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REAL TIME EMBEDDED BASED SYSTEM FOR MONITORING THE TRAFFIC CONDITION FOR ACCIDENT CONTROL

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Abstract

This is a technology that serves as the best in the final moments of human life. Communication has reached unimaginable heights, and we believe that this technology can benefit humans more. Because the condition of our country's roads is not particularly good, and they vary dynamically, there are pitches and humps in the road in some places. The main goal is to create an Atmega328P controller that can run on an embedded system and automatically locate the site of an accident and alert those involved. Because the person involved in the accident may not be in a position to send the information, it should be done automatically. One of the leading causes of death in all places is traffic accidents. This paper provides an alert before the situation becomes dangerous and immediately shares the location of the accident. Once an accident occurs, an alert will be issued if the driver is unable to drive and his or her location is tracked using GPS (Global Positioning System).

Keywords: Embedded System, Traffic Monitoring, Accident Control, Traffic Accidents, Vehicle's Location, Alert.

Introduction

Every hour, 17 people are killed in road accidents in India. Every year, approximately 1.5 lakh people die. In 2019, this percentage increased.The number of accidents on the road is increasing every day as the number of vehicles on the road increases. Every year, the death rate rises by 2.4%. The main causes of accidents are excessive speed, drinking and driving, uncontrollable situations, and if the vehicle collides with any hard objects.Driver error is responsible for 78.4% of accidents, which includes speeding and alcohol consumption. The current system only obtains information manually. Traffic cops are used to determine whether or not a driver is under the influence of alcohol. This paper aims to reduce the number of accidents by informing drivers about some alternative solutions. When the accident happened, the location was sent as a message via GPS and GSM. This aids in quickly locating the location and providing immediate first aid. In this case, the microcontroller is crucial. This system includes sensors to keep drivers alert. Sensors such as vibration sensors, alcohol sensors, and eye blink sensors are used in this application. GPS and GSM are both used to track the location and notify the appropriate numbers via text message. [1] Aboli Ravindra Wakure and Apurva Rajendra Patkar created the system in 2015 to locate and report the location of an accident and to provide immediate assistance. GPS is used to track the location. GSM displays the position of a vehicle in terms of latitude and longitude. However, inquiring required a significant amount of human effort. [2]

According to the National Survey, the number of accidents that occur in India each year is close to 1.3 million. Around half a million people suffer from non-fatal injuries, with many becoming disabled as a result of their injury. There are two major factors that contribute to an accident. The first and most important reason is the hazardous road conditions. These are significant hindrances to safe and comfortable transportation. Maintaining our roadways in good condition is a difficult problem due to harsh weather, unexpected traffic loads, and normal wear and tear, which causes degradation of even well-laid roads. The second most important reason is driver distraction. In this paper, we discussed how we can prevent accidents in congested traffic and dangerous road conditions. We used a camera that can continuously send signals in response to changes in the road. We used a microcontroller that performs continuous image processing of the road and computes the results to prevent vehicular accidents. This operation is performed using an image processing technique. PIC controller, camera, buzzer, break sensor, and two axis robot are the component details. [3]

Using cutting-edge LED technology, it is now possible to retrain the characteristics of headlight icons in low beam as well. The glare fare connected drive high beam assistant improves visibility at night significantly. At night, the camera automatically detects traffic and relays the information to the headlights. Headlights adjust the distribution of light based on the traffic situation. [4]

With rapid economic development, transport has become an increasingly important component of the national economy and everyday life. As a result, it is critical to construct a modern traffic control system in order to alleviate road traffic congestion and reduce accidents. For example, advanced and sophisticated video surveillance systems as an important component of transportation for image acquisition, on-site snapshot, after taking of evidence, and other important tasks have become the people's consensus. In this system,

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video monitoring and traffic information transmission are critical. Monitoring systems are typically installed on motorways, traffic junctions, toll booths, and other key locations based on current traffic monitoring needs. The monitoring centre receives all of the information. [5]

Ultrasonic sensor

The GH-311 ultrasonic Motion sensor measures distances accurately and non-contactly from about 2 cm (0.8 inches) to 3 metres (3.3 yards). It has a 3-pin male header for power (+5 V), ground, and signal. The header can be connected to a breadboard or a standard three-wire extension cable. It is very simple to connect to microcontrollers, as only one I/O pin is required. The GH-311 sensor operates by transmitting an ultrasonic burst (well above human hearing range) and providing an output pulse corresponding to the time required for the burst echo to return to the sensor. The distance to the target can be easily calculated by measuring the echo pulse width. [6]

