

An Intelligent Approach for Vehicle to Vