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DESIGN AND DEVELOPMENT OF WEARABLE SMART AIRBAG WITH PROTECTION AND NOTIFICATION SYSTEM

Kalyani A[1], Riswanth S[2], Vishnu M K[3], Nazeeha M S[4], Pavithrashree K[5]
[1]*Associate Professor, Biomedical Engineering, Velalar College of Engineering and Technology, Erode, Tamilnadu*
[2,3,4,5]*UG - Biomedical Engineering, Velalar College of Engineering and Technology, Erode, Tamilnadu*
Orcid id: https://orcid.org/0000-0002-0945-7184

ABSTRACT
This design introduces a mobile airbag system designed for fall protection for people from bike accidents. the development of an integrated sensing system for the airbag deployment decision in an intelligent jacket. A number of sensing systems have been developed and fused their opinions to give an airbag deployment decision. The performance of the prototype system is estimated through several test runs. The results proved that the airbag deployment decision is robust and intelligent and can be retrofitted into vest/jacket with built-in airbag control. This unit consists of three-dimensional MEMS accelerometers, a vibration detector, GSM, a GPS announcement IoT module, and a Micro Controller Unit (MCU). It records mortal information through the analysis of fall discovery. It also have a notification system to alert the users caretakers or family members.
Keywords—mobile airbag, sensing system, notification system

1. Introduction

Fall is the most significant cause of injury for seniors and vehicle accident . These cascades are because of numerous disabling fractures that could ultimately go in front to death due to complications. Outstanding seniors (over 75 times old) have fallen at least formerly a time, and 24 percent have severe injuries. This is a serious public health problem with a substantial impact on health and healthcare costs. Among people affected by Alzheimer's complaints, the probability of a fall increases thrice. Caretaking of those persons can be bettered by using detectors that cover the vital signs and conditioning of cases and ever communicate this information to their caregivers. The consequences of a fall can vary from scrapes to fractures and in some cases lead to death. Indeed if there are no immediate consequences, the long stay on the bottom for help increases the probability of death from the accident. For this reason, fall discovery is an active area of exploration. In recent times, unresistant monitoring results have entered into health monitoring systems in homes, supported living surroundings, and nursing homes. In times of emergency, they respond quickly. Themajority of research on cascades that use accelerometers focuses on figuring out how muchacceleration changes. When the acceleration value exceeds a critical threshold, the fall is detected. The use of wearable and active detectors provides better monitoring capability. A donation is made towards similar standardization by collecting the most applicable parameters, data filtering ways, and testing approaches from the studies done so far. State-of-the-art fall discovery ways were surveyed, pressing the differences in their effectiveness at fall discovery. A standard database structure was created for the fall study that emphasizes the most important rudiments of a fall discovery system that must be considered for designing a robust system, as well as addressing the constraints and challenges. In addition, fall exertion stroke- terns are particularly delicate to gain for training systems.These systems successfully detect falls with perceptivity. still, fastening only on large acceleration can affect numerous false cons from falls suchlike conditioning similar to aiding down snappily andrunning. likewise, former studies used complex algorithms like support vector machine(SVM) and the Markov modelto detect the fall. still, the delicacy of these systems has not been proven to be largely effective. They also consume an excessive amount of processing resources and are unable toprovide real-time

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responses. In this paper, we propose a new bias grounded on MEMS accelerometersand gyroscope chips. When a fall is detected, the microcontroller sends a signal to a motor connectedto the affectation cartridge. A motor opens the cartridge and inflates the airbag before it hits the ground. When a fall is detected, the ESP32 microcontroller uses GSM and GPS modules to shoot a warning communication to the caregiver containing the stoner's position and vital signs.

