iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** VIII **Month of publication:** August 2024

DOI: https://doi.org/10.22214/ijraset.2024.64085

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue VIII Aug 2024- Available at www.ijraset.com

Smart Accident Reporting and Surveillance System

M. Pravalika[1], Samreen Shaik[2], M Abhinava[3], S. Rakesh[4]
Student, Jawaharlal Nehru Technological University, Hyderabad

Abstract: Accidents are one of the most destructive incidents on the road. While numerous factors can contribute to a collision, driver irresponsibility and excessive speed are the most typical causes. Inadequate awareness can also cause emergency response times to be delayed. The growth of Internet of Things (IoT) technology may provide a solution to these challenges by reducing the incidence of accidents. We're working on a smart system that alerts drivers, regulates vehicle speed, and alerts others in the event of a crash. Using a distance sensor, this device continuously measures the distance between the vehicle and any impediments. When the vehicle approaches a crucial distance, it automatically slows down and warns the driver to reduce speed. In the event of an accident, the responsible party will receive a warning message containing information on the involved car. The primary purpose of accident prevention is to limit the number of traffic crashes that cause fatalities and property damage. The Accident Prevention and Detection System (APDS) attempts to save lives by shortening emergency response times. We are working on an IoT application that will reduce the number of accidents.
Index terms: RFID, Accelerometer, Global Position System (GPS)

I. INTRODUCTION

Auto accidents are a primary cause of death. The time between when an accident happens and when emergency personnel get on the site is essential in determining how many lives can be saved. We may save many tragedies by lowering the number of fatalities during this key period and ensuring that firefighters and medical crews arrive on time. Implementing a Collision Alarm and Automobile Surveillance System is one technique to reducing reaction time. This system anticipates when a collision with another vehicle is possible and promptly alerts emergency personnel when one occurs.

The current study focuses on this technology, which is primarily intended to identify accidents. Initially, the system was based on GPS, which continuously received inputs from satellites to track latitude and longitude positions. When an incident is recognized, the Uno board's gyroscope activates. The GSM module then uses the GPS data to send an electronic message to a specified phone number containing the most recent position information.

To monitor traffic incidents, the device uses a motion sensor, Arduino, GPS, and GSM modules. If someone requires immediate assistance or is feeling unwell, they can use the SOS button to send an alert. In the event of a false alarm, a reset button is available to prevent the message from being broadcast, saving valuable time for emergency responders.

The growing number of automobiles on the road has increased traffic risks and accidents, putting lives at risk. This emphasizes the importance of top-tier emergency services in the country. The suggested system delivers collision warnings automatically, recognizing occurrences rapidly and provides critical information such as location data and addresses, which can be accessed promptly using Google Maps. The resulting alarm is promptly transmitted to the central emergency server, allowing surrounding ambulances to arrive quickly and potentially saving lives.

II. CONTRIBUTION OF OUR RESEARCH

1) The IoT-based smart technology reduces accidents.
2) The vehicle's speed can be controlled in close proximity to other vehicles.
3) The system has a buzzer alert and reset button to notify the hospital, PS, and family members of an accident.
4) Offering RFID lock systems to prevent vehicle theft and GPS tracking.

III. LITERATURE SURVEY

In order to evaluate results and make data-driven judgments, a number of research projects were carried out in this area. A range of inquiries encompassing concepts, viewpoints, and evaluations provided valuable understanding of the mindsets and actions of the groups who were polled. Furthermore, critiques are particularly helpful in setting up a foundation for assessment and a standard by which to compare profitability over time.

IV. PROBLEM IDENTIFICATION

This section explores the benefits and drawbacks of several existing systems, while ignoring others. There are numerous approaches available for simply detecting impacts. However, there has not been a system that successfully reduces and identifies occurrences concurrently. One example is vehicle incident notification and detection software, which detects an automobile accident using a vibration sensor and GSM and GPS modems and sends a warning message to the police supervision center for assistance.

