

IOT BASED TUMBLING DETECTION FOR AGED PEOPLE



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Abstract

In present day situation there has been an increment in the number of aged people that can protect for themselves. Yet, there are sure dangers associated with age which include falls, blood stress or coronary heart problems among others, that could bring about critical effects to the persons. The goal of this have a look at is the improvement of a system oriented IoT, which may be received with the aid of the low income population, permitting any family member to do a far off following up. One of the most extreme issues is the falls. Because of this we commenced improving a module that can identify drops with accelerometers in this first degree, controlling of elderly can be done with the "Intel Galileo" development board and their condition can be send to the authorised person through GSM. The detailed description of the sensors which are used to rendering of corrections and data analysing are explained, due to functioning with a sensor MMA7361 with Intel Galileo distinguished from other platforms.

Keywords:

IoT;
Accelerometer;
Tumbling detection;
MMA 7361 sensor;
GSM modem.

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1. Introduction:

Aged people mainly get injured and causes to death due to falls and also. Early involvement is crucial. Tumbling of aged person can cause functional damage, need domestic servant, If its nor timely abeted. Preventing drops for aged people is very crucial in the scheme of the National Policy, the administrative of organised reinforcement of the society, accumulate a guide where the point of laps is the main part of advise in dangerous positions.

The impacts of falls can be hopeless without suitable and quick interaction. A history shows one third of population over 64 suffers in each year due to falls is indicated by World Health Organization. This is the main object of injury in elderly people and one of the superior causes of incidental death in people above 75. In addition ruptures produced over falls represent 90% of actions. If they fall, we can give quick supervision and improvement of their health by the family members.

The family member can do a remote following up with the build up system related to IoT, that can be obtain through the less revenue society. This system gives fast reaction by notifying the falls.

2. Development:

This project distinguishes a real-time inviolability prototype system that notifies the condition of the elderly people. The main aim of this project is to find falls indications in elderly people. If falls occurred send a message to family members, then they will respond immediately to the situations of human lives. The purpose of the prototype system is to develop a less expensive, low powered product acclimatized design, in which acceleration “g” values from accelerometer sensor is observed. The accelerometer is integrated to a Intel Galileo. After observation of the acceleration “g” values when it exceeds the predefined threshold which indicates falls has occurred then the crucial steps can be taken once message is circulated to the authorised person.

The Embedded box will evaluate IoT Fall Detection performance for safety. The Embedded box will notify the performance of the elderly people.

The Embedded Box must meet the following requirements:

- (i) Measure the acceleration of a body.
- (ii) Data analysis software
- (iii) Communication between Embedded box and owner using GSM.

Block diagram:

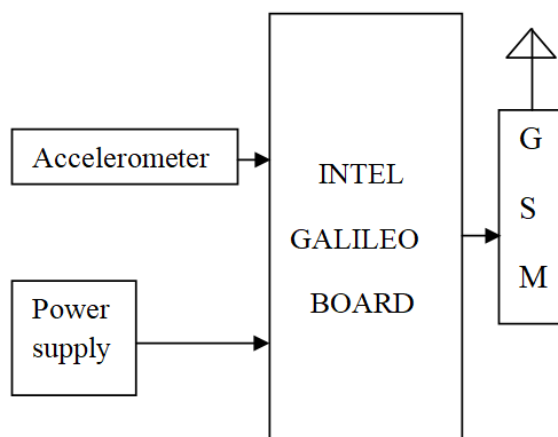


Figure 1. Block diagram of tumbling detection.

A. features of the MMA7361 sensor:

MMA 7361 Accelerometer sensor can gauge stable or varying acceleration in its entire three axes. The use of the sensor is in different areas and several devices can be manufactured using it. The accelerometer gauges amplitude of acceleration where it is placed and also we can gauge acceleration/deceleration of an entity, or slope of a platform regards to earth axis. The MMA7361 is a less power, less analysis capacitive micro machined accelerometer emphasize signal conditioning, a 1-pole integrator, temperature rectification, self test, 0g-Detect which senses continuous fall without any gravitational force., and g-Select accepts for the choosing among sensitivities. Any external device is not required for Zero-g offset and sensitivity. To make the MMA7361 ideal for controlled battery power-driven electronics a Sleep Mode is included.

