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FALL DETECTION AND ALERT SYSTEM USING IOT

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Abstract- The purpose of this project is to detect falls by using inertial sensors embedded in hearing instruments. Falls represent a major public health risk worldwide for elderly people. In that sense, the present work proposes an innovative IoT-based system for detecting falls of elderly people in indoor environments, which takes advantage of low-power wireless sensor networks, and smart devices.This alert can be manually operated as well in case of any other emergencies that do not trigger the fall detection.

Keywords: IoT, Arduino IDE.

I. INTRODUCTION

Falls represent a major public health riskworldwide for elderly people. A fall not assisted in time can cause functional impairment in an elder and a significant decrease in his mobility, independence, and life quality. Several technologies have been developed which utilize webcams to monitorthe activities of elder people. However, the cost of operation and installation is expensive and only applicable indoors. This method will restrict the user movement and produce high false alarms due to frequent swinging and movement of the device. For fall detection, an accelerometer and gyroscope were used to detect the acceleration and body tilt angle of the faller respectively. If a fall is detected, an alert is activated and the system reacts automatically by sending notifications to thegroups responsible for the care of thepeople.

II. OBJECTIVE OF PROJECT

To develop an intelligent and effective fall detection and alert system using Smart phones and wireless sensor nodes. To develop a reliable and cost-effective efficient fall detection and alert system. To develop a fall detection system that is user- friendly and without causing disturbance to activities of daily living of elderly people.

The system which we proposed is used to evaluate the accuracy of detecting falls by using inertial sensors embedded in hearing instruments. By coupling the accelerometer with the gyroscope, the accuracy of the system was improved due to reducing false positives and true negatives. an Alert systemin form of a short message service (SMS) was transmitted to the concerned authorities.

The fall detection method based on machinelearning is not a general solution, thus diverse methods were adopted the Accelerometer was a mainstream sensor used by the fall detection system in our proposed system. Since it can only get the velocity and acceleration of one part of the human body wearing devices, the thresholds-based method became the preferred method. The System which we proposed is used to evaluate the accuracy of detecting falls by using INERTIAL SENSORS embedded in hearing instruments.

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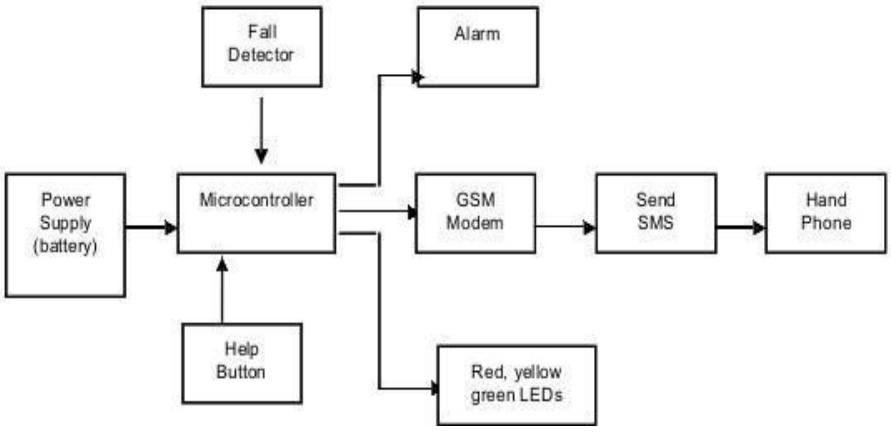

Fig 1: Overall concept of fall detection andalert system using IoT.

III. LITERATURE SURVEY

Falling is among the most damaging event elderly people may experience. With the ever-growing aging population, there is an urgent need for the development of fall detection systems. Thanks to the rapid development of sensor networks and the Internet of Things (IoT), human-computer interaction using sensor fusion has been regarded as an effective method to address the problem of fall detection. In this paper, we provide a literature survey of work conducted on elderly fall detection using sensor networks and IoT. Although there arevarious existing studies that focus on the falldetection with individual sensors, such aswearable ones and depth cameras, the performance of these systems is still not satisfying as they suffer mostly from high false alarms.