However, this technology has limited accident-prevention capabilities. Another option, an IoT strategy for monitoring fatal incidents, focuses on notifying authorities while also giving transparency and navigation information to the accident scene. However, it lacks a system to prevent accidents. A device called "Alcohol Detection and Accident Prevention of Vehicle" detects alcohol in the vehicle's exhaust and sends a message to the driver's loved ones, including the vehicle's position.

While useful in certain cases, this strategy is ineffective for general accident detection and prevention. Other systems, such as those that use satellite and cellular techniques, can detect wrecks based on speed data and notify police stations. These systems use satellite technology to monitor and compare a vehicle's speed, but they lack accident-prevention alarm functions. The research and development of IoT-based automobile safety warning and tracking systems enables the geolocation of accidents and vehicle theft, but they lack the equipment to avoid fatalities.

V. PROPOSED SYSTEM

An Arduino serves as the primary microcontroller in the system block diagram for this accident alert system, which is intended to be installed directly in the vehicle. When there is a collision, a vibration sensor detects it and transmits a signal to the Arduino IDE.

The precise position of the accident site can be determined by using a satellite to calculate its longitude and latitude coordinates. The microcontroller is only connected to a few base stations in this arrangement.

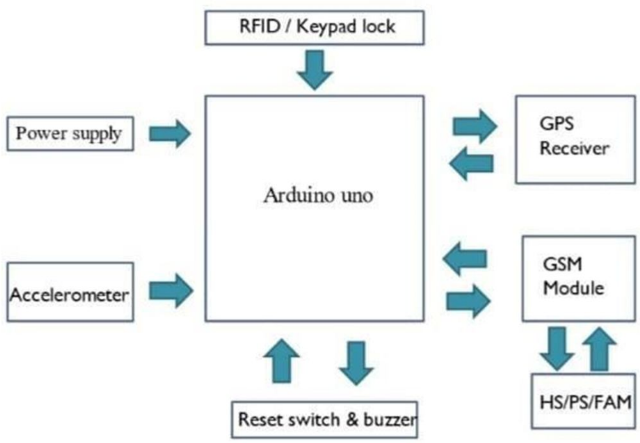


Fig. 1. Block Diagram

The accelerometer determines the degree of the impact and confirms the message's authenticity, allowing a text, call, and location to be sent quickly to the selected contacts in the code in the event of a collision. A wait period is given to give the user enough time to push the reset button if the occurrence is small. Once customized, the gadget can be fitted in the car and activated after completion. If the car tilts during a collision, the speedometer changes the position of its axes. These values are delivered to the Arduino, which detects any axis movement. If a shift is detected, Arduino extracts the coordinates from the GPS module and sends an instant message to the chosen contacts, such as the police, ambulance, or family member, containing the exact location of the accident. The message also contains a Google Earth link for easy identification of the incident location. By tapping the link in the message, the recipient can see the vehicle's exact location on a Google map.

In this application, we plan to add additional features like...

A. RFID Lock System

This system will work as a smart locking mechanism to help prevent car theft. If an unauthorized individual attempts to get access to the vehicle, the system will send an immediate alarm to the owner's mobile phone, including the vehicle's location. This guarantees that only the vehicle's owner has access.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue VIII Aug 2024- Available at www.ijraset.com

B. Speed Control System

This system will control the speed of the vehicle in order to lessen the chance of an accident. When an obstruction comes into view, the system will initially slow down the car. If the obstruction is too close, the system will halt the car completely until the path is clear.

C. Location Tracking

This system will trace the stolen vehicle. When a car is stolen, the owner simply transmits a certain code via text message from their registered cell number. The technology then returns the vehicle's position within seconds.

VI. DESIGN AND ARCHITECHTURE

The next section describes the theoretical structure of our suggested system, which is intended for use in battery-powered cars, as well as its basis and functions. Specific components must be put appropriately in the vehicle. A high-frequency monitor should be mounted in the front of the car, while an accelerometer sensor should be mounted in the vehicle's middle lower area, whether it has a manual or automatic transmission. A connector must also be mounted in front of the driver's seat.

