WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Intelligent Vehicle Safety and Monitoring System:

Shubham Tade[1], Rahul Rathod[1], Sakshi Kharchan[1], Mahesh Lonkar[1], Sunil Gurav[1], Shivam Wagre[1], Dr. P.S Deshpande[2]

[1]U.G. Student, Department of Computer Science & Engineering, Shreeyash College of Engineering and Technology, Aurangabad, India
[2]Assistant Professor, Department of Computer Science & Engineering, Shreeyash College of Engineering and Technology, Aurangabad, India

ABSTRACT—

Live Vehicle Tracking and Estimated Time of Arrival Leveraging GPS and IoT technology, this system enables real-time tracking of vehicles and provides continuous updates on the estimated time of arrival (ETA) using machine learning algorithms to analyze data from location data points using a GPS module. By interacting with drivers via mobile, the system provides safety alerts. Accident Avoidance Utilizing sensors, the system actively monitors the vehicle's surroundings to detect potential collisions and issues warnings to the driver with the help of the ADXL335 sensor. It also assists in maintaining a safe distance from other vehicles. Prevention Features: Automatic Braking System: In critical situations like school or college areas, the system can trigger an automatic braking mechanism to prevent accidents. The system is equipped with technology to detect the alcohol level of the driver using an MQ3 sensor. If impaired, warnings are issued, and, in some cases, the vehicle may be immobilized. Real-time monitoring of vehicle speed helps identify overspeeding. Alerts are sent to the driver to encourage safe driving

Keywords—intelligent transportation systems, accident prevention, real-time tracking, intelligent vehicle safety, GPS

INTRODUCTION

In today's era of advanced technologies, the combination of GPS and IoT has led to the development of an innovative and crucial system for vehicle safety and management. This system represents a significant shift in ensuring the well- being of drivers, passengers, and pedestrians. By utilizing real-time vehicle tracking and dynamic estimation of arrival times, this technology-driven solution employs a machine learning algorithm to analyze data from GPS modules and location data points. This not only improves fleet management efficiency but also establishes direct communication with drivers through mobile devices, incorporating a range of safety alerts. At the core of this advanced system is its proactive approach to accident prevention. Utilizing state-of-the-art sensors, particularly the ADXL335 sensor, the system continuously monitors the vehicle's surroundings, promptly detecting potential collisions and issuing timely warnings to the driver. Additionally, it actively contributes to maintaining a safe distance from other vehicles, promoting a secure driving environment. In critical scenarios, such as school or college areas, an automatic braking system takes immediate action to prevent accidents and protect lives. The system goes beyond collision prevention by integrating features designed to address driver impairment. The inclusion of an MQ3 sensor enables the discovery of alcohol situations in the motorist. In response to impairment, the system issues warnings and, in certain cases, immobilizes the vehicle, emphasizing a commitment to responsible and safe driving practices. Real- time monitoring of vehicle speed further reinforces this commitment, with cautions totally transferred to motorists displaying signs of over speeding, thereby promoting adherence to safe driving morals. In the unfortunate event of an accident, the system seamlessly transitions into deliverance operation mode. A sophisticated network of detectors, combined with impact analysis, instantly detects accidents and cautions exigency services, icing a rapid-fire and effective response. Fires within the vehicle are also instantly detected by the system's detectors, easing a nippy response to alleviate implicit disasters.

1) Arduino UNO Arduino is an open source computer tackle and software company, design, and stoner community that designs and manufactures single-board microcontrollers and microcontroller accouterments for erecting digital bias and interactive objects that can smell and control objects in the physical and digital world