Research Methodology

When a high-risk situation is identified in an uncontrolled situation or as a result of carelessness, the driver should be alarmed. This may assist drivers in controlling their vehicles, potentially avoiding an accident. This is only possible if the system operates quickly. Manual mode is still used to obtain various information, and the existing system and traffic cops are used to determine whether or not the driver has consumed alcohol. This paper employs WSN (Wireless Sensor Networks) for detecting accident locations and alerting authorities about accidents, as well as vehicle tracking via GPS modem. The proposed work employs a PIC Controller, Eye Blink Sensor, Vibration Sensor, Alcohol Sensor, Power Supply, GSM, GPS, Relay, and Motor. The block diagram depicts the various sensors used in our system, including the microcontroller, buzzer, GSM, GPS, relay, motor, and LCD display. Figure 1 depicts the proposed system's block diagram.

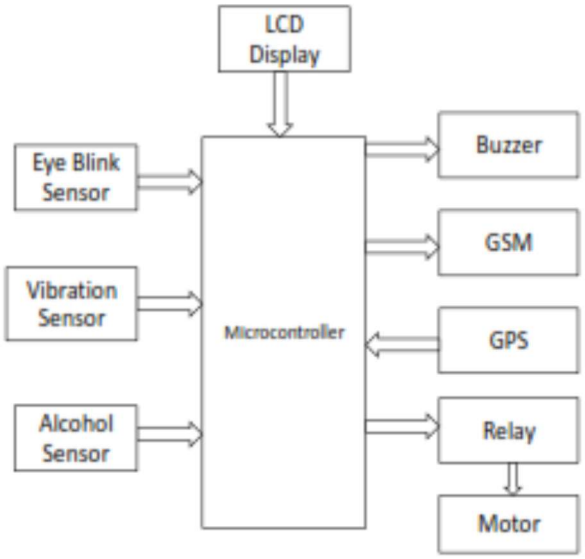

Figure 1 Block Diagram

Result and Discussion

The LCD display, which is an electro-optical amplitude modulator, is used to display sensor messages and alerts. Automobiles use buzzers, which are sharp and bright electronic signalling devices that alert the driver. This emits a warning sound in the form of a continuous, beeping, or intermittent buzzing. GPS provides the vehicle's location, whereas GSM provides both longitude and latitude. GPS is also used for navigation. GPS can provide a unique address for any location on the planet. GSM is based on digital technology. GSM offers international roaming, increased spectrum efficiency, and low-cost base stations. It has access to multiple technologies and uplink and downlink frequencies. In this system, the relay serves as the switch and is controlled electrically. The movement of the vehicle is indicated by the motor. This paper focuses on how an automatic accident and prevention system can provide greater safety and sophisticated security. This module keeps track of all hazards and threats. The proposed solution is user-friendly. This is useful in taxis, buses, and trucks. Figure 2 depicts the outcome of the proposed idea. [7-8]

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Figure 2: Accident Detection, Alert and Tracking System

The proposed system alerts and detects the occurrence of an accident and sends the information to the registered number. This is accomplished after several attempts. In the worst-case scenario, the vibration sensor activates and transmits the message shortly after the accident occurs. The GPS locates the accident site, and the GSM transmits the message. If an accident occurs, the module sends data to the specified number. These were discovered after several trails and worked out well. These can be used in any network-capable area. Because the location is easily found, this aids in providing medical treatment as soon as the accident occurs. [9-10]

Implementation of Traffic Monitoring System Based on Embedded Web Technology

This paper describes a method for implementing remote traffic monitoring using embedded WEB technology and the Internet via Web Server applications solidified in an embedded ARM processor. As a result, as shown in Figure 3, managerial personnel can have remote real-time monitoring of traffic management via Web browsers without regard to time or geography. Traditional local monitoring's time-consuming effort, as well as deficiencies in equipment maintenance, are effectively overcome, and traffic management efficiency is greatly improved. To classify information, embedded Web Server applications use various classification treatments based on the types of information, which are then properly displayed in browsers. Particular emphasis is placed on the effective separation of confidential and public information. [11]