The device contains a green safety indication that signals when the space between two vehicles is enough. As the distance reduces to a crucial level, the system slows the car and displays a yellow warning light and message on the interface. If the cars draw any closer, the system will limit the speed to around 20 km/h, activate a buzzer, and illuminate a red LED light as a significant warning. If the driver does not reply to this message, the system will automatically park the car by reducing the voltage to zero volts.

The accelerometer sensor, placed on the vehicle's central bottom surface, precisely detects changes in the X, Y, and Z axes. If an accident occurs despite the reduced speed, the device will sound the alarm. If the motorist does not turn off the buzzer by hitting a button, the system will phone and send an SMS with the accident location to a hospital, police station, or family member for quick assistance. This system uses GSM and GPS modules to make calls and send SMS messages.

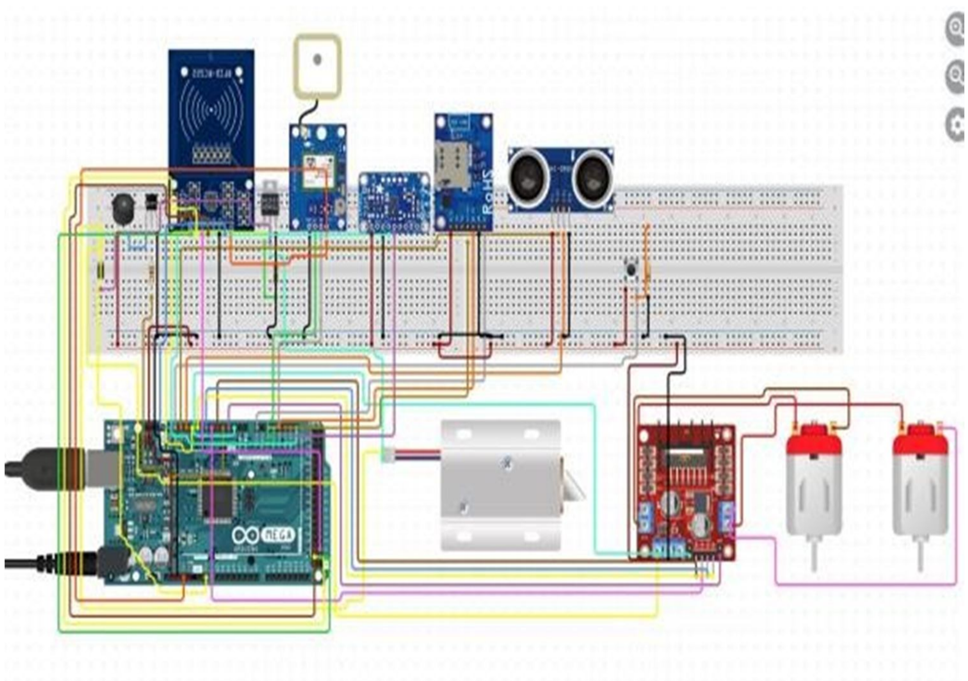


Fig. 2. Circuit Diagram

The proposed model contains an improved car theft protection feature based on Radio Frequency Identification (RFID). This method unlocks the vehicle by identifying the owner's individual RFID tag or card. If the vehicle is taken, the owner can submit a security code using the registered mobile number. The system will recognize the registered phone and send an SMS with the vehicle's location.