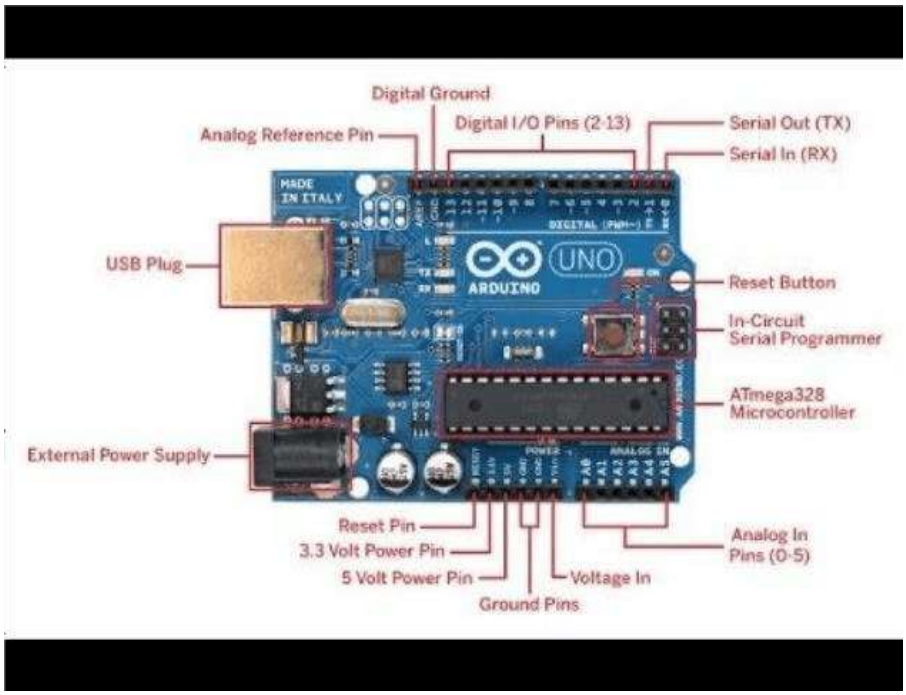

Fig 1.1 Arduino UNO

2) Motor motorist L293D: The Arduino L293D motor motorist guard companion is a robotics design that involves driving colorful types of motors. The most common types used for robotic operations include DC, servo, and stepper motors. still, these motors generally can not be driven directly by Arduino or anotherFig.1.1 Arduino UNO microcontroller. This is because of their advanced current and power conditions, so motor securities or motorist ICs are used rather. These securities, or ICs, insulate a motor's power force and use control sense from the microcontroller circuitry.Here are some crucial points about jumper cables.

1. types

-Male-to-Male (MM): Both ends have exposed male pins, used to connect components with female headers.

2. Lengths:

-Jumper wires come in various lengths, from a few inches to several inches or even longer.

3. Colors:

-They are often available in different colors, which helps organize and identify connections in a crowded circuit.

4. Materials:

-Jumper wires are typically made of flexible, stranded wire to allow for easy bending and insertion into tight spaces on a breadboard.

3) Motor motorist L293D

The Arduino L293D motor motorist guard companion is a robotics design that involves driving colorful types of motors. The most common types used for robotic operations include DC, servo, and stepper motors. still, these motors generally can not be driven directly by Arduino or another microcontroller.

4)Ultra-Sonic Sensor

An ultrasonic detector is an electronic device that measures the distance of a target object by emitting ultrasonic sound swells, and converts the reflected sound into an electrical signal. ltrasonic swells travel faster than the speed of audible sound(i.e. the sound that humans can hear). Ultrasonic detectors have two main factors the transmitter (which emits the sound using piezoelectric chargers) and the receiver(which encounters the sound after it has travelled to and from the target).

Fig1.2 Ultra-sonic sensor

5) Gear Motor X4:

Gear Motor is a generally used term that designates a hoist that derives its lifting and lowering power from a mechanical setup involving a gear set and curvaceous orelectric motor.As the name implies, a gear motor or geared motor is a motor having an attached gear assembly. The gear assembly or gear train enable the gear motor to give lower dog collar at a lower RPM than the motor alone would be suitable of furnishing.

Fig:1.3 Gear Motor X4

6) Robots Wheels X4:

Standard buses (or fixed buses) are the most common robot bus. They're simple bidirectional buses that can move on or backward. Similarly, you can use them as either a Drive or loafer bus. Wheeled robots are robots that navigate around the ground using motorized buses to propel themselves.

Fig:1.4 Robots Wheels X4

B. List of sensors:

- Arduino UNO R3: It's a small programmable board that acts as the brain of your project.
- Jumper Wires: These are special wires that allow you to easily connect different parts of your project.
- ADXL335: This is a sensor that detects movement or changes in position.
- MQ3 - Alcohol Sensor: This sensor can detect alcohol in the air.

- 16x2 LCD Display: It's a small screen that can show text or simple pictures.
- Alarm: It makes a loud sound to alert people of a specific event or emergency.
- GY-GPS6MV2 - GPS Module: This module helps you find the exact location of your project using satellites.
- GSM 800L - Sim Module: This module lets your project communicate over the mobile network, like sending texts or making calls.
- 5V Power Supply: It's a device that provides the right amount of electricity to power your project.
- FOR ABS (Auto Braking): It's a component that helps your project apply brakes automatically in critical situations.
- Ultrasonic Sensor: This sensor uses sound waves to measure the distance between your project and objects nearby.
- Motor Driver L293D: It helps control the speed and direction of motors in your project.
- Gear Motor X4: These motors are used in robotics projects to make things move.
- Robot Wheels X4: They are special wheels designed for robots that help them move around.