2. EXPERIMENTAL METHODS OR METHODOLOGY

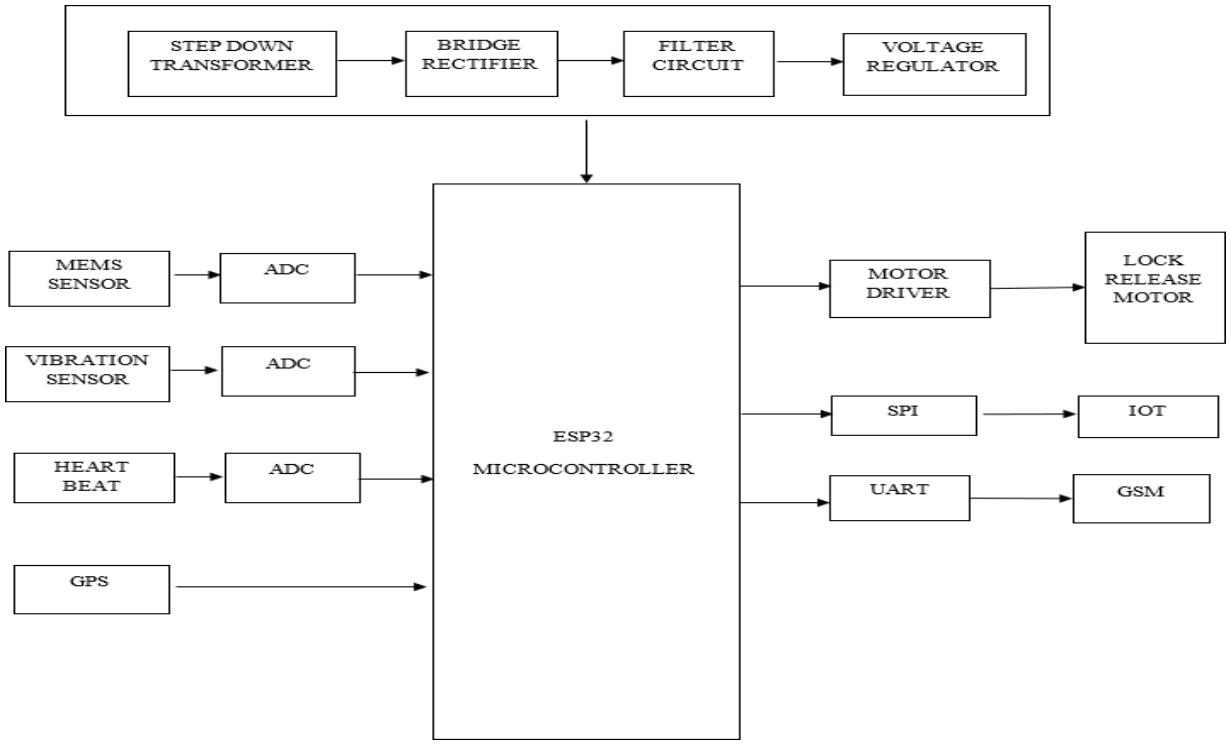
Hardware Requirements:

- ESP32 MICROCONTROLLER
- VIBRATION SENSOR
- MEMS SENSOR
- HEARTBEAT SENSOR
- ADC
- MOTOR DRIVER
- GEAR MOTOR
- GSM
- GPS
- UART (Universal Asynchronous Receiver/Transmitter)
- SPI (Serial Peripheral Interface)
- POWER SUPPLY UNIT

software requirements

- ESP COMPILER
- EMBEDDED C LANGUAGE
- HTML BASIS

block diagram



BLOCK DIAGRAM

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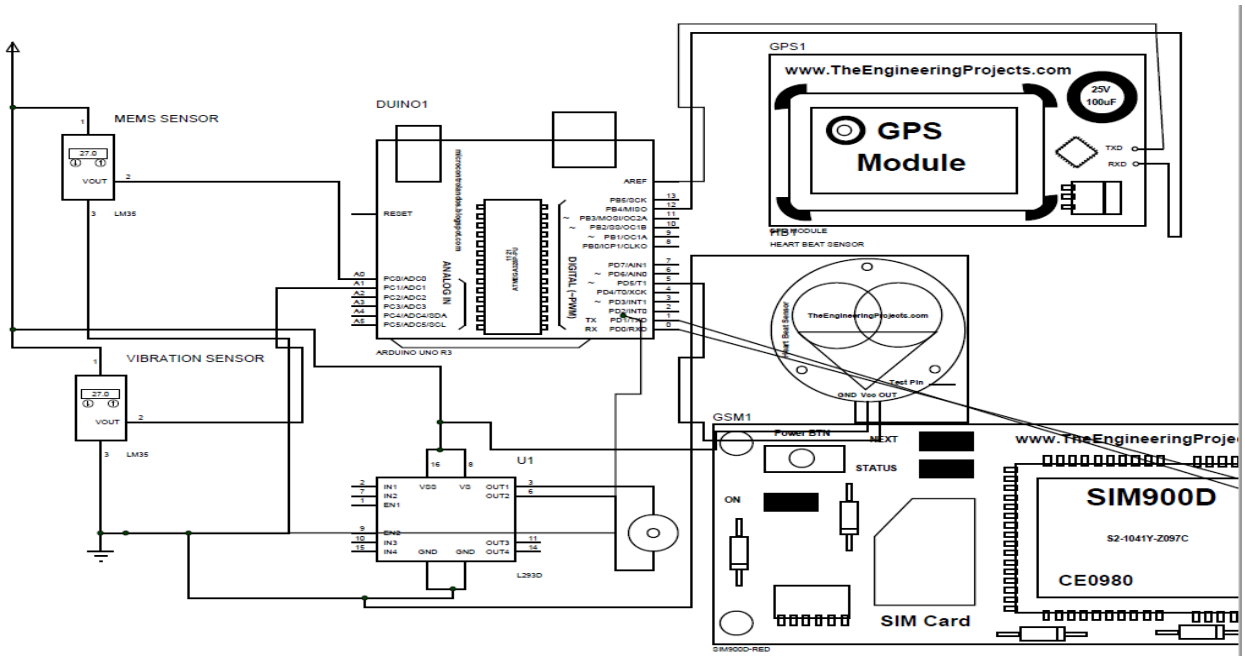
Step 1:-After wearing the vest the MEMS sensor, GPS and GSM module and the vibration sensor will remain active the whole time
Step 2:-When the MEMS sensor detects the value dropping less than 45 degrees with respect to the vest and ground and when a collision is detected by the vibration sensor they send a positive signal to the microcontroller
Step 3:-When the above-mentioned criteria occur the microcontroller will turn the motor driver which will in turn release the lock
Step 4:-After the lock is released the airbag will inflate to protect the user from impact and fall injuries
Step 5:-when the fall or collision is detected the microcontroller will send an SMS alert to the user's caretakers through the GSM module and also through IOT.

