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Research Article

VEHICULAR COMMUNICATION BASED INTELLIGENT COLLISION WARNING SYSTEM

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A R T I C L E I N F O

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A B S T R A C T

In the era of automation, the transport system should be proactive to avoid accidents due to high traffic population. In this work proposes a vehicle-to-vehicle communication protocol for comparative collision warning. The wireless data communication between two vehicles is provided by introducing ZigBee technology. It is designed around low-power consumption allowing batteries to essentially last forever. The distance measurement is provided by ultrasonic sensors. Ultrasonic sensors are transmitting and receiving ultrasonic signals. Road accidents account for a severe threat to human lives from both an injury as well as a financial perspective. Today, special attention is focused on the technologies that can reduce traffic accidents. The microcontroller controls entire process, it is programmed to send a signal to buzzer and ZigBee when the distance range is obtained. The main objective of this project is to alert the driver when he is close to the front vehicle.

INTRODUCTION

Road accidents account for a severe threat to human lives from both an injury as well as a financial perspective. Given that vehicles are designed to facilitate a smooth means of transportation, manufacturers have long been in the process of designing vehicles based on principles of reliability and safety. However, due to reasons such as human-error, circumstantial error and negligence, accidents occur. Today, special attention is focused on the technologies that can reduce traffic accidents. V2V technologies are simple to implement primarily because of their reliance on wireless communication.

The communication protocol includes ZigBee to communicate the information between two vehicles. The distance measurement between two vehicles is done by Ultrasonic sensor. The microcontroller controls entire process, it is programmed to send a signal to buzzer and ZigBee when the distance range is obtained. The main objective of our project is to alert the driver when he closes to the front vehicle.

Proposed design is cost-effective, reliable and has the function of accurate speed tracking and controlling. It is completely integrated system so that it can be implemented in all vehicles, then it is easy to track and control vehicles at any time. The accidents can be avoided if we control the speed of the vehicle. The use of GSM and GPS technologies allows the system to track object. If a password like SMS is sent by the owner, it automatically stops the vehicle or we can use it for different.

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This work can provide real time control. The current system can be able to provide monitoring process from anywhere. The purpose of this system is to design and integrate a new system which is integrated with GPS- GSM to provide following feature: a) Location information, b) Real time tracking using SMS, c) track bus driver activity d) Communication is instantaneous therefore we can receive running report quickly.

LITERATURE SURVEY

In this paper they introduce an active alarming system for moving vehicles using Global Positioning System (GPS) and a wireless communication module Initial work focused on systems where a vehicle would gauge obstacles in its path through the use of cameras, radars, acoustic systems, etc. A Vehicular collision warning systems (CWS) cannot identify heterogeneous obstacles, however, based on the propagation property of the wireless system, the obstacle can be detected. Numerous studies have been made on CWS where GPS data including speed and direction are transmitted to other vehicles. A CWS cannot identify heterogeneous obstacles, however, based on the propagation property of the wireless system they can detect obstacle. [1]

In this paper many of the applications requires real-time communication with high reliability. To meet a real-time deadline, timely and predictable access to the channel is paramount, existing vehicle- to-vehicle safety systems together with new cooperative systems using wireless data communication between vehicles which can potentially decrease the number of accidents on the highway road in India i.e. transmit the messages within deadlines. Lane departure warning messages are send to the driver if he crosses the lane. [2]

In this paper constructed data pilot (CDP) estimator for the current communication standards, by fully exploiting the channel correlation characteristics across two concatenated symbols. On the basis of the CDP estimator, we further resort to two efficient techniques to improve its performance over the entire signal-to-noise ratio (SNR) region. For the first technique, the time-variant mobile channel is modeled as a first-order process so that the exact autocorrelation value of the two adjacent symbols can be derived. For the technique, the SNR is estimated and serves as priority information. For V2V communication systems, the design of channel estimation technique is much more difficult and significant than any other wireless system. This report focuses on one of the most important challenge among these deficiencies [3].

This paper proposes a vehicle-to-vehicle communication protocol for cooperative collision warning. And the research what they have gone is traffic accidents have been taking thousands of lives each year, outnumbering any deadly diseases or natural disasters. Studies show that about 60% roadway collisions could be avoided if the operator of the vehicle was provided warning at least one-half second prior to a collision. Using V2V communication, A can send warning messages once an emergency event happens. If vehicles B &C and can receive these messages with little delay, the drivers can be alerted immediately. In such cases, C has a good chance of avoiding the accident via prompt reactions, and benefits from such warnings when visibility is poor or when the driver is not paying enough attention to the surroundings. Thus, the vehicle to-vehicle communication enables the cooperative collision warning among vehicles A, B &C A Vehicular Collision Warning Communication (VCWC) protocol is discussed in this paper. [4]

In this paper they have discussed about the security and theft prevention. The security goals are achieved by the GSM, GPS technology. The system has two main units. The first is security unit which is embedded in the vehicle. This unit consists of a GSM modem, GPS receiver, control relay, current sensor and Microcontroller.

