

Design and Realization of the Accelerometer Based Transport System

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ABSTRACT

An accident is a deviation from the expected behavior of an event that negatively affects property, living organisms or people and the environment. Safety while communicating or traveling between vehicles is a top priority for everyone. The work presented in this article documents the architecture of the accident detection system. The design of the accident location system reports the accident to the police control room or other emergency call system. The accelerometer was used to detect sudden changes in vehicle g-forces due to a crash. If the g-force range falls below the severity of the accident, the GSM modem sends a text message to a predetermined phone number. The buzzer is also on. The product design was tested under different conditions. The test result confirms the stability and reliability of the system.

Keywords: Buzzer, Living Organisms, Accident Detection System, GSM Modem

I. INTRODUCTION

According to the March 2021 report, the total number of motor vehicles registered in India is more than 280 million. India has 39 million car users and approximately 225 million two wheelers have been sold to customers in 2021. every year approx. 1.5 lakhs people dies on Indian road which translate on average, into 47 incidents every day result in 1130 injuries and 422 fatalities. 18 people die each hour. Within India Tamil Nadu is the state with the greatest number of injuries from traffic accidents, revealed to a recent survey. The 2021 accident data for Indian roads is shown in Figure 1.1.

The internet of things has become a need in our daily lives. More than 13 billion electronic and digital gadgets are now in use, or a total of two per person. An excellent example of the IoT is "SMART HOME", The most intelligent gadgets are those that can be programmed and managed remotely. Future IoT growth is expected to come from all economic sectors, including business, industry, healthcare, and public safety.

The utility components and all other day to day the way people live and work is changing as a result of the combination of items with access to the internet and strong statistical capabilities. Hence the term "Internet of Things" is described as extending

connectivity to networks and computing capabilities beyond computers to include ordinary household goods so that data can be produced, exchanged, and consumed with little or no involvement from humans. Many lives could not be saved despite wearing helmets due to a lack of prompt medical attention.

Our research intends to speed up contact with those closest to the injured person so that the sufferer may receive medical treatment more quickly.

II. RELATED WORKS

1) Using accelerometer sensors, track bus vibrations in real time.

This study describes an accelerometer-based real-time monitoring system for bus vibrations. The system is designed to detect and record vibrations caused by various road conditions, including potholes, speed bumps, and uneven pavement. The authors use an Arduino microcontroller and a wireless module to transmit the data to a remote server, where it can be analyzed and used to improve road maintenance and reduce vehicle maintenance costs.

Published by: (2019), Ahmed et al.

2) A Smart Transportation System Based on Accelerometer and Gyroscope Sensors.

and gyroscope sensors. The system is designed to detect and record various driving behaviors, including acceleration, braking, turning, and lane. This paper proposes a smart transportation system based on accelerometer changing. The authors use machine learning algorithms to analyze the data and provide feedback to drivers, fleet managers, and transportation planners. The system is intended to improve driver safety, reduce fuel consumption, and optimize vehicle routes.

Published by: Jin et al. (2020).

3. "In intelligent transportation systems, acceleration-based vehicle classification is used".

This paper presents an accelerometer-based vehicle classification system for intelligent transportation systems. The system is designed to classify vehicles based on their size, weight, and type, using data collected from accelerometer sensors installed on the road surface. The authors use machine learning algorithms to analyze the data and provide real-time information to traffic controllers and transportation planners. The system is intended to improve traffic flow, reduce congestion, and enhance road safety.

Published by: Li et al. (2018).

4) The article is titled "Design and Implementation of an Accelerometer-Based Collision Detection System for Vehicles."

This essay explains the planning and execution of an accelerometer-based collision detection system for vehicles. The system uses multiple accelerometers and a microcontroller to detect and record collisions and near-miss events. The authors use machine learning algorithms to analyse the data and provide feedback to drivers, fleet managers, and insurance companies. The system is intended to improve driver safety, reduce vehicle maintenance costs, and facilitate insurance claims processing.

Published by: Tseng et al. (2019).

5) The research project "Development of a Wireless Sensor Network System for Structural Health Monitoring of Bridges Using Accelerometers" focuses on this topic.