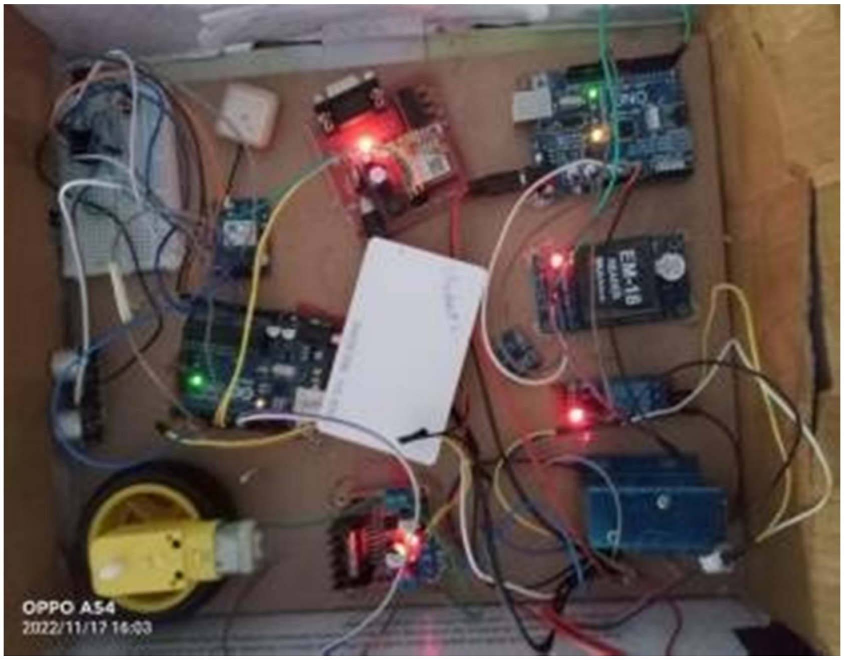


Fig. 3. Prototype

VII. IMPLEMENTATION

We used an Internet of Things (IoT) gadget with a number of parts and modules as well as communication capabilities.
The required hardware and software for the system are outlined below:

1) *Uno Arduino:* The Arduino UNO is the central microcontroller board for the system. It is more user- friendly compared to other boards, such as the Arduino Mega. The UNO features 6 input pins, 14 digital pins, a USB connection, a power jack, and an ICSP (In-Circuit Serial Programming) header. It supports various shields, circuits, and digital/analog I/O pins. The Integrated Development Environment (IDE) is used for programming and is compatible with both online and offline platforms.
2) *Gyroscope Device:* A gyroscope measures the velocity and movement of an object to determine its precise position and track its motion. It detects velocity, which is the object's displacement divided by the change in time. Gyroscopes are used in collision security systems to monitor stable forces (e.g., friction, gravity) and dynamic forces (e.g., vibrations).
3) *GSM Module:* The GSM (Global System for Mobile Communication) module is a type of mobile modem created by Bell Laboratories in the 1970s. It is widely used for mobile communication worldwide. GSM operates on frequency bands of 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz to provide voice and data services. It uses time- division multiplexing to manage client information and can transmit data at speeds between 64 kbps and 120 Mbps.
4) *Sonic Sensor:* Ultrasonic sensors measure distance by emitting ultrasonic waves and detecting the time it takes for the echo to return. The HC-SR04 ultrasonic sensor is used in this system to determine distance.
5) *RFID Sensor:* The RFID system includes a reader antenna, a transceiver, and a transponder. The RFID reader or interrogator can be fixed or portable, connecting to a network to activate and read RFID tags using electromagnetic radiation. The RFID tag transmits a signal to the reader, which is then converted into data. The range of the RFID tags and readers can vary based on the type of tag, reader, and environmental factors.
6) *GPS Sensor:* The GPS (Global Positioning System) uses satellites and ground-based control systems to provide location data. A small antenna on the GPS chip receives signals from orbiting satellites. The GPS unit includes a receiver with a display and memory for storing data.

VIII. RESULTS

In this provision, a few of the characteristics that are integral to our system are provided. Image "3" shows the prototype of the system to prevent and detect accidents, and Image "4" depicts the notification via text message which was imposed on the people in charge.

