Journal of Research Trends
OPEN ACCESS
ISSN: **APPLIED** | Volume-1 Issue-1,
Inaugural Edition July-December 2026
JRT-11-05 | DOI:

IoT-Based Smart Accident Detection and Monitoring System

Dr. V. PRAVEEN KUMAR, *Associate Professor, Dept of ECE,*
SREE CHAITANYA INSTITUTE OF TECHNOLOGICAL SCIENCES, KARIMNAGAR

ABSTRACT: The number of accidents killing people these days is very high. Consequently, our recommendation will provide the benchmark for optimal management of this circumstance. A vibration sensor and a micro electromechanical system (MEMS) sensor will interface with the server to notify any issues, as specified in the project. The Arduino Mega Controller can notify you of any issues using GPS and GSM technology. The victim's location is determined using data obtained from the GPS MODEM. The verification of the location enables the subsequent implementation of the necessary procedures.This paper can be utilized to monitor the victim's pulse rate and detect the gas in the vehicle.
Keywords: *Arduino Mega, GSM, GPS, Heartbeat sensor, Vibration sensor.*

I. INTRODUCTION

IoT stands for the Internet of Things, which is a network of physical things that are capable of talking with one another independently. The phrase "Internet of Things" is referred to by the abbreviation "IOT," and it is an important aspect of modern life. The term "Infrastructure of the Information Society" was given to it because of its ubiquitous applicability across a variety of platforms. These platforms include Raspberry Pi, smart water meters, home automation systems, and Internet of Things (IoT) home security models. It is possible for physical items to contain electrical components, such as sensors, networking devices, and Arduino software, in order to better enable the movement of data inside an Internet of Things system.

In contrast to the existing architecture of the Internet, which allows any device with an embedded circuit to interact with any other thing, the Internet of Things restricts communication to only specified items. Because of this, it is no longer necessary to have an active connection to the Internet. The Internet of Things (IoT) is rapidly becoming pervasive across all industries and domains, thereby considerably broadening its scope and increasing the likelihood that it will become the most cutting-edge technology by the year 2020. Because of the Internet of Things, manufacturers now have access to a wide variety of promising new opportunities.

According to one point of view, producers have a substantial amount of control over the ways in which their products are ultimately utilized. In contrast, customers are able to control and link their devices, which results in experiences that are more tailored to their specific needs. This article offers a technique for cleaning trash cans that makes use of the Internet of Things technologies. Due to the fact that accidents have a substantial impact on the decision to transfer to metropolitan locations, it is vital to implement monitoring systems that are capable of spotting scenarios like this. It is planned to make use of ultrasonic sensors in this setup.

The sensor, which is located in the front of the car, determines the distance between the vehicle and all of the nearby impediments. As soon as the engine of the vehicle detects a collision, it will

CC BY NC

immediately cut power to the vehicle. Because of this, we are unable to initiate any kind of action regarding it. Following this, an email with the data is sent from the server to the team that is conducting the inquiry.

Within the context of this particular event, the Internet of Things has the ability to save lives.The number of accidents that occur in metropolitan areas will decrease as a result of this strategy.There are certain circumstances in which it has the potential to save lives. The information that you provide should pertain to the group that is also claiming their exemption.

II. LITERATURE SURVEY

A warning will be issued by the motorist Drowsiness Monitoring and Controlling System if it identifies that the driver is fatigued. Exceedingly fatigued drivers contribute to an excessive amount of vehicular accidents. In addition to conserving time and resources, this technology will enhance individuals' quality of life by mitigating frequent accidents. An Arduino controller monitors both the ultrasonic distance to the object and the data from the vibration sensor. The Arduino acquires heart rate measurements from the pulse sensor. The service center obtains the driver's current location data using the GPS system. All of these specifications were juxtaposed with the regular data from the controller. An IoT signal is transmitted upon the detection of any discrepancies. The capacity for autonomous cessation is a further attribute of the vehicle. The principal function of an LCD is information display.

Driving under the influence has emerged as a predominant cause of automobile accidents in recent years. Statistics indicate that a significant proportion of vehicular accidents leading to fatalities or severe injuries are attributable to fatigued drivers. Extensive research has focused on the creation of systems capable of detecting motorist weariness and issuing timely warnings. The objective is to diminish incidents attributable to drowsy driving. Despite the efficacy of these therapies, there exists a significant risk linked with the application of electrodes on the head and body.