In order to assess the structural state of bridges, this study suggests a wireless sensor network system. The use of accelerometers. The system is designed to detect and record vibrations caused by various environmental factors, including wind, traffic, and seismic events. The authors use machine learning algorithms to analyze the data and provide feedback to bridge engineers and maintenance crews. The

system is intended to improve bridge safety, reduce maintenance costs, and extend the lifespan of bridge infrastructure.

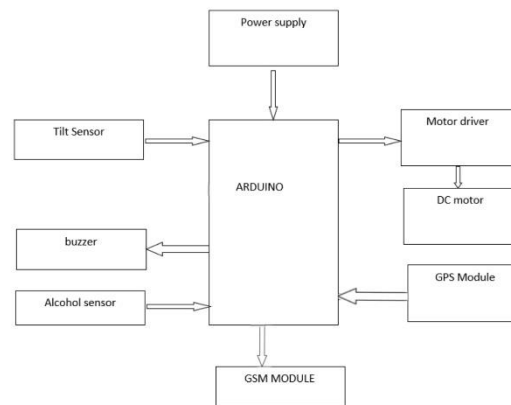
Published by: Song et al. (2017).

III.METHODOLOGY

At the time of the accident, finding the location of the intimate and victim is a somewhat difficult task that must be found. Unfortunately for those who were there at the accident site at critical times, the victim's personal information remains unknown. The project's primary goal is to provide a system for IOT detection and reporting. The system's special capability is to locate the victim and report the accident with pertinent details to the ambulance service and the victim's family, so that the victim can be provided with urgent medical care. The ARDUNIO NANO module is used to achieve this function and a unique code is programmed into this module. The tilt The ARDUINO NANO module, which is attached to the sensor's sensor, determines the accident's vibrational frequency. The module was configured with the maximum voltage limit for a vibration threshold. The GPS unit connects to the ARDUINO NANO and all are built into the vehicle. Family members and friends can locate the victim with the use of the GPS module. Today, GPS is an essential component of a car's system. The vehicle's axles are monitored by the gyroscope for any rapid changes. Arduino is used to test this. Through the Global Positioning System (GPS) module, the Arduino Nano alerts the police control room or the rescue team, such as the location. The police can therefore instantly identify the position using the GPS module after getting the information. After the venue has been confirmed, the appropriate actions are going to be taken.

The driver or vehicle has an IoT device and it turns on the system when it starts driving. The shock sensors detect the threshold frequency when an accident happens and the rider impacts the ground. If

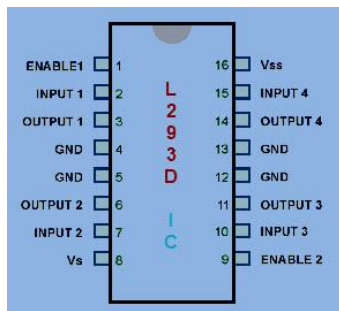
the value is higher than the voltage limit, the GPS module extracts the precise position of the spot. The registered mobile phone is immediately notified of the driver's information and position as shown by the latitude and longitude data. The maps pinpoint the precise site of the accident and the details contained in the notification.



The Arduino Nano is a small and compact microcontroller board based on the ATmega328P. It is designed to be used for small projects that require a microcontroller with a low profile and minimal space. The Nano board is like the Arduino Nano board, but it is smaller in size and has a lower power consumption.

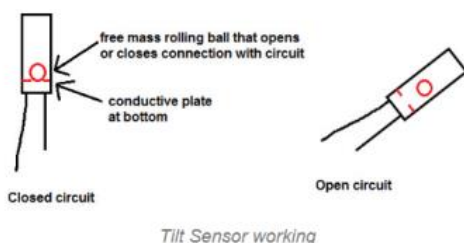
Driver circuit

A twin H-bridge motor driver integrated circuit (IC) is the L293D. Because that they take a low current control signal and output an increased current signal, motor controllers' function similarly to current amplifiers. The motors are controlled through the use of this stronger current signal. Two built-in H-bridge driver circuits are included in the L293D. In its general operating mode, two DC motors can be used simultaneously, forward and reverse.



A current-carrying wire experiences a torque and has a tendency to move when it is put in a magnetic field. This is how a direct current (DC) motor operates. This is referred to as a vehicle. The direction of spin also shifts if the wire's current flow is reversed. The DC motor's operating notion is based on the fact that when the electric and magnetic fields interact, a mechanical force occurs. The left-hand rule developed by Fleming, which states that if your left hand's thumb, middle finger, and index finger are all extended perpendicular to one another and your thumb points in the direction that the DC motor shaft experiences the force, your middle finger and index finger should point in the opposite direction to the magnet field, will indicate the guidance in which the motor in question rotates.

