

A Survey on Smart Devices for Object And Fall Detection

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Abstract - — *Elderly falls nearly often lead to serious health problems and a loss of physical fitness. We have additional alternatives for protecting the elderly as technology progresses. The design of a wearable alerting device is possible because of the usage of low-power components. Sensors have simplified the design and deployment of sensor systems. It is easier to locate the elderly using the Global Positioning System (GPS). If the person falls, we're building a fall detector with sensors and a microcontroller that will send an SMS with his/her location to concerned people so they can seek aid immediately. We're working on an object detector that can alert users about obstructions when their eyesight deteriorates with age, and it can also be used by blind people.*

Key Words: Smart Glasses, Ultrasonic Sensors, Blind People, Object detection, Accelerometer, Gyroscope

1.INTRODUCTION

One of the most dangerous things that can happen to an elderly person is falling. With the growing elderly population, there is a pressing demand for fall detection systems, which is why we are introducing a low-cost fall detector that can not only provide a fall warning but also the location of the fall. We've included obstacle detection in our research since we feel that prevention is always preferable to cure. Smart glasses are an example of this. This gadget consists of a pair of glasses with an obstacle detection module in the center, a processing unit, and an output device. A pair of smart ultrasonic glasses for blind people consists of a pair of wearable glasses, ultrasonic sensors for detecting obstacles in the blind man's path, a buzzer to emit sound in the direction of the obstacle from the man, a central processing unit consisting of Arduino Nano that takes the information from the sensor about the obstacle distance and processes it according to the coding done and sends the output through the buzzer, and power supply is provided. The sensor is sandwiched between the optical glasses' top bar and bridge. Single strand copper wires connect all of the components to the central unit, which is powered by a USB connection. Because ultrasound has a strong point, the energy consumption of a slow wave traveling in the medium over a reasonably long distance, ultrasonic sensors will be the best sensors to use. As a result, it's widely used to calculate long-

distance distances. At the same time, ultrasound offers a wide range of applications for objects in the dark, dust, smoke, electromagnetic interference, toxic, and other difficult environments. The ultrasonic sensor is perpendicularly connected to the spectacles. The distance transmitted by the sensors to the central unit decreases as the blind man approaches the impediment. Many navigation gadgets now feature seeing-eye guide dogs, which can see to some extent despite the fact that the voyage is intended to ensure the blind's safety. However, there are a few difficulties to be addressed: Training a guide dog is more difficult, and it typically takes 3-6 months; however, training a skilled guide dog takes approximately two years; additionally, with dog daily life consumer spending, the cost can easily reach a million rupees and guide dogs have a limited life cycle. According to the specifications, ultrasonic glasses are reasonably inexpensive, resulting in a gadget that is accessible to all. These smart glasses are easy to understand and utilize. After using it for 2-3 times, a blind person will grasp how it works and would be able to manage it with ease.

2.PROPOSED PROTOCOL

When a fall is detected, an alert is triggered, and the system reacts quickly by sending a warning and location to the person in charge of the elderly person's care. The MPU6050 sensor module has a gyroscope and an accelerometer sensor. The accelerometer provides angle information such as X, Y, and Z-axis data, while the gyroscope determines the direction. To detect a fall, the amount of the acceleration will be compared to the threshold value. If the device detects a fall, it sends an email and a notification to the person concerned. A Node MCU ESP8266 is used as a microcontroller and Wi-Fi module to give a notice with the IoT App. The obstacle detection module and the processing unit are connected. The gyroscope calculates direction, while the accelerometer provides angle data on the X, Y, and Z axes. The obstacle detection module and output device are connected to the processing unit. Obstacle detection is handled by an ultrasonic sensor, processing is handled by a control module, and output is handled by a buzzer. The ultrasonic sensors are activated by the control unit, which collects data about the barrier. When a sensor detects an object from a distance, it emits a sound and warns the user if it is within 30 cm.

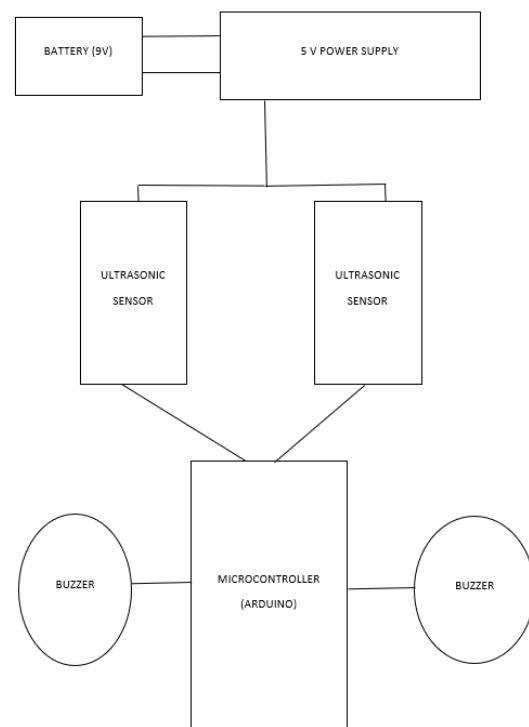
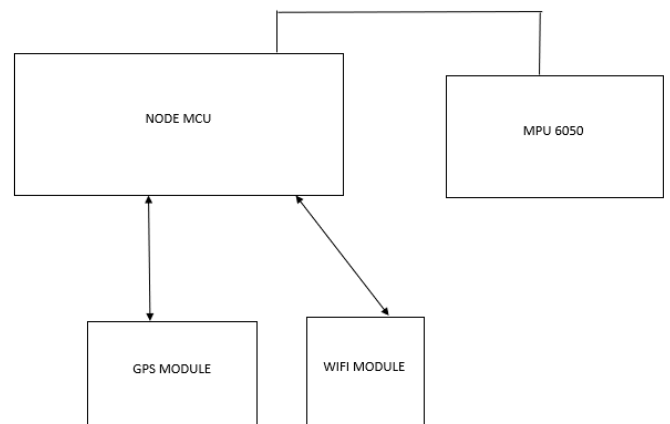
3.THEORY