Utilizing subjective measures as input to a system is likewise atypical. Nonetheless, this may result in the driver becoming disoriented and precipitate unforeseen outcomes. This paper discusses an undetected real-time system. The eye closure ratio was utilized as an input parameter in our proposed methodology to evaluate the driver's fatigue level. When the eye closure ratio exceeds the permitted threshold, the driver is notified by an auditory alert. The device operates on a Raspberry Pi, which further captures footage of the driver's eyes. The paper's major purpose is to create and evaluate an automated system architecture to expedite the arrival of medical assistance after an accident. Systems for emergency medical assistance and accident detection can facilitate this objective. The proposed design incorporates a piezoelectric sensor, an accelerometer, and a global positioning system. The microcontroller determines the user's location after the GPS is on. Internet of Things devices can communicate with databases via a GSM/GPRS module. An Android application is created as a component of the enrollment process to collect essential health data, emergency contact information, and hospital details.

Unexpected traffic halts frequently contribute to vehicular collisions,

CC BY NC

particularly on highways with limited sight. Implementing stationary traffic sensors along roadways that communicate with drivers' smartphones via a 4G network typically resolves this issue. However, these items are not consistently stationed alongside roads and highways. This paper examines the feasibility of placing mobile traffic sensors in volunteer vehicles and private or public transit as an alternative solution to this issue. Specifically, we utilize an IoT Cloud system that monitors traffic and disseminates notifications through Open GTS and MongoDB. All individuals operating cars, including those responsible for essential emergency services such as ambulances, can significantly benefit from our IoT Cloud platform. Accidents are more probable when drivers are fatigued. This research establishes a dependable and intelligent way for identifying if a motorist is drowsy by merging yawn and eye closure detection techniques. This technique utilizes an in-car camera to capture the driver's visage. A recorded video sequence is initially employed to identify and track the face utilizing computer vision methodologies. Thereafter, the regions surrounding the eyes and mouth are meticulously examined for signs of driver fatigue.

III. SYSTEM ARCHITECTURE

Figure 2 illustrates the system designed for the detection and monitoring of incidents. This method is not only very simple to implement but also effective in detecting accidents. The memory and vibration sensor must be activated regardless of the occurrence of an accident. Depend on memories. Upon the car's rollover, the microcontroller promptly detects the signal. Data transmission to the server will be executed utilizing GPS and GSM. Furthermore, the appropriate police station or rescue squad will obtain the text message. The SMS message includes facts about the accident's location and the oxygen levels concerning the individual's condition within the vehicle.Messages can be scheduled for future dispatch, and data can be continuously monitored through a website.The centralized system monitors and documents data on the vehicles. In the event of an accident, the design's heartbeat sensor can be utilized to alert the rescue team. Our rescue team utilizes the website, which automatically updates the data, to ascertain the heartbeat range.

Upon ascertaining the distance between the vehicles, the ultrasonic sensor will autonomously decelerate one of them. The concentration of oxygen in the vehicle involved in the collision can be measured using a gas sensor. Subsequently, the website's oxygen level fluctuated. In the case of a minor collision without penetration to the vehicle's interior, the switch will be unable to connect with the hospital.

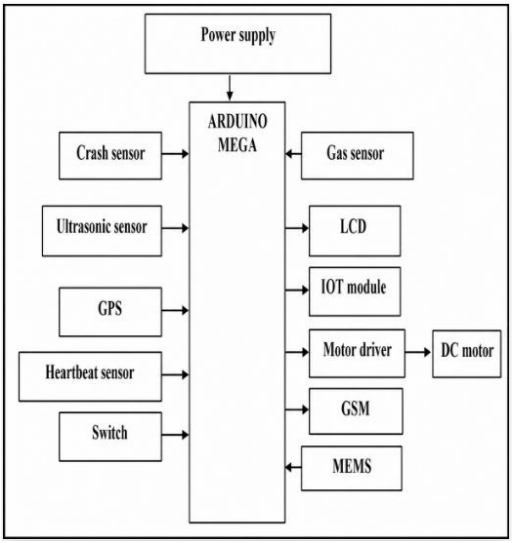


Fig-1 Architecture diagra

ARDUINO MEGA

The ATmega1280 microcontroller, as detailed in its datasheet, is an excellent

CC BY NC

selection based on the Arduino Mega platform. The device comprises 54 digital I/O pins, 14 of which serve as PWM outputs, 15 analog input pins, and a hardware serial interface featuring 4 UARTs. A crystal oscillator with a frequency of sixteen megahertz is also incorporated. As it is governed by microcontrollers, initiating its use requires merely connecting it to a USB port on a computer or utilizing a battery or an AC-to-DC adapter for operation. Mega Arduino boards with integrated communication functionalities are produced utilizing the Arduino Duemilanove, also referred to as Diecimila. As seen in Figure 2.



Fig.-2 Arduino Mega

GSM MODULE:

It stands for Global System for Mobile Communications. The GSM was created by the European Telecommunications Standards Institute.The protocols utilized by mobile phones in 2G digital cellular networks are illustrated in Figure 3.



