these elements come together to create a smart home system to provide a safe and secure living condition for elderly people. A prototype was successfully designed and tested for the same.

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