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IoT BASED ACCIDENT LOCATION SHARING SMART HELMET

Ishas Ahamed Akbar Ali
Electrical and Electronics Engineering
NPR College of Engineering and Technology
(Autonomous)
Madurai, India
ishasahamed90@gmail.com

Jeyaram Murugan
Electrical and Electronics Engineering
NPR College of Engineering and Technology
(Autonomous)
Madurai, India
ramanjeya19@gmail.com

Mohammed Ashik Sulaiman
Electrical and Electronics Engineering
NPR College of Engineering and Technology
(Autonomous)
Madurai, India
ashikmohd7010341674@gmail.com

Saravanamuthu Kannan
Electrical and Electronics Engineering
NPR College of Engineering and Technology
(Autonomous)
Madurai, India
muthusaravana49@gmail.com

DR.S.Sathyamoorthi
Assistant Professor
Electrical and Electronics Engineering
NPR College of Engineering and Technology
(Autonomous)
sathyamoorthi@nprcolleges.org

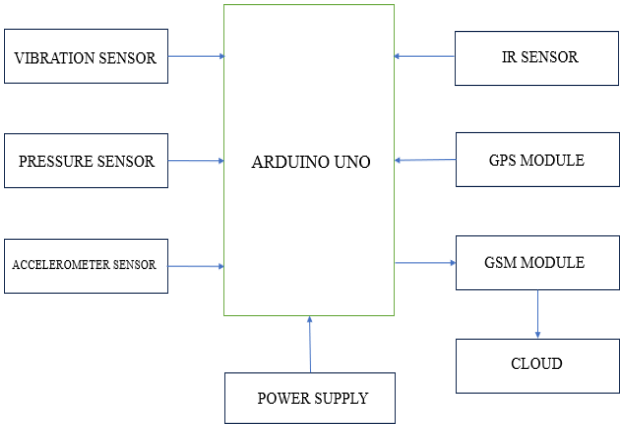
***Abstract*— This paper introduces a new method for sharing accident locations using a smart helmet equipped with various sensors: vibration, pressure, GPS (Global Positioning System), GSM (Global System for Mobile Communication), and accelerometer. These sensors work together to detect and evaluate accident severity in real-time. The vibration sensor detects impact forces, the pressure sensor identifies altitude changes crucial for hilly terrain accidents, and the GPS provides accurate location data. The GSM module sends distress signals to predefined contacts and authorities, while the accelerometer monitors head movements to differentiate regular motions from impacts. Upon accident detection, the helmet automatically sends an SOS (Save Our Souls) signal with precise coordinates to emergency responders, aiming to reduce response times and potentially save lives. This system promises to enhance road safety and emergency response mechanisms significantly.**

***Keywords*— Smart Helmet, Internet of Things, Sensors, Real-Time Crash Detection, Emergency Notification, GPS Module, GSM Module.**

will never ignore or forget to wear the helmet and upholds his safety in a very easy and comfortable way. We explore its design, implementation, and transformative potential in our presentation.