When the car is in motion, the client receives a confirmation SMS indicating the status. If this is illegal or any intruder tries to run the car, the owner can send SMS to switch off the car. The system will also check the mobile number of the message sender, to confirm that the phone number is legal or illegal to access the system and if the phone number is legal the system will turn off the car. [5]

METHODOLOGY

The below figure 1 shows the Block diagram of v2v communication protocol The ZigBee which act as transceiver will send the signal to the microcontroller, then from microcontroller an alerting message will be send to the concerned person. The distance sensor consisting of ultrasonic sensor will measure the distance between the vehicles before collisions. Hence the distance sensor act as an input to the microcontroller the measure of distance will help in avoiding the collision. The GPS and GSM modem are used to acquire and track the satellites simultaneously the SMS will be send to mobile which act as receiver.

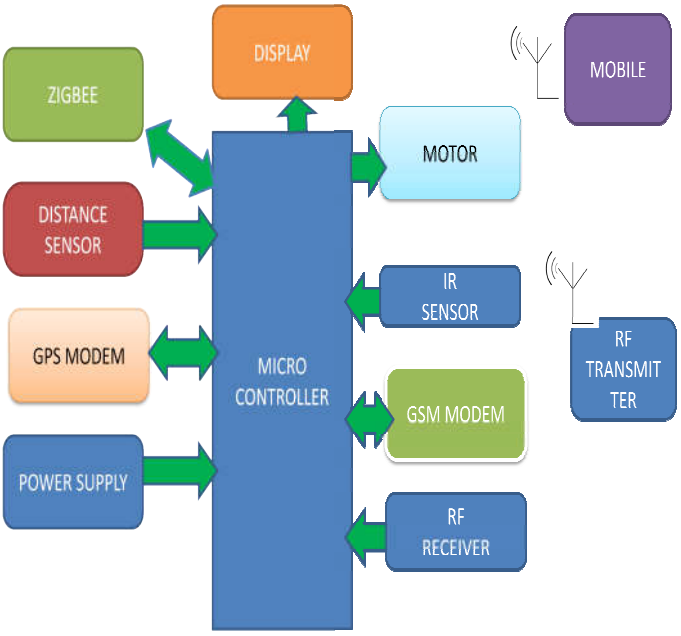

Figure 1 Block diagram of v2v communication protocol

The power supply or battery is required to do the following process; hence we are giving 9V input voltage but microcontroller requires 5V. Hence the inbuilt circuit consisting of step down transformer and rectifier will supply the required voltage for the number of devices connected to it. Meter act as output which used to display the speed at present. The DC motor act as output which converts electrical energy in to mechanical energy. The 2*16 LCD displays which is an output will display the current job in process. The radio frequency i.e. RF transmitter and RF receiver which act as both input and output for micro controller. They are also known as transceiver; they both send and receive the signal. It works on the principle similar to radar or Sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. They generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. The design and development of the project work have done in the following steps. Literature review on park assist system algorithms and architectures has been carried out by referring the journals, books, websites and the related documents. A suitable algorithm for parallel parking and the reverse maneuvering have been identified from the pertaining literature, Fuzzy logic algorithm is proposed as a part of the work. Sub-modules for parking place identification and reverse maneuvering techniques have been identified from the reviewed literature. Sub-modules of above techniques are developed by using Stimulant platform. The proposed fuzzy logic controller is mapped to State flow logic of Simi link. The developed sub-modules are integrated to verify the functionality using control desk environment of space. A suitable sensor (distance sensors) and actuators (DC motors) are selected for whole system as per requirement. The designed algorithm implemented on DS 1104 R & D controller board and as well as Arduino Uno R3 board and the results obtained have been verified against the results from the simulated output. RF transmitter and RF receiver which act as both input and output for microcontroller. They are also known as transceiver; they both send and receive the signal.

RESULTS AND DISCUSSION

This section includes result and discussion of our project. The obtained result of each step is presented in this chapter. It results are presented in the form of snapshot. When the kit is on, initially the LCD displayed "loading wait for a moment "the below figure shows that initially when the kit is on. After some time the LCD displayed as "GSM is connected and on". It indicates the GSM is now ready to use.

Then next step is GPS range, initially LCD will displayed as "no GPS range wait for a moment" After some time GPS is connected. By using mobile the person will send the message to the GSM. That message is "track vehicle". GSM will receive the message from the person.

The GPS receiver will receive the message from satellite. It passes the message it to LCD. The LCD displayed the longitude and latitude of the vehicle and the GSM will send that message to the concerned person. The below Fig 4 shows that longitude and latitude of the vehicle.

Fig 2 longitude and latitude of the vehicle

The ultrasonic sensor will measure the distance between two vehicles. In ultrasonic sensor there are two ports one is transmitter and another one is receiver. The transmitter will trigger the pulse, the triggered pulse will hit the obstacle and it comes back to the receiver. The receiver will receive the triggered pulse and calculate the distance between two vehicles using the distance, time, speed of light relation.