Fig-3 GSM

HEART BEAT SENSOR:

The pulse sensor comprises a red LED and a photodetector. The LED must emit a high intensity of light to maximize transmission through the finger before detection occurs. Although it may not be readily apparent to the touch, the detector is now capable of identifying blood flow through the arteries induced by the heartbeat.

With each heartbeat, the detector signal is correspondingly modified. This version produces an electrical pulse. A logic level of +5 V is generated as an output signal subsequent to the amplification and triggering of this signal by an amplifier. The LED blinks with each heartbeat, indicating the pulse's activity. The number displayed is four.

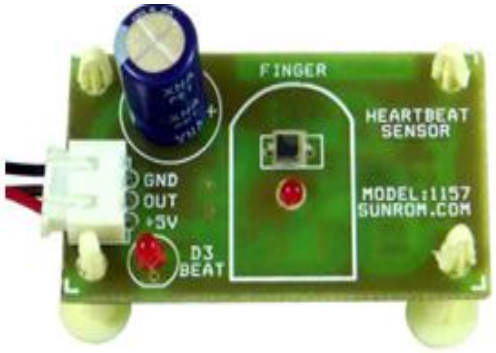


Fig-4 Heartbeat sensor

GPS MODULE:

A minimum of twenty-four satellites is required for a navigation system to be designated as the Global Positioning System (GPS). There are no installation or subscription costs, and the GPS system operates continuously, regardless of weather conditions. The observed number is five.

CC BY NC



Fig-5 GPS Module

GAS SENSOR:

A gas detector is employed to ascertain the quantity of gas in a specified area. A gas sensor can determine the concentration of a gas through interaction. The intensity of an electric field at a specific point in space can be defined as the breakdown voltage of a gas. The gas detector identifies voltages. Monitoring the apparatus's current discharge enables the determination of gas concentration.The number displayed is six.



Fig-6 WI-FI Modem

IV. FLOW CHART

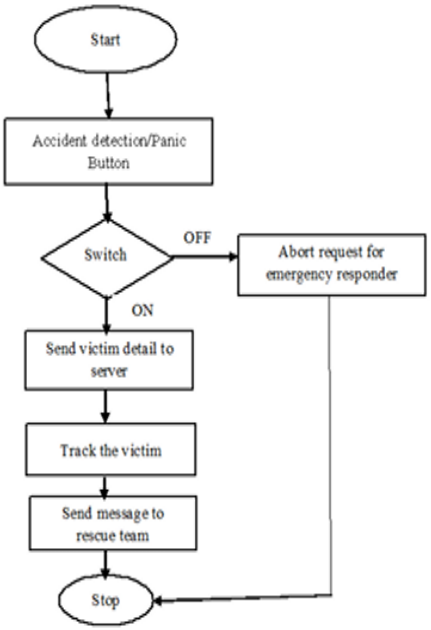


Fig-7 Schematic Flow Chart

V. CONCLUSION

The system's design provides benefits such as compactness, cost-effectiveness, and portability. By integrating its accelerometer, GPS, and GSM sensors, it reduces the likelihood of accidents.A series of enhancements have been implemented for devices capable of autonomously detecting accident scenarios. The duration required to locate the spot is diminished, enabling patients to receive treatment promptly, so preserving several lives. The primary objective of the accident system project is to diminish the number of fatalities resulting from these occurrences. The advancement of this technology has significantly facilitated responses to unforeseen incidents occurring at night or in remote locations. The significance of this process in our daily lives will increase.

REFERENCE

[1] Vikas Desai, “Design and Implementation of GSM and GPS

Based Vehicle Accident Detection System", IJIT, Vol 01, Issue 03,pp. 1-4,2013.

[2] C.Prabha, R.Sunitha, R.Anitha, "Automatic Vehicle Accident Detection and Messaging System Using GSM And GPS Modem", IJAREEIE, Vol. 3, Issue 7, pp. 1-5, 2014.

[3] Vikram Singh Kushwaha, Deepa Yadav, "Car Accident Detection System using Gps, Gsm and Bluetooth" in IJERGS May-June 2015.

[4] AboliRavindraWakure,ApurvaRajendraPatkar, "Vehicle Accident Detection and Reporting System using Gps And Gsm.", IJERGS, Vol 10,Issue 4,pp.-25 28, April 2014.

[5] N. Watthanawisuth, "Wireless Black Box using MEMS Accelerometer and GPS Tracking for Accidental Monitoring of Vehicles", IEEE conference in Jan, 2012.

[6] Hoang Dat Pham, "Development of vehicle tracking system using GPS and GSM modem" IEEE conference in Dec, 2013.

[7] Rashida Nazir, Ayesha Tariq, Sadia Murawwat, Sajjad Rabbani,"Accident Prevention and Reporting System using GSM (SIM 900D) and GPS (NMEA 0183)", Int. J. Communications, Network and System Sciences, 2014, 7, 286-293 Published Online August 2014.