Accident Prevention, Identification, and Alert System

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Abstract - **The advancements in the transportation system has been the generative power for humans. The automobile has great importance in our daily life. We utilize it to go to the workplace, transport passengers, and deliver our goods. But it can also bring disaster if used carelessly or because of mismanagement. Speed and carelessness are one of the most important risk factors in driving. Despite many actions taken by different organizations all around the world and various programs to create awareness against careless driving, accidents take place every now and then. However, many lives could have been saved if the emergency service could get the crash information in time and additional safety features. As such, efficient automatic accident prevention, identification, and alert system will be beneficial for saving precious human life.**

Keywords – **Accident Detection, Prevention, Alert, Raspberry Pi Pico, Safety, GSM, GPS, Accelerometer.**

I. INTRODUCTION

The advancements in the transportation system have been the generative power for humans. The automobile has great importance in our daily life. We utilize it to go to the workplace, transport passengers and deliver our goods. But it can also

bring disaster if used carelessly or because of mismanagement. Speed and carelessness are one of the most important risk factors in driving. Despite many actions taken by different organizations all around the world and various programs to create awareness against careless driving, accidents take place every now and then. However, many lives could have been saved if the emergency service could get the crash information in time and additional safety features. As such, efficient automatic accident prevention, identification, and alert system will be beneficial for saving precious human life.

Nowadays lots of accidents happen on highways due to an increase in traffic and also due to rash driving. And in many situations, the ambulance or the authorities are not informed in time. Our project with various sensors and GPS and GSM is designed for such situations.
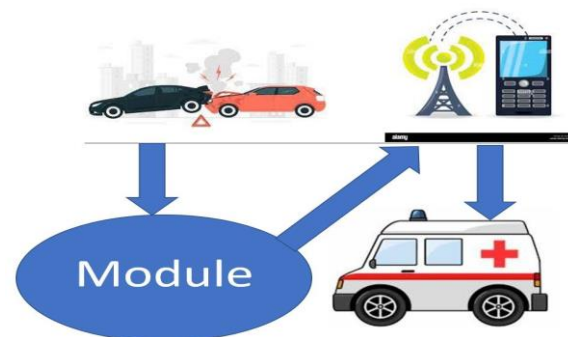

Fig.1 Accident alert system

NEED FOR ACCIDENT DETECTION SYSTEM IN VEHICLES

The need for accident prevention, identification, and alert systems is essential in minimizing the risks associated with accidents. With the increasing number of vehicles on the road and the use of heavy machinery in industries, accidents have become a common occurrence. These systems can provide an early warning system to prevent accidents from occurring. By detecting potential hazards and alerting drivers or workers to take appropriate safety measures, accidents can be avoided.

Moreover, the use of accident prevention, identification, and alert systems can significantly reduce the number of fatalities and injuries associated with accidents. These systems can detect accidents in real-time, alert emergency services, and provide valuable information about the location and severity of the accident, which can help in the rescue operation. By providing an efficient and timely response, these systems can save lives, reduce injuries, and mitigate economic costs associated with accidents.

RELEVANCE TO THE PRESENT INDUSTRIAL SCENARIO

Accident detection, prevention, and alert systems are becoming increasingly relevant in today's industrial scenario due to the rising dependence on machines and automation. With the use of heavy machinery or hazardous materials in manufacturing, there is an increased risk of accidents, which can be minimized by incorporating such systems. These systems provide an early warning to prevent accidents by detecting potential hazards and alerting workers to take appropriate safety measures. In case of an accident, these systems can also quickly alert emergency services and provide critical information about the location and severity of the incident, facilitating prompt medical assistance.

I. Related works

Automated vehicle accident detection systems have been developed that use a range of techniques, such as image processing, computer vision, and machine learning, to detect and classify vehicle accidents in real time. Examples include systems that use camera-based sensors to detect vehicles and pedestrians in the vicinity of a crash, as well as systems that use radar-based sensors to detect vehicles and other objects in the vicinity of a crash.