Fig 3 Distance between two vehicles is less than 60

In this work the two conditions as follows, if the distance is less than 60 the vehicle starts reducing speed. if the distance is less than 30 the vehicle will stop. If the vehicle is trying to cross the line in the road, hence as we know that the dark color absorbs the light and the light color emits the light, the IR sensor will detect the white line which is present in the road. It will indicate by buzzer; vehicle will automatically turn left. LCD will display as "moving to left". The below Fig 4 shows that lane guiding using IR sensor. In this work we are using ZigBee, hence it acts as transceiver. Hence the ZigBee transmitter is placed in the accident zone and the receiver is placed in the vehicle the signals which are received from the accident zone by means of which the driver will get an alerting message to reduce the speed of vehicle the driver fails, LCD displayed as "school zone is ahead", then with the help of programming the speed of the vehicle starts decreasing and after The below figure 4.3 shows that distance between two vehicles. passing the school zone, the vehicle can have retained its original position. The below figure 5 shows that accident and school zone alert.

With the help of IR rays an alerting signal will be send for the driver when he is in drowsiness state, if the driver is driving the vehicle at the night time if he gets sleep his eyes will be in the position to closed, then at that time the IR rays continuously monitor will alert the driver by alarm. The ZigBee act as transceiver by sending the information, if any road damages or a danger zones are present with the help of which the driver can maintain safety and thereby he can drive safely.

Fig 4 Distance between two vehicles is less than 30

Fig 5 lane guiding using IR sensor

Fig 6 accident and school alert using ZigBee

With the help of GPS the vehicle location is obtained. If some accidents occur or in some unnecessary condition vehicle tracking plays an important role. Initially the GPS will locate the angle i.e. the longitudinal and latitude values of the vehicles location with the help of Google map we can find the location of the vehicle.

Complete model of work

The Collision Warning system uses a distance sensor to detect vehicles or obstacles in front of the car. The system calculates the distance to the object in front and, if the car gets close enough that there is a risk of collision sounds an alarm and displays a visual alert, prompting the driver to apply the brakes. Forward Collision Warning alerts you if an object in your path has suddenly stopped or slowed down, so you can react faster. FCW will significantly reduce the chance of a crash or a fatal accident. As per the design of programming the vehicle speed can be control if the vehicle crosses limited

speed in accident zone or in the danger zone like school zones, hospitals.

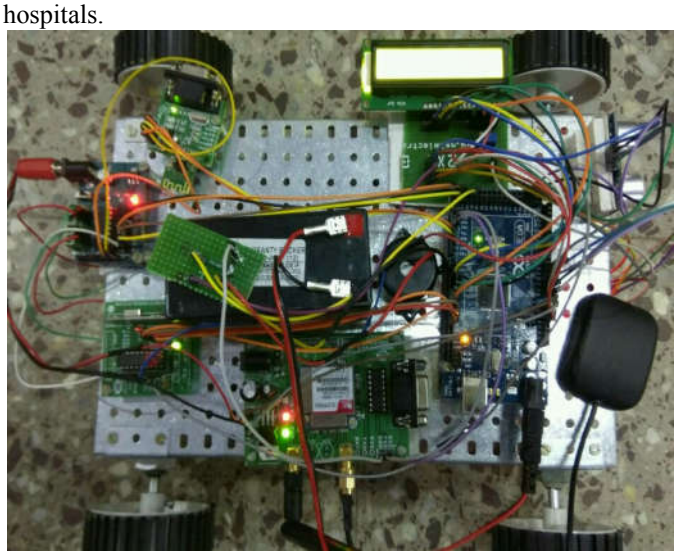

Fig 7 complete model of proposed work

CONCLUSION

In this report, we focused on the number of traffic problems which are taking many lives in our society day to day, Hence the main ambition of our project is to reduce the number of accidents by implementing our project in all vehicles in future. To overcome the present situation of the traffic and accidents we are using the mentioned technologies to reduce the number of accidents. In our project we are using IR sensor to detect the drowsiness and by alerting the driver if he is facing that situation. We are using ZigBee which act as transceiver to detect if any danger or accident zones are present by using GSM and GPS technologies alerting message will be send to the driver with the help of which he can manage his speed which results in reducing the number of accidents. The collision can be avoided by using the ultrasonic sensor which detects the distance between the vehicle and alert the driver before collision and the discipline driving by following the lane. We are using a lane guider with the help of which the above can be obtained. Major scope for the future is to go with real time and for real four wheel vehicles with BLDC motors, characteristically described as follow Random parking space selection Inclusion of neural network in addition to fuzzy logic. Time saving methodologies. Higher end implementation with enhanced motors. Improvement in steering angle. Artificial intelligence. With use of more ultrasonic sensors we can improve the efficiency. Use of vision based system for parking place identification will minimize the parking space measurement error.

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