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Accident Detection and Alert System Using IoT

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Abstract: Accidents have recently emerged as a major source of concern for humans. Due to a lack of information about the location, magnitude of the accident (or) other issues, some victims cannot be rescued by the response team, which may be an ambulance or police. Many technologies were developed, however they were unable to overcome the problem. However, this project will provide clarification on how to overcome this hurdle. A central system is employed in this project, to which a vibrator sensor, GSM (Global System for Mobile Communications), and GPS modules are attached. To prevent detecting errors, numerous sensors are strategically distributed throughout the vehicle. After an accident takes place the vibrator sensor becomes active, and GPS (Global Positioning System) is engaged with the assistance of the central system GSM (Global System for Mobiles). Immediately, alert messages will be handed down to the response teams, outlining the live location and severity of the accident

Index Terms: Accident Detection, Aurdino, Vibration sensor, GPS, GSM and Alert sytem

I. INTRODUCTION

The traffic jam has become a major issue in people's daily lives. The primary root cause of delays in traffic is the rise in people and the improvement of prudence. As a result, the number of accidents is increasing. Several technologies have appeared to oversee the riff and prevent road accidents, like as embedded monitoring systems established with either microcontrollers or Arduino and can be extended via IOT. Congestion in traffic has become an ongoing issue in people's daily lives. The fundamental root cause of traffic delays is an upsurge in people and an enhancement in prudence. As a result, there has been an increase in the number of accidents. Several solutions have come forth to supervise the riff and avoid collisions on the roads, like embedded monitoring systems developed with microcontrollers or Arduino and extend ablevia IOT. The GSM sim 900A is used to deliver alert messages to contacts registered on the SIM card.GPS is used to share the location of a location. The car number and location of the accident will be in corporate into the alert messages.

This project is divided into three sections.

- Ambulance unit;
- vehicle unit;
- traffic unit

The project's existence is based on ambulances and traffic units.

II. RELATEDWORK

Smith et al. (2018) published "A Comprehensive Review of IoT-Based Accident Detection Systems." This study presents a thorough examination of several IoT-based accident detection systems. It addresses several detecting systems, such as sensors, cameras, and accelerometers, as well as their merits and disadvantages. The authors examine the essential features, algorithms, and communication protocols used in these systems, emphasizing their usefulness in real-time accident detection and warning creation. " IoT-Based Fall Detection and Alert System for Elderly People " by Johnson et al. (2019) This study, which focuses on fall detection, proposes an IoT-based system meant to detect falls among older people. It investigates the use of wearable electronics and environmental sensors to detect movement patterns and changes in body orientation. The authors suggest a fall detection algorithm.

Patel et al. (2017) published "Accident Detection and Reporting System Using IoT and Cloud Computing." The current research demonstrates a method for reporting and identifying accidents that makes use of IoT devices and cloud computing.

The authors offer a framework for transmitting accident data collected through sensors and GPS devices to the cloud for processing and analysis. The technology then provides real-time announcements, informing emergency services and other relevant authorities that action needs to be taken quickly. Kimetal., " Real-Time Accident Detection and Alert System for Smart Cities" (2021). This article, with an emphasis on smart cities, presents an IoT-based accident detection and alert system to improve urban safety. The authors investigate the application of sensors, cameras, and computational edge approaches to identify accidents in real time. They serve as a framework for alert manufacturing and emergency response that takes into account the particular obstacles and needs of urban environments. "IoT-Based Vehicle Collision Detection and Alert System" by Lee et al. (2020). This study, with a focus on car accidents, provides an IoT-based system for identifying and warning occurrences in real time. The authors investigate the use of sensors in automobiles, such as accelerometers and GPS, to capture and transmit relevant data. They describe an algorithm that examines the collected data to determine the severity of the collision and sends appropriate signals to emergency services and vehicles in the vicinity. "Lee et al.'s (2020) "IoT-Based Vehicle Collision Detection and Alert System" This research, which focuses on automobile crashes, presents an IoT-based system for detecting and warning incidents in real time. The authors explore the incorporation of sensors in automobiles, such as accelerometers and GPS, to record and send relevant data. They describe an algorithm that analyses the collected data to evaluate the severity of the collision and sends relevant signals to emergency services and adjacent vehicles.