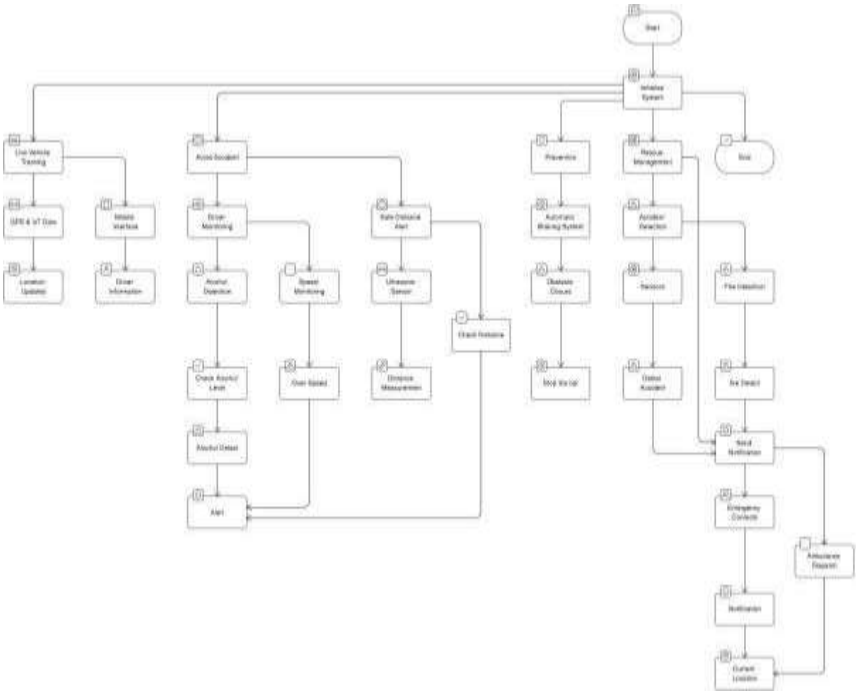

Fig:1.5 Workflow diagram

Working on:

GPS and IoT in Vehicle Tracking: The integration of Global Positioning System (GPS) and Internet of Things (IoT) technologies enables precise and real-time vehicle tracking.

Collision Detection and Warning Systems: Employing a combination of sensors such as ADXL335 collision detection and warning systems continuously monitor the environment around the vehicle.

Automatic Braking System and Alcohol Level Detection: The system includes an automatic braking system that can help reduce the severity of collisions by applying brakes autonomously in critical situations.

Real-time Monitoring of Vehicle Speed: Real-time monitoring of vehicle speed is achieved through sensors integrated into the system, allowing continuous speed tracking and assisting in identifying potential speed violations for enforcement purposes.

Rescue Management and Emergency Response: The system also encompasses components related to rescue management and emergency response. By facilitating real-time communication between vehicles, infrastructure, and emergency services, it aids in providing timely assistance during accidents or emergency situations.

SR. NO	Sensors	Price For model	Limitations	Range
1	Arduino UNO R3	650	Limited number of I/O pins Limited processing power	Bluetooth typically has a range of tens of meters
2	GSM 800L	487	if you require faster data rates, you might need to consider modules compatible with 3G or 4G networks	GSM networks typically have a range that covers large geographic areas.
3	GPS NEO 6	449	The NEO-6M is designed for 2G GSM networks. If cellular communication is required, and 2G networks are not available in your region, you might need a different module.	Horizontal Position Accuracy: Approximately 2.5 meters.
4	Jumper Wire	100	Limited Current Capacity	Jumper wires come in different lengths, typically ranging from a few inches to several inches

RESULT

- Avoid Accident:

1) Driver Monitoring and alert
2) Keep a safe distance alert to other vehicles

- Prevention

1) Automatic Braking System (ultra-sonic sensors)
2) Detect the alcohol level of the driver (MQ3)
3) Detect overspeeding *Result:* (using LM393)

- Rescue Management

1) Detect the accident (ADXL 345)
2) Fire detection
3) send a notification to emergency contact and Ambulance with the current location

ACKNOWLEDGMENT

With a profound feeling of immense gratitude and affection, we would like to thank our project guide, Dr. P.S. Deshpande, for her continuous support, motivation, enthusiasm, and guidance. Her encouragement, supervision, constructive criticism, and confidence enabled us to complete this project. We also wish to extend our reverence to Dr. P. S. Deshpande, Head of the Computer Science and Engineering Department, for motivating us to put our best efforts into this project. We express our deep gratitude to Dr. B. M. Patil, principal, for their constant motivation and for providing the necessary infrastructure. Finally, graceful thanks to family, friends, colleagues, and everyone who has directly or indirectly contributed to making this seminar a success.

Fig : module snapshot

REFERENCES

[1] Vehicle Tracking and GPS Technology: https://www.arvento.com/en/what-is-a-vehicle-tracking-system

[2] Sathe Pooja, Vehicle Tracking System Using GPS, International Journal of Science and Research (IJSR), India Online ISSN: 2319-7064, 2013. Pankaj Verma, J.S. Bhatia, Centre for Development of Advanced Computing, Mohali, Punjab, India, Design and Development of a GPS- GSM-Based Tracking System with Google Map-Based Monitoring, International Journal of Computer Science, Engineering, and Applications (IJCSEA), Vol. 3, No. 3, June 2013.

[3] Intelligent Transportation Systems (ITS) Book: "Intelligent Transport Systems: Technologies and Applications" by A. Perallosetal. Journal: IEEE Transactions on Intelligent Transportation Systems.

[4] GPS and IoT in Vehicle Tracking: "An IoT-Based Vehicle Tracking System Using GPS and Smartphone" by R. Soundarya and S. Hemalatha.

[5] Machine Learning in Vehicle ETA Prediction: Paper: "Predictive modeling of arrival times for public buses using artificial neural networks" by X. Zhu and H. Yang.