Literature shows that fusing the signals of different sensors could result in higheraccuracy and lower false alarms while improving the robustness of such systems. We approach this survey from different perspectives, including data collection, data transmission, sensor fusion, data analysis, security, and privacy. We also review the benchmark data sets available that have been used to quantify the performance of the proposed methods. The survey is meant to provide researchers in the field of elderlyfall detection using sensor networks with a summary of progress achieved up to dateand to identify areas where further effort would be beneficial.

IV. ALGORITHM

Fall detection algorithm:-

The total sum acceleration vector Acc,which contains both dynamic and static acceleration Components, is calculated fromsampled data as indicated in Eq. (1)

Acc= (Ax)2 + (Ay)2 + (Az)2

Where Ax, Ay, Az is the acceleration in the x, y, z axes, respectively.

Similarly to the acceleration, the angular velocity is calculated from sampled data as indicated in Eq. (2)

w = (Wx)2 + (Wy)2 + (Wz)2

Where Wx, Wy, Wz the acceleration in the x, y, z axes, respectively.

When stationary, the accelerationmagnitude, Acc, from the tri-axial accelerometer is constant, and angular velocity is 0o/s. When the subject falls, the acceleration is rapidly changing and the angular velocity produces a variety of signals along the fall direction Since the FallIndex (Acc) requires high sampling frequency and fast acceleration changes, it will miss falls that happen slowly.

Hence, Acc is not used unless we want to compare the performances of our systems with previous studies that have used the same positions but with different speeds and accelerations. The lower and upper fall thresholds for the acceleration and angular velocity are calculated.

V. APPLICATION

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, can store data, visualize it, and do many other cool things. There are three major components in the platform:

Blynk App - allows to you create amazing interfaces for your projects using various widgets we provide.

Blynk Server - responsible for all the communications between the Smartphone and hardware.

Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the

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incoming and outcoming commands.

Features:
Similar API & UI for all supported hardware& devices. Connection to the cloud using: WiFi
Bluetooth and Ethernet USB (Serial)GSM Set of easy-to-use Widgets Direct pin manipulation with nocode writing.

Easy to integrate and add new functionalityusing virtual pins History data monitoringvia Super Chart widget. Device-to-Device communication using Bridge Widget Sending emailstweets push notifications, etc.

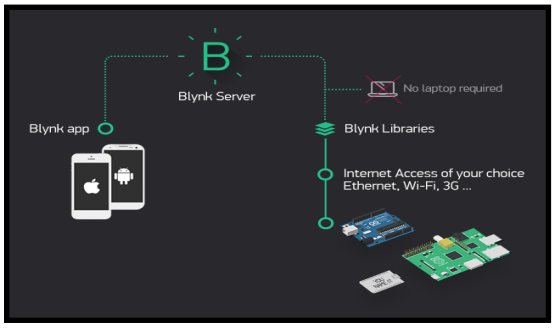

FIG: BLINK APPLICATION

Analyzing the severe consequences of persons falling and the current market to counter this problem, we came up with the plan of introducing an Arduino-based kinematic method.
The MPU6050 sensor module is a complete 6-axis (3-axis Accelerometer and 3-axisGyroscope) Module. It is Micro-Electro- Mechanical Systems (MEMS) that velocity, orientation, displacement, and other motion- related parameters.
A fall occurred and is found to be lying down on the ground, and a notification is sent via BLYNK Application on the caretaker's mobile.