III. EXISTINGSYSTEM

There is a fatality as a result of a delay in the delivery of an ambulance to the hospital during the golden hour. The ambulance has become stuck in traffic. It would be advantageous to the ambulance if the traffic signals in the hospital's path had been switched on. System of Post-Accident Detection There is also a lack of intelligence in the detection systems. The collision and pre-damage status are unable to be determined. People's observation method will include manual time delays (first aid).

IV. PROPOSEDSYSTEM

Arduinouno is utilised as a microcontroller in this project, and all components are connected to it. The temperature sensor measures the driver's body temperature, and the pulse sensor measures the driver's heart rate. We shall receive a notification to our mobile number whenever the sensor values exceed the threshold value. When we turn on the switch, we receive a notification indicating an emergency situation, and we can monitor the location using GPS. When an accident occurs, the vibration sensor activates, and we receive a notification with the position, which we can monitor using GPS.

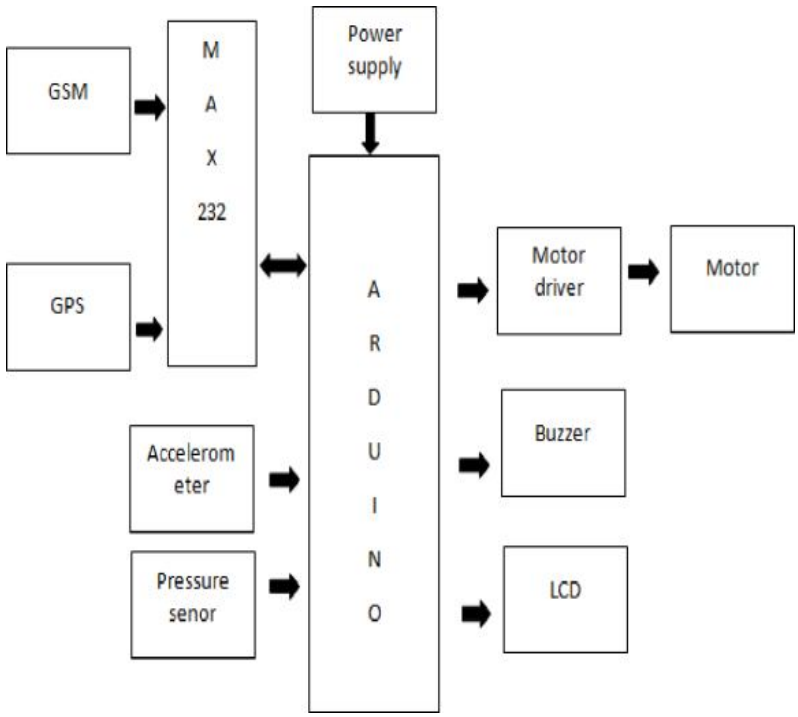
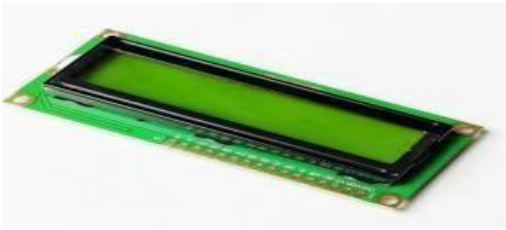


Fig.1.Block Diagram

Components:

AURDINOUNO:

The primary hardware tool that we are employing is the Arduino Uno, a microcontroller board based on the AT mega 328. It contains 14 digital I/O pins, 6 analogue inputs, a ceramic resonator operating at 16 MHz, a USB connection, a power jack, an ICSP header, and a reset button. It comes with everything you need to support the microcontroller; simply connect it to a computer through USB or power it using an AC-to-DC adapter or battery to get started.

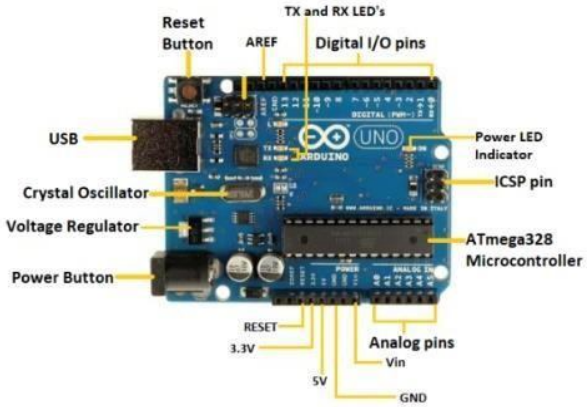


AREF: The Analogue Reference (AREF) pin is used to feed a reference voltage from the external power source to the Arduino UNO board.