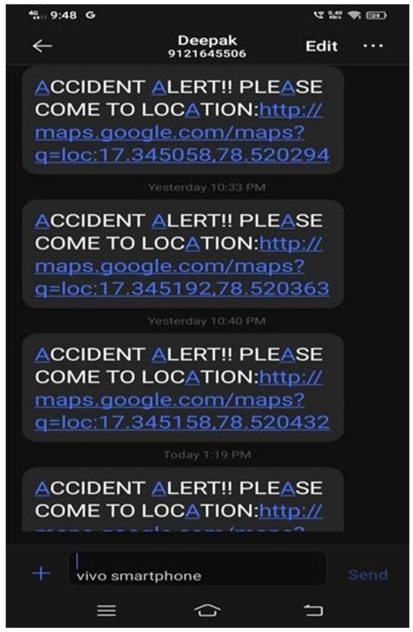


Fig. 4. Block Diagram

IX. CONCLUSION AND FUTURE WORK

The advanced system proposed in this study, which is IoT- based and designed to help reduce unintentional fatal accidents, has been implemented. This approach aims to provide precise information about the crash location and cause. Prompt assistance and support for accident victims are crucial. The vehicle can be tracked using a GPS unit as part of the system. Crash details are sent via mobile. The performance of the proposed systems is satisfactory. Additionally, a noise detector is integrated to enhance crash detection capabilities.

1) *Future Use 1:* This device could be integrated with the vehicle's airbag system to prevent occupants from hitting interior components such as controls or windows.
2) *Future Use 2:* By linking the recording device to microcontroller modules that capture images of the accident site, navigation can be improved and made faster.

REFERENCES

[1] Aarya D.S, Athulya C.K, Anas. P, Basil Kuriakose, Jerin Susan Joy, Leena Thomas, "Accident alert and tracking using Arduino:" ISSN: 2320 – 3765, Vol. 7, Issue 4, April 2018

[2] Eldeen, Ibrahim Momen, Yaseen, Fadel Almola, Ahmed Musab, Yahia Merchant, Hassan Tewfik Hassan, and Supervisor Dr. Abuagla Babiker, Mohammed Babiker, "Accident detection and reporting system using GPS and GSM modules," October 2017.

[3] Kumar, A. & Jaganivasan, V. & Sathish, T. & Mohanram, s. "Accident detection and alerting system using GPS & GSM. International Journal of Pure and Applied Mathematics." volume 119, Issue no. 15, ISSN 1314-3395, 2018, Pp 885-891.

[4] C.M. Dakshina Moorthy, J.N. Reddy, "Recovery of interlaminar stresses and strain energy release rates in composite laminates, Finite Elements in Analysis and Design," Volume 33, Issue 1, 1999, Pages 1-27, ISSN 0168-874X, https:// doi.org/ 10.1016/S0168-874X(98)00071-7.

[5] R. Kumar, Kumar, ''Availability and handling of data Received through GPS device; in tracking a vehicle", Advanced Computing Conference (IACC) 2014, IEEE International.