B. Intel Galileo:

Tumbling detection can be done with this equipment. This is Based on Intel x86 architecture the first Arduino-certified development board is Intel Galileo. Galileo is an arduino compatible development board that means it can be programmed with the arduino IDE using arduino programming language.

To build a project, Intel Galileo hardware development board allows writing code and creating electronic circuits. It is compatible with Arduino software development (IDE). By using Arduino software libraries the development board can run an open source Linux OS. Existing programs in Arduino IDE is called "sketches". When the board is power on then the sketch runs all the time.

This Intel Galileo has Linux operating system, which includes an Intel Quark X 1000 32bit 400MHz processor, and 256MB of RAM. It used flash memory 8M, EEPROM 8kb and micro SD card up to 32GB for booting and long time storage.

It takes the accelerometer readings and analyse or compare the readings with standard or reference values and gives the information about the aged person to the GSM module.

C. GSM module:

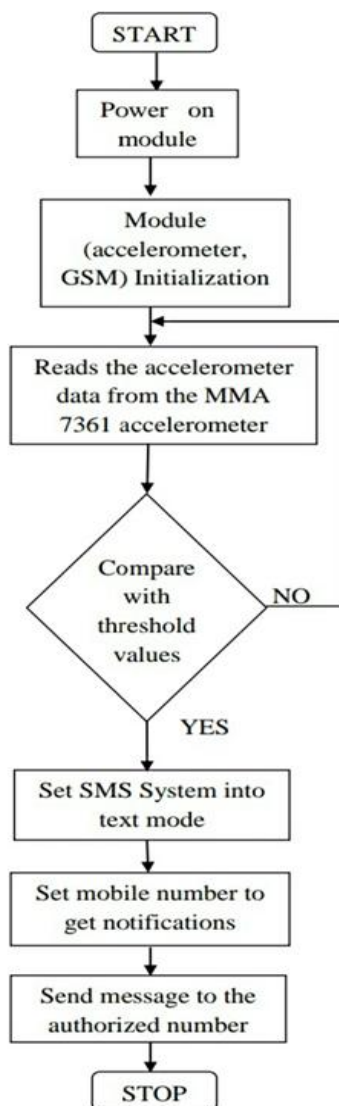
Global system for mobile Communications (GSM) is used for transferring the information. The communication between the elderly people and family members is provided with the help of GSM. This can used to give important notifications (through messages) to the family member. By using the AT commands the notifications are sent to the registered mobile number.

Some of AT commands are:

- AT+CMGF--- this syntax is used for selecting the message format.
- AT+CMGR=<index> --- this syntax is used for reading the message.
- AT+CMGS= <length> <CR> ---It is used for sending the message in text mode.

In text Mode, SMS can be sent by the following steps:

1. Initially select the message format by using this command AT+CMGF.
 - If this command is equal to one i.e., AT+CMGF=1 then it will select the text mode otherwise PDU mode can be selected.
2. We can enter the destination address for sending the message.
 - AT+CMGS="cell phone number"--- By using this syntax we can write the mobile number.
3. If we write this ">" in AT commands, it will be displayed on the screen.
4. Write the message for sending through the SMS.
5. After writing the message, write the command as "ctrl+Z" for sending the SMS, "OK" will be displayed if the message delivered successfully.

Algorithm:

Flow chart of the projects shows that,

Step 1: Starting with initializing the Intel Galileo, accelerometer and all the other modules (GSM). After that task initialization is started.

Step 2: Accelerometer data conversion begins and the values are read by Intel Galileo.

Step 3: If Accelerometer exceeds the threshold limit then message is sent through GSM modem to the family member.