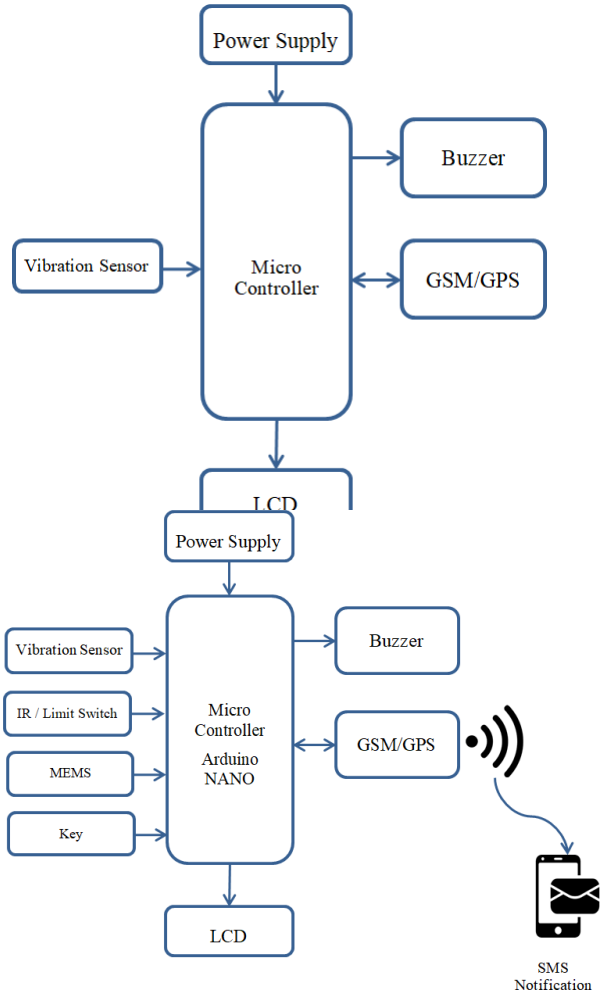
II. METHODOLOGY

The diagram presents the proposed approach, incorporating a variety of sensors installed on the helmet. The central processing unit responsible for the system's operation is an Arduino microcontroller, specifically the ATmega328P microcontroller. To ensure rider safety, the system integrates a vibration sensor connected to an Arduino Uno. This sensor measures the helmet's vibration content and transmits the data to the microcontroller.



I. INTRODUCTION

Our presentation unveils the IoT-based Accident Location Sharing Smart Helmet, a cutting-edge solution integrating sensors and communication modules for real-time accident detection and location sharing. Most of the accidents occurring cause severe deaths due to rash driving, not using safety measures. Many people don't realize that wearing a helmet reduces the risk of a severe brain injury or even death (in some cases). During a fall or collision, most of the impact energy is absorbed by the helmet rather than your head and brain. People are charged when they don't put on their helmets, yet they completely ignore the significance of it and cost their life for it. We've found a way to make helmets compulsory who is riding a bike. An easy, cost-efficient, comfortable way where the rider's safety is given utmost priority. GPS, GSM module and Accelerometer are also



installed in the helmet which helps us know when a sudden accident occurs (by monitoring accelerometer) and sends the location to our family. A tracking system is enabled and can be monitored (if required) if the person is being followed by an unknown person or any such risks. In this way, the person

III. EXISTING SYSTEM

Many different technologies were used to control the vehicle when the vehicle collision is occurred. Using only the vibration sensor to detect the vehicle accident. Includes GPS and GSM modules to determine the position of the vehicle and to deliver the information to the owner.

When an accident occurs, individuals involved, or witnesses typically report the incident to emergency services or authorities through phone calls or in-person visits to police stations or emergency response centers.

Existing Block Diagram

IV. PROPOSED SYSTEM

The proposed system internally comprises Alert system and accident prevention Microcontroller ESP32.Despite the advances made in MEMS, vibration monitoring and analysis equipment, The selection of sensors and the way they are mounted on a machine remain critical factors in determining the success of any monitoring program. Also, if the vehicle the faces less damages driver can restrict to send the message notification. If any more damages the message can send automatically.

Proposed Block Diagram

A. Sensor Integration**:** Smart helmets are equipped with a range of sensors, including accelerometers, vibration, GPS modules, and possibly additional sensors like pressure sensors or heart rate monitors.

B. Accident Detection: The sensors embedded in the smart helmet detect abnormal movements, sudden impacts, or changes in speed and orientation, which may indicate an accident or collision. Algorithms are used to analyze sensor data and distinguish between normal activities and potential accidents.

C. Emergency Response: GPS coordinates provide accurate location information, facilitating quick response times and efficient deployment of emergency services.

HARDWARES

Arduino NANO:

- Arduino is an open-source platform for prototyping based on user-friendly software.
- It provides a flexible base for engineers to experiment on designing interactive environments.
- Its main components are,
  - 14 digital input/output pins (6 can be used as PWM outputs)
  - 6 analog inputs (can also be used for digital I/O - so a total of 20 digital I/O's)
  - 16 MHz crystal oscillator
  - USB connection
  - reset button.