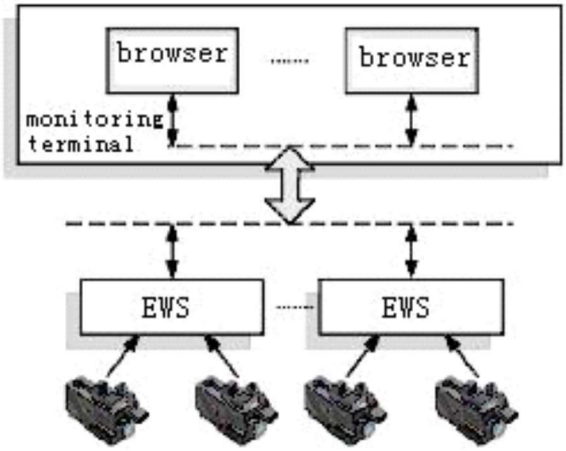

Figure 3: Embedded video monitoring system

The embedded Web traffic monitoring system is built around embedded Web technology. Meanwhile, it is integrated with traffic information acquisition, surveillance, control, information publication, and other traffic control functions. The collected traffic data is then stored, managed, transmitted, analysed, and displayed. The entire project will be split into two subsystems. The first system will

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monitor red signal violations at traffic lights. The Raspberry Pi board, camera, and one ultrasonic sensor will be used in this system. When the traffic light turns red, the ultrasonic sensor in the signal unit begins to detect vehicles that are violating traffic laws. If a vehicle violates the red signal, the ultrasonic sensor GH-311 will detect it. At the same time, the camera will take a picture of the vehicle and send it to the monitoring centre via web technology. As a result, the system at the signal unit will have a database of all vehicles that have broken a traffic rule. We will also use ultrasonic sensors to monitor the vehicle's speed. As soon as the vehicle enters a specific road, the ultrasonic sensor detects it and the system begins the counter. The counter will be incremented until the same vehicle cuts the second ultrasonic spot at a specific distance from the first ultrasonic sensor. [12]

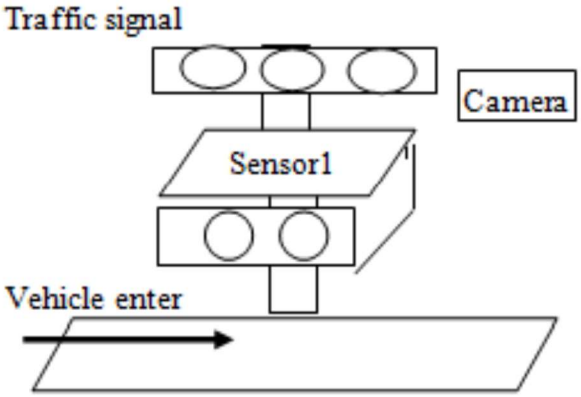

Figure 4: For Vehicle Detection

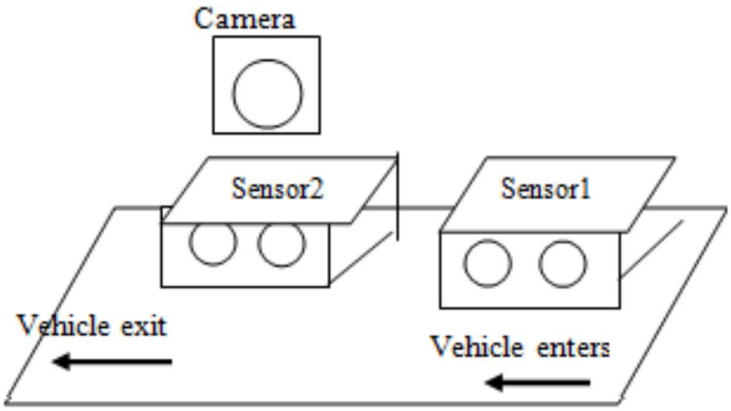

Figure 5: For Speed Measurement

Conclusion

WSN is used in the proposed work to work more efficiently than the other manual functions. Our model is completely automatic, whereas the other requires manual intervention. This allows you to easily locate the system's location. The specifications we used will produce superior results to any other models. Because it is fully automated, the system ensures better prevention, safety, and security. The system we use employs user-friendly wireless sensors to alert drivers. The system employs embedded Web server technology to implement data collection and monitoring via a modular structure and a heterogeneous network that is seamlessly linked. The embedded Web-based traffic monitoring system has low power consumption, high integration, real-time efficiency, and easy scalability.

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