VI IMPLEMENTATION RESULT

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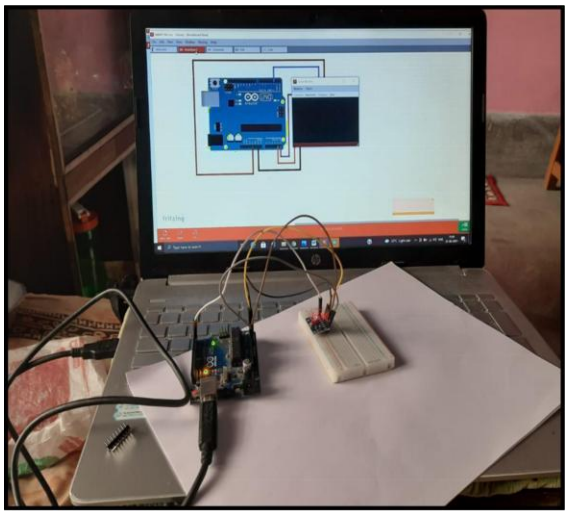
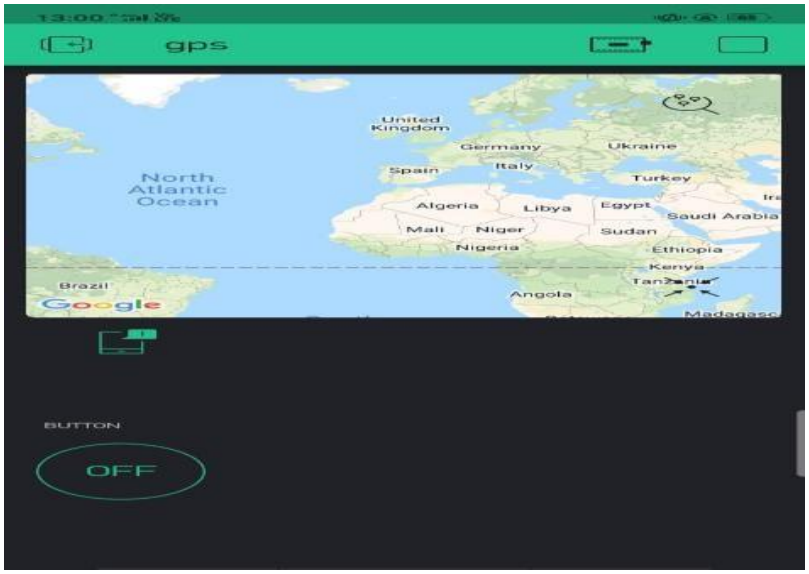
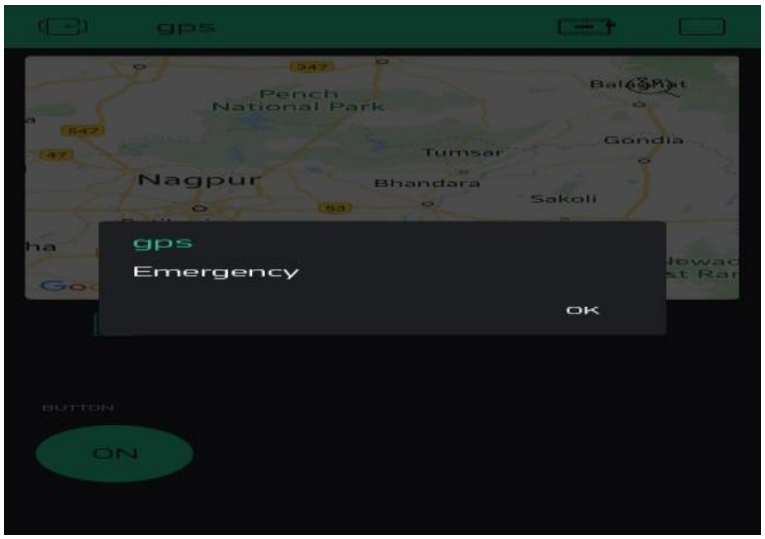


INTERFACE





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VII CONCLUSION

It was observed that once the help button was pressed or the accelerometer was manipulated to cause the microcontroller to detect voltage variation beyond the acceptable limits, the system was activated. One could see the flashlight is activated together with the sounding of the buzzer and lastly, the predefined SMS text message was also received on the mobile phone. The future enhancement of this project was we can introduce an SMS notification during fall occurrence time and provide authentication for the device to maintain security and One could be able to hear the relay switching.

VIII REFERENCES

1. M. Tinetti and M. Speechley, "Prevention of falls among the elderly," N Engl J Med, vol. 320, no. 16, pp. 1055-1059, 1989
2. C. E. Coogler, "Falls and imbalance,"Rehab Management, pp. 53, April/May 1992.
3. K. M. Pocinki, "Studies aim at reducing the risk of falls," P. T. Bulletin, pp.13-02-90 KEYWORDS: IoT, Arduino IDE