Devices called tilt sensors provide an electrical signal that modifies in response to angular movement. Within a constrained range of motion, tilt and pitch are measured using these sensors. Because sensors only give a signal, inclinometers are occasionally referred to as inclinometers instead of sensors.



Tilt Sensor working

jumped wires

The components of your breadboard are linked to the buttons of the Arduino head using wires called jumpers. Connect all of the circuits using them. In

order to link two sites without soldering, jumper wires are simple cables with connector pins on each end. Jumper wires can make it easier to adjust the circuit as needed when utilized with bread boards and other prototyping machinery. Easy enough. truly does not get many basic wires like jumper wires. Male-male, male-female, and female-female varieties of jumper cables are among the most common. The thread's removal distinguishes them from one another. Female ends are used to connect objects while male endings have a pin that extends from them and can be used to connect objects. The most common and most often utilized jumper are male to male.

A push button switch is a small, enclosed mechanism that terminates an electrical circuit when pressed. When it's turned on, a small metal spring inside touches two wires, causing an electric current to flow. When it is off, the spring retracts, the contact is broken, and no current flows. The switch housing is made of non-conductive plastic.

MQ3 alcohol sensor module. This module was constructed using a MQ3 alcohol gas sensor. It is a reasonably priced semiconductor sensor that can find alcohol gases in concentrations ranging from 0.05 mg/l to 10 mg/l. SnO₂, the sensor's sensitive component, has a reduced conductivity in clean air.

The Global Positioning System (GPS) is a satellite-based system that calculates and measures its position on Earth using ground stations and satellites. Navigation System with Time and Ranging (NAVSTAR) GPS is another name for GPS. For accuracy, a device that uses GPS must receive information from at least four satellites.



GSM module

A GSM module is a hardware device that allows mobile communication over the GSM network. It may be used to a range of tasks that call for communication, monitoring, or remote control. For connection over the GSM network, the module, which has a SIM card slot, is attached to a microcontroller or other device. GSM modules are commonly used in applications such as remote monitoring of equipment, telemetry, and security systems. They can also be used in location-based services, tracking devices, and other applications that require mobile communication. The GSM network operates on different frequency bands in different regions of the world, so it's essential to choose a module that is compatible with the frequency band used in your location.



IV. RESULTS AND DISCUSSIONS

This system will send the messages and will also call to the emergency contacts which were stored in the device. It will immediately send the responses to the target customer by SMS or phone call when the vehicle meets the accident.

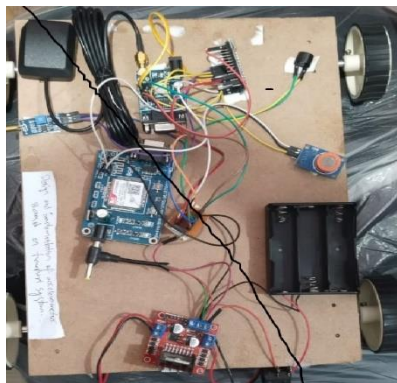


Figure: Alcohol detected by the MQ3 sensor.

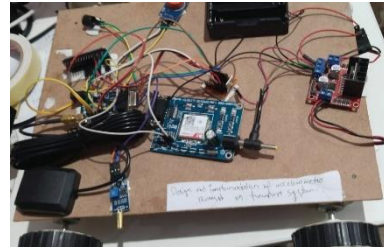


Figure: The GSM will send the message to the emergency numbers along with location whenever the accident occurred.

V. CONCLUSION

The majority of accidents in recent years involved motor vehicles. Numerous lives are lost as a result of this alarming spike in motor vehicle accidents. The main cause of many deaths is inadequate treatment received at the appropriate time. The primary variables may be the ambulance's tardy arrival or the absence of a witness who could provide the responding officer with information or a family member who could provide it. The proposed initiative addresses this problem by offering a crash detection and reporting system with the objective of saving at least half of the lives lost in accidents. Additionally, it may be utilized to control the speed of the automobile and deter the driver from going too fast by transmitting the information to the rider's family. The duty of saving countless lives will fall on prompt identification and reporting.

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