circuit diagram



CIRCUIT DIAGRAM

The below figure shows the circuit illustration of the Airbag system. This system is grounded upon GPS and GSM Technology in order to compensate for the being health system, to descry the early fall using the data acquired from the people and specifically designed to give better services and cover cases of injury. With the nonstop advancement of MEMS fabrication technology, inertial detectors like 3-axis accelerometers and 3- axis gyroscopes, which gets descry the change in speed and fete falling, also triggers the airbag circuit. To keep the moment of the case complete with detectors in the body, the wireless detectors are needed to be minimized and wearable. These detectors are twinkle detectors and vibration detectors which are introductory conditions of cases while falling. The vibration detector used then's SW- 420 which is a perfection-integrated device. For controlling action ESP32 microcontroller is used. It's a 32-bit microcontroller with an inbuilt memory of 520KB of SRAM and 3 periodical anchorages generally used with microcontrollers for programming. Whenever the accident occurs by using the GPS, it'll be suitable to get a particular position where the accident occurs, also GSM sends the communication to authorized family members.

3. Results and Discussion

In this design, a simple medium regarding the forestallment of physical damage to the upper body corridor of a bike rider in case he or she faces an accident has been demonstrated. In this medium, a vest bedded with defensive airbags which are equipped with vibration and gyroscopedetectors is used. These vibration detectors on passing a particular shockwave lesser than a certain threshold give a

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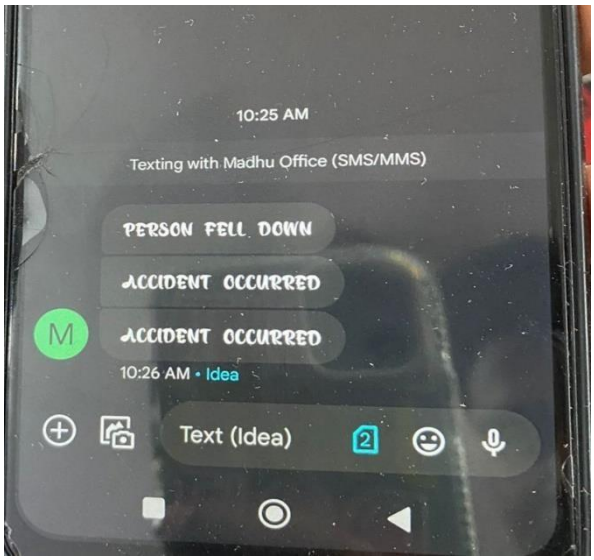
positive signal to the Arduino that the accident has passed and it needs to inflate the airbags. On entering the signal, Arduino turns the motor incontinently to which a cinch is attached. Within many nanoseconds, the cinch, attached to the inflator fully detached therefore puncturing it and the airbags get inflated with the incoming CO2 that was preliminarilycompressed in the tube. Now, on activation of the medium, the GPS GPRS GSM module sendsan SMS to the registered cell phone(perhaps the number of a family member or caretaker) mentioning the location of the accident. likewise, The Heart rate detectors for descry any abnormal heart rate of the victim. The Arduino prints the corresponding result in an IOT alert, thereby giving the medical platoon an idea about his vital parameters and about his condition.



In the future, we will integrate an ultrasonic detector into the system to increase fall discovery delicacy and enhance sequestration and data security by combining blockchain technologies with the system to save data relating to senior persons. also, we will also try to incorporate bottom airbags with PIR detectors operated using IoT bias for dependable and effective servicesso protection from injuries as a result of the cascade is controlled. before experimenters used wearable airbags, and they demanded the capability to cover the entire body. also, having to wear airbags at all times seems bothersome for the senior who may formerly have declined health. So, in the future, we will try to integrate bottom airbags with the PIR detectors. When the senior person falls, the detector perceives the senior person's fall stir and starts the motor to fill the airbag. So, when the senior person falls, the airbag will blow up, and the senior personwill fall on it, and, this way, we will help people from falling injuries.

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CONCLUSION

This paper proposed a detector-grounded fall discovery scheme. The system detects cascade using MEMS detectors and vibration detectors which are mounted on the vest. We considered physiological cascade, lower-position falls, falls on a single position, and swing falls, enhancing thecase's falling delicacy and saving the case's life. Jackets and vests are the most loved fashion thing by everyone. So on with its swish features, adding some further safety outfits will make it a good safety option for a commuter. This system will help bikers to cover themselves during any exigencyconditions.

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