Because such fall-detecting IoT devices are now highly expensive on the market, we wanted to make it at least affordable for the elderly. When both the software code and the hardware are complete. To test the project, hold the MPU6050 in your palm and walk gently before dropping it. The device triggers the fall detector event and sends a message to the App as well as an email to the specified email address if the magnitude exceeds the threshold value. A gyroscope and an accelerometer sensor are included within the MPU6050 sensor module. The accelerometer provides information about the angle, such as X, Y, and Z-axis data, while the gyroscope determines the orientation. The magnitude of the acceleration will be compared to the threshold value to detect the fall. To deliver a notification with the IoT App, a NodeMCU ESP8266 is utilized as a microcontroller and Wi-Fi module. We've included a GPS module into our fall detection system so that we can track down the person who has fallen. We've set up an application to communicate via the GSM protocol. In this section, we'll show a map of the location as well as five value displays that show the latitude, longitude, speed, direction, and number of satellites. As soon as the device is turned on, it uses the GPS module to determine its location and then sends it to the server through GSM, where it is received and shown on the application.

The Ultrasonic sensor is used in "Smart Glasses" to measure the distance between an object and the person wearing the glasses. The spacing should be between 30 and 150 centimeters. The device we created consists of sensors that detect barriers in the surrounding area and provide feedback to the blind person about their whereabouts. The idea is to sense the object without any effort.

We propose a system for visually challenged people that consists of smart eyewear. The user's spectacles will be fitted with hardware. When the user wears the glasses and travels somewhere, the hardware's sensors will detect obstructions. A buzzer will also be utilized to warn the user that the obstacle is approaching. With smart glass, blind people will no longer be reliant on others for mobility.

3.1 BLOCK DIAGRAM:

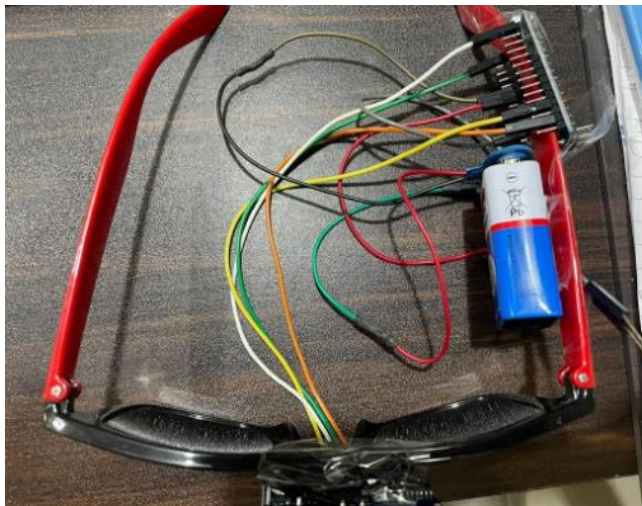


3.2 BLOCK DIAGRAM DESCRIPTION:

The block diagram depicts the ultrasonic sensor, Arduino Nano, buzzer, and power supply. An Ultrasonic Sensor is linked to the Arduino, and when the sensor detects anything, it transmits a signal to the Arduino. The Ultrasonic sensor emits high frequency sound waves at regular time intervals as the velocity of sound in the air changes. The waves are reflected back to the receiver when they strike an object. Waves with a frequency of roughly 40 kHz and a range of up to 2 meters are emitted by the sensor.