- Reset button: Adds a Reset button to the connection.
- USB-It allows the board to communicate with a computer. It is required for programming the Arduino UNO board.
- Crystal Oscillator: With a frequency of 16MHz, the Crystal oscillator makes the Arduino UNO a powerful board.
- Voltage Regulator: The voltage regulator transforms the input voltage to 5V.
- GND: Ground pins. The earth pin functions as a pin with no voltage.
- Vin: This is the input voltage.
- Analogue Pins: Analogue pins range from A0 to A5.Analogue pins read the analogue sensor used in the connection. It can also function as GPIO (General Purpose Input Output) pins.

LCD:

LCD (Liquid Crystal Display) is a type of flat panel



- **AT mega 328 Micro controller:** This is an AT mel family single-chip microcontroller. The processor code inside it is of 8-bit. It combines Memory (SRAM, EEPROM, and Flash), Analog to Digital Converter, SPI serial ports, I/O lines, registers, timer, external and internal interrupts and oscillator.
- **ICSP pin:** The In-Circuit Serial Programming p in allows the user to program using the firmware of the Arduino board.
- **Power LED Indicator:** The ON condition of the LED indicates that power is turned on. The LED will not light up if the power is turned off.
- **Digital I/O pins :** The digital p in shave the value HIG H or LOW. Digital pins are those with numbers ranging from D0 to D13.
- **TX and RX LEDs**: The illumination of these LEDs represents the successful flow of data.

BUZZER:

The buzzer or beeper is a voice signaling device that can be mechanical, electromechanical or piezo electric. Typical buzzers and beepers applications include confirmation of user inputs, such as alarms, timers and mouse clicks or pulsations.

Accelerometer Sensor:

An accelerometer is a device that detects and monitors acceleration forces in a particular direction. It has been used in many different applications, including robots, mobile devices, gaming controllers, and systems that detect motion.

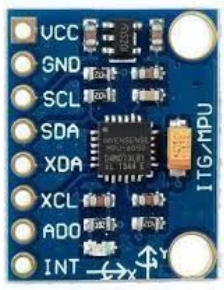
GSM module:

GSM (Global System for Mobile Communications) is a widely used standard for mobile communication, facilitating voice and data transmission over cellular networks. It involves several crucial components that work together to provide mobile communication services.

GPS:

The Global Positioning System (GPS) is a satellite-based navigation system comprised of a network of 24 satellites orbited by the United States Department of Defence. GPS was originally meant for military usage, but the government made it available for public use in the1980s.

Gyroscope:



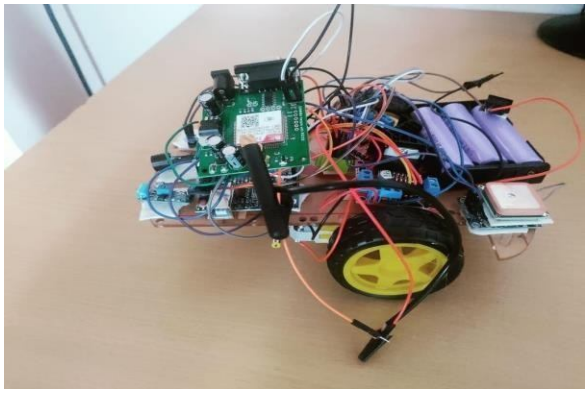
To measure and maintain direction and angular velocity, gyroscopes are crucial sensors used in many applications. It is made up of various parts that interact according to the concepts of rotation and angular momentum.

MUX 232:

A common integrated circuit (IC) for serial communication is the MAX232, which is utilized in particular for voltage level conversion between RS-232 signals and those from other devices that run on lower voltages.

It is made up of essential parts and works by transforming voltage levels to provide interoperability between various devices.

RESULT:



CONCLUSION:

To sum up, the implementation of IoT-based accident detection and alert systems offers immense possibilities for improving safety and emergency response across different sectors. These systems utilize sensor data, real-time monitoring, and advanced communication technologies to swiftly identify accidents and notify relevant parties. As a result, response times can be expedited, potentially leading to life-saving out comes.

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