Accelerometer:

- The MPU-6050™ parts are the world's first Motion Tracking devices designed for the low power, low cost, and high-performance requirements of wearable sensors.
- MPU6050 sensor module is complete 6-axis Motion Tracking Device.
- It combines 3-axis Gyroscope, 3-axis Accelerometer and Digital Motion Processor all in small package.
- Also, it has additional feature of on-chip Temperature sensor.
- It has I2C bus interface to communicate with the microcontrollers.

Vibration Sensor**:**

- A vibration sensor is a device that measures the amount and frequency of vibration in each system, machine, or piece of equipment.
- Those measurements can be used to detect imbalances or other issues in the asset and predict future breakdowns.
- Here Vibration sensor module detects the vibration of vehicle and sends a signal to ESP32.

LCD Display (16X2):

- This is a white on green display having 16 characters and 2 rows with high brightness backlight.
- 16 x 2 LCD is ready to use with micro-controllers as a digital input.
- LCD used to display the prototype sensors data display, and any data that requires a simple display.

Buzzer:

The buzzer in this circuit is used when microcontroller provides high signal, i.e. when a fall is greater, the circuit will be completed, and the buzzer will start alarming.

Power Supply:

- The power supply module was required to supply regulated 5V dc to the circuit while plugged to the mains.
- The components include Step down transformer, Voltage regulator, Capacitors and Diodes.

ADVANTAGES

1. The proposed system is practical and easy to use.
2. All signals are measured by efficient and more accurate.
3. Efficient in vehicle tracking system.

V. Results And Discussions

The hardware connection depicted in Figure 3 aligns with the setup described for the proposed system. The project effectively combines various components and technologies to enhance rider safety and encourage responsible behavior. At the core of the system is the Arduino microcontroller, which acts as the central processing unit overseeing its operation. To promote safe riding practices, an infrared (IR) proximity sensor verifies if the rider is wearing a helmet. During a fall, a gyroscope detects accidents, triggering an immediate response. If a crash is detected, the system retrieves data from the GPS module and utilizes the GSM module to send SMS notifications to authorities and designated family members, providing them with the precise location. This swift communication facilitates prompt assistance during emergencies. In case of an accident, the system promptly alerts authorities and designated individuals, facilitating rapid assistance and potentially saving lives.

VI. Conclusion

The proposed system is developed to provide the information about the accident occur and the location of the accident. It helps to easily provide the assistant and help to the victim of the accident. This system uses GPS module to locate the vehicle. GSM is used to provide the information of accident. The results of the proposed systems are satisfactory. Based on the gathered results and information from the related literature and studies, the researchers formed the following conclusion. The Smart Helmet is a viable tool or device that can be used to help motorcycle riders in times of emergency.

VII. REFERENCES

[1] Albert Alexe, R. Ezhilarasie, "Cloud Computing Based Vehicle Tracking Information Systems", ISSN: 2229 - 4333 (Print) | ISSN: 0976 - 8491 (Online) IJCST Vol. 2, Issue 1, March 2011

[2] H. D. Pham, M. Drieberg and C. C. Nguyen, "Development of vehicle tracking system using GPS and GSM modem," in IEEE Conference on Open Systems (ICOS), Kuching, 2013.

[3] Mashood Mukhtar, "GPS based Advanced Vehicle Tracking and Vehicle Control System", I.J. Intelligent Systems and Applications, 2015, 03, 1-12

[4] Ambade Shruti Dinkar and S.A Shaikh, Design and Implementation Of Vehicle Tracking System Using GPS, Journal of Information Engineering and Applications, ISSN 2224-5758, Vol 1, No.3, 2011.

[5] M. Ahmad Fuad and M. Drieberg, "Remote vehicle tracking system using GSM Modem and Google map," in IEEE Conference on Sustainable Utilization and Development in Engineering and Technology (CSUDET), Selangor, 2013.

[6] SMART HELMET Prof. K. Y. Rajput1, Gunprabh Chadha2, Brij Kanodia 3 and Vishal Lakhani. International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 02 | Feb-2016