3. Results:

Battery used for the build is DC 5V. Integration of parts are shown in the Fig.4.1. GSM and Accelerometer modules are interfaced to the Intel Galileo.

The build shown below is examined by generating the threshold values forcibly. Alert messages are sent after generating and verifying the fall conditions.

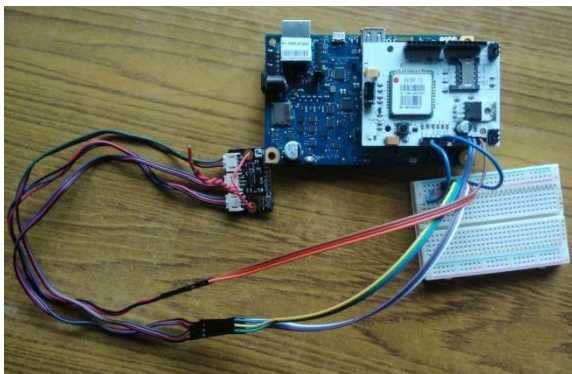


Figure 2. Connections of project.

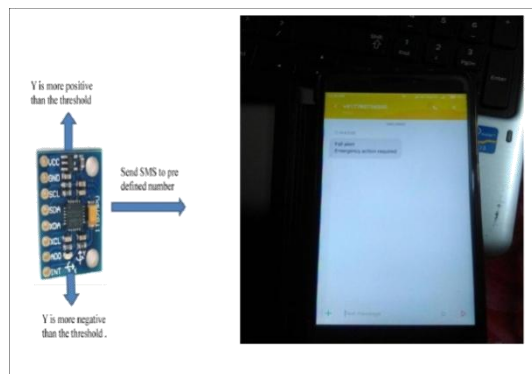


Figure 3. Message alert.

4. Conclusion

The project “IoT BASED TUMBLING DETECTION FOR AGED PEOPLE” was successfully designed and implemented. The accelerometer data is very useful for real time monitoring of body movement. We have originated a less expensive, low power consumption product for identifying the falling of elderly people and notifies the condition of elderly people to their family members to avoid dangerous falls. This system is built with Intel Galileo and an accelerometer MMA7361.

References

- [1]. Getting Started with Arduino by Massimo Banzi text book.
- [2]. Beginning Arduino by Michael McRoberts text book.
- [3]. Intel® Galileo and Intel® Galileo Gen 2: API features and Arduino projects for Linux programmers by Manoel Carlos Ramon text book.
- [4]. Mobile Cellular Telecommunications; Analog and Digital systems by William C.Y.Lee text book.
- [5]. <<<https://www.arduino.cc/en/Guide/HomePage>>>[online]
- [6]. SIM900_AT Command Manual_V1.03 (www.espruino.com/datasheets/SIM900_AT.pdf)
- [7]. eecs.oregonstate.edu/education/docs/accelerometer/MMA7361_module.pdf
- [8]. T.Ryan Burchfield, S.Venkatesan, <<Accelerometer-based human abnormal movement detection in wireless sensor networks,>> Proceedings of the 1st ACM SIGMOBILE International Workshop on systems and networking Support for healthcare and assisted living environments, HealthNet 2007.
- [9]. M.J.Mathie, B.G.Celler, Nigel Lovell, Adelle C F Coster, <<Classification of basic daily movements using a triaxial accelerometer>>2004.
- [10]. G.Kanmani Prince, R.Hemamalini, Y.I.Rajkumar, <<Lab VIEW based abnormal Muscular Movement and Fall Detection using MEMS Accelerometer during the occurrence of seizure,>>Indian Journal of science and technology,vol 7,2004.
- [11]. J.Lou, B.Zhong y,D.Lv,<<Fall monitoring devices for old people based on Tri-Axial Accelerometer,>> vol 6,2015.
- [12]. MMA7361 accelerometer<<http://wiki.eprolabs.com/index.php?title=MMA7361_Accelerometer>> [online]
- [13]. B.Banjanin, L.Zhang y, C.N.Wang,<<Fall Detection Monitoring,>>2013.