Research has been conducted on using artificial intelligence (AI) to identify and classify vehicle accidents. AI-based systems have been developed that use machine learning techniques to automatically classify vehicle accidents and predict the severity of the crash. Moreover, research has been conducted on the use of computer vision techniques to detect and analyze objects in the vicinity of a crash. These systems use cameras mounted on vehicles to detect and identify objects at the scene of a crash, such as vehicles, pedestrians, and other objects in the vicinity.

Additionally, the use of vehicle-to-vehicle (V2V) communication systems to prevent vehicle accidents. V2V systems use short-range communication technologies to exchange data between vehicles in order to detect a potential collision.

India is making progress in the development of vehicle accident, identification, and prevention systems. The following are some related works being done in India:

1. Intelligent Traffic Management System (ITMS): This is an automated system designed to detect and identify vehicles involved in accidents in India. The system is equipped with sensors that can detect and provide information on the speed, location, and direction of vehicles. ITMS is being

used in several cities across India, including New Delhi and Bangalore.

2. Automated Crash Notification System (ACNS): This system is designed to detect and notify authorities of vehicle crashes in India. It utilizes a combination of vehicle sensors, communication networks, and GPS to detect, identify, and report accidents. The system is currently being tested in several cities in India, including Mumbai, Pune, and Bangalore.

3. Intelligent Roadside Safety System (IRSS): This system is designed to monitor road conditions and detect obstacles that may lead to accidents. It utilizes a combination of radar, cameras, sensors, and communication networks to detect, identify, and alert drivers of incoming dangers. IRSS is currently being tested in several cities in India, including Chennai and Delhi.
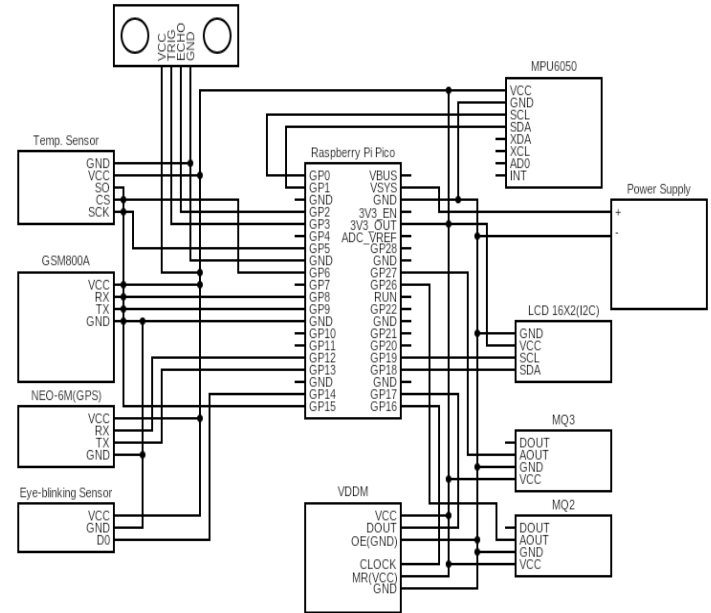
II.   Proposed system

The proposed Accident Prevention, Identification, and Alert System is designed to detect potential accidents and prevent them by alerting drivers or emergency services. The system consists of several components, including an Eye Blinking Sensor, Temperature Sensor, Alcohol Sensor, Smoke Detection Sensor, Alcohol Detection Sensor, Ultrasonic Sensor, Accelerometer, GSM, GPS, and LCD Display.

The Eye Blinking Sensor is used as a drowsiness detector to warn drivers when they are feeling sleepy. The Temperature Sensor is used to detect overheating of the engine or other parts of the vehicle, which can lead to accidents. The Alcohol Sensor and Alcohol Detection Sensor detect the presence of alcohol in the driver's breath or blood, respectively, and alert the driver to the danger of driving under the influence of alcohol. The Smoke Detection Sensor detects the presence of smoke,