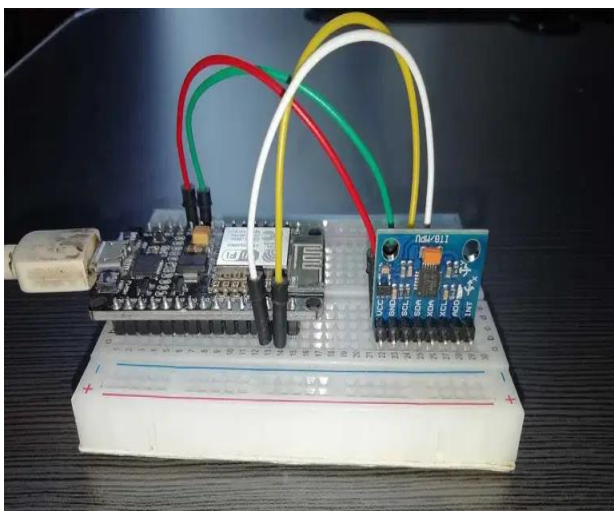
In the fall detection system, the MPU6050 sensor module has a built-in gyroscope and an accelerometer sensor. NodeMCU is used as a microcontroller. An ESP8266 is a Wifi module which is built-in to the NodeMCU and being used for transmission of data via radio waves. These waves send output to mobile app and notification is sent to the concerned person.

4.RESULTS:

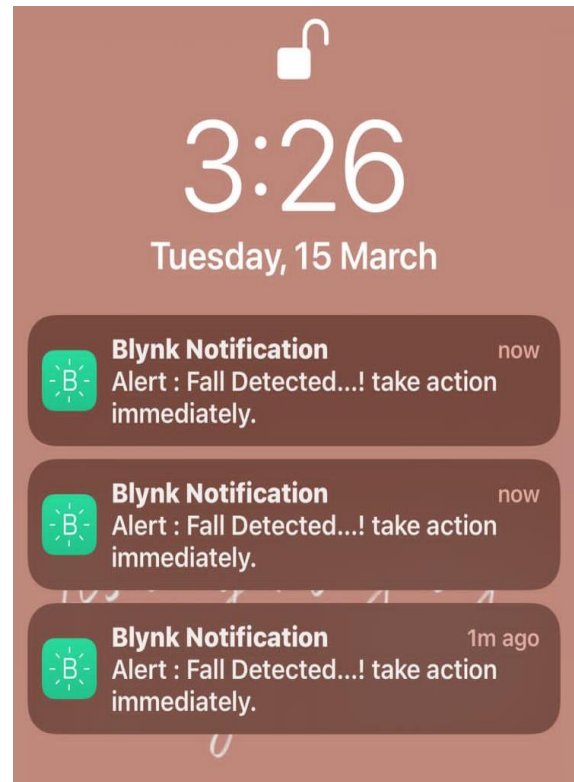


ULTRASONIC SMART GLASSES

This is an object detecting system model that was demonstrated using smart glasses. For object detection, an ultrasonic sensor is affixed to the spectacles. A 9-volt battery is used to provide electricity. The switch is used to turn the system on and off. When an object is detected, a buzzer is an output device that generates a sound. The model performs admirably.



FALL DETECTION SYSTEM



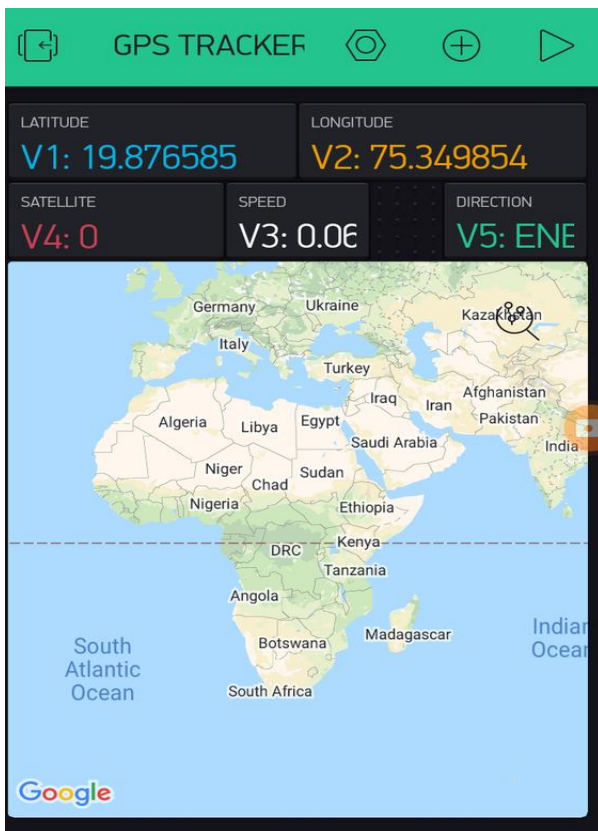
SCREENSHOT OF FALL DETECTION

This is a screenshot of the fall detection system's output. When the person wearing this device falls, the system will send a notification to the phone of the concerned person.

GPS LOCATION TRACKER

We've set up an application to communicate via the GSM protocol. In this section, the screenshot added below shows a map of the location as well as five value displays the latitude, longitude, speed, direction, and number of satellites. As soon as the device is turned on, it uses the GPS module to determine its location and then sends it to the server through GSM, where it is received and shown on the application.





4. CONCLUSIONS

The fall detector will detect a person's fall and notify the concerned person/doctor, as well as send the location. It can also be used to detect falls of fragile products in industries like glassware to prevent damage. Smart glasses can identify barriers in front of them and alert the user, minimizing crashes and lowering injuries as people's eyesight deteriorates with age. It can also be used by visually impaired people.

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