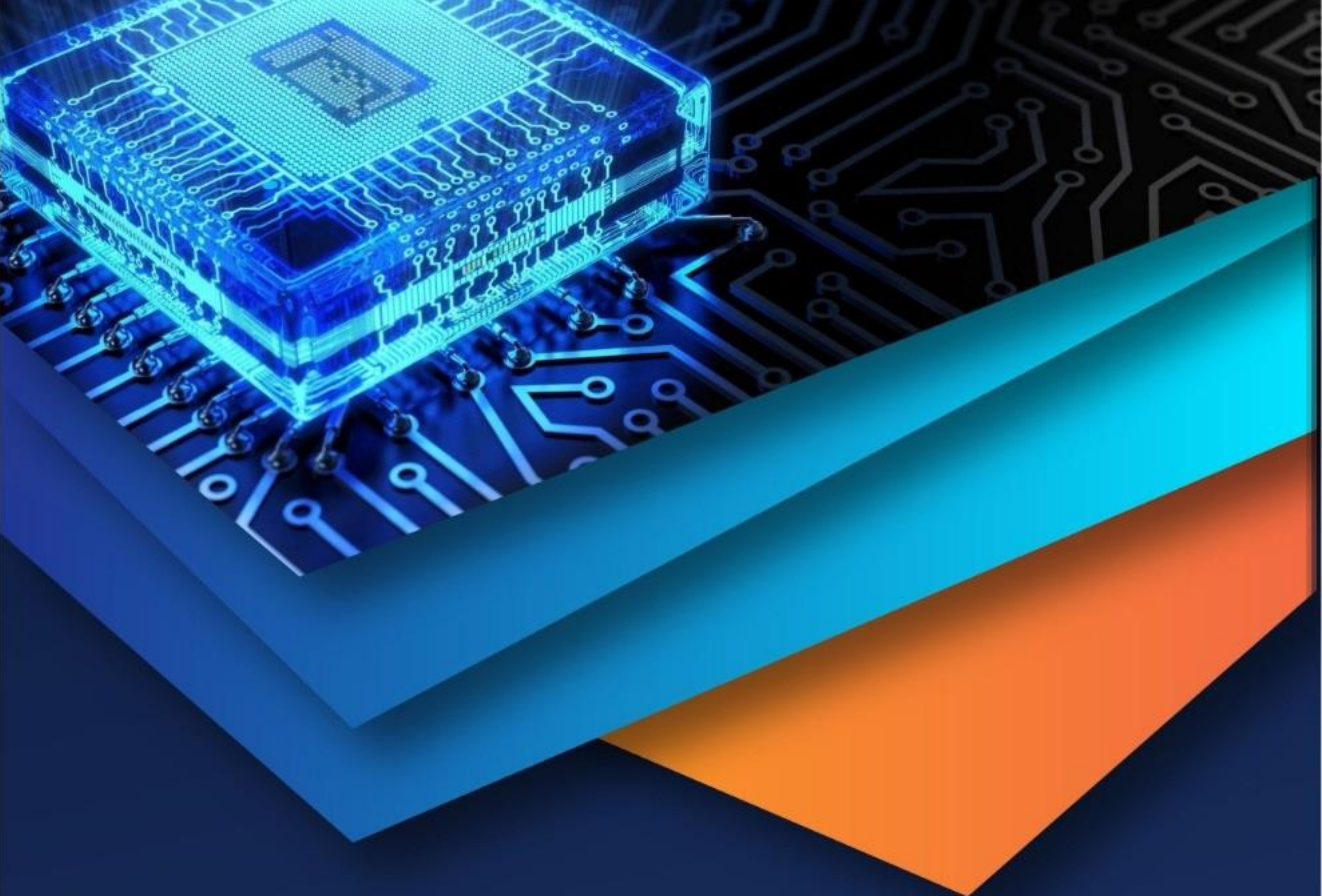
[6] Seok Lee, G. Tewolde, Jaerock Kwon, "Design and Implementation of a vehicle tracking system using GPS, GSM technology and smartphone application, IoT 2014, IEEE.

[7] Jamis Kluga, Ansis Kluga "Driver's professional skills evaluation with modified GPS vehicle tracking system," IEEE publication June 2017.

[8] G. R. Shete, D. A. Shah, A. Gaidhani, S. D. Shinde, and S. R. Sharma, \"Smartphone-based Vehicle Tracking and Accident Prevention System,\" International Journal of Computer Applications & Information Technology, vol. 8, p. 172, 2017.

[9] P. P. Pingle, A. S. Marathe, and P. R. Ahirrao,\"Intelligent Vehicle Accident Detection & Notification System (VADANS) Using Smart Sensor and GPS Technologies,\" Imperial Journal of Interdisciplinary Research, vol. 2, 2016.

[10] Ashish Kushwaha, Gaurav Katiyar, &Harshita Katiyar, Hemant Yadav, Saxena 'GPS and GSM Based Accident Alarm System'; National Student Conference On "Advances in Electrical & Information Communication Technology" AEICT-2014.



doi crossref

10.22214/IJRASET

INDEX COPERNICUS

45.98

ISRA JIF

IMPACT FACTOR: 7.129

TOGETHER WE REACH THE GOAL

IMPACT FACTOR: 7.429

ISI

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)