which can indicate a fire, and alerts the driver to take immediate action.
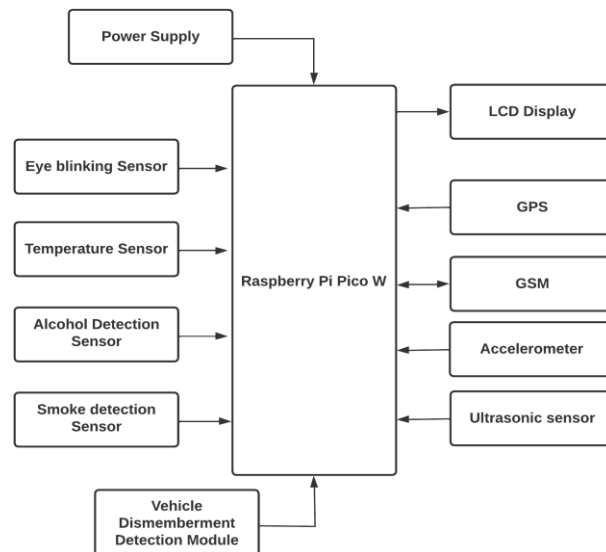

Fig.2 Circuit Diagram

Fig.3 Block Diagram

The Ultrasonic Sensor and Accelerometer measure the distance between vehicles and the tilt angle of the chassis, respectively. They are used to detect

accidents and calculate their severity. The GSM and GPS modules are used to locate the vehicle's correct position and send the location to emergency services or other designated recipients. The LCD Display shows the status of the system and the distance between vehicles.

The VDDM(Vehicle Dismemberment Detection Module) is a specially designed module that can detect if the wheels or doors of the vehicle get separated to form the vehicle in case of an accident.
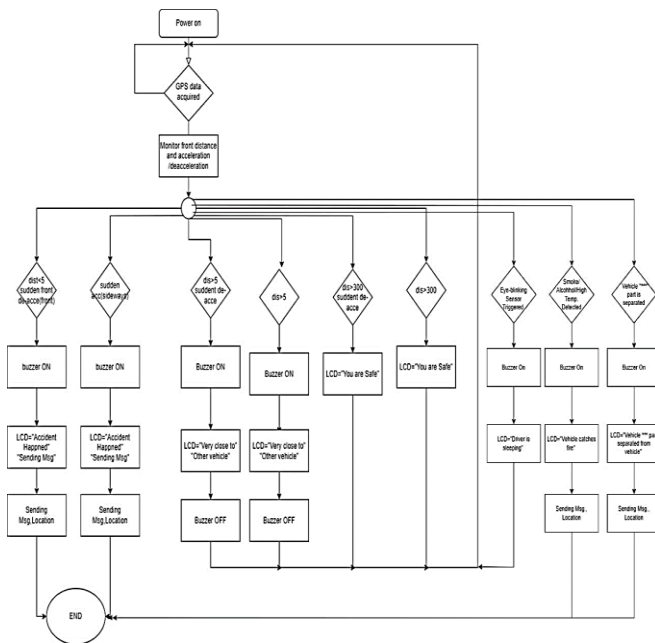

Fig.4 Flow Chart

FUTURE SCOPE

A camera module can be attached to the vehicle to click pictures immediately at the time of the accident and send the image to the server. All the data collected at the server can be used for Big data processing in the future to evaluate some results related to road accidents.

The GPS and GSM systems can be used to determine over speed in restricted areas and

charge penalties automatically decreasing human manpower, and saving time and money.

The reporting systems can be used with Home security, personal security connecting with family, vehicle security, and many more.

III. CONCLUSION

The proposed Accident Prevention, Identification, and Alert System is an innovative approach to address the increasing risk of accidents in various industries and transportation sectors. The system uses various sensors such as eye blinking, temperature, alcohol, smoke detection, and ultrasonic, as well as GSM and GPS modules for real-time accident detection, prevention, and location tracking. The accelerometer and tilt sensors ensure safe driving, while the LCD display provides critical information to the driver. The use of this system can significantly reduce the number of accidents, save lives, and reduce economic costs associated with accidents.

This proposed system provides an effective way to prevent accidents by alerting drivers about potential hazards, such as drowsiness, alcohol consumption, and smoke in the vehicle. Additionally, it can detect accidents in real-time and send GPS coordinates to emergency services, providing timely medical assistance to the injured. The system's use in the transportation sector can also reduce the number of accidents and associated costs, improving road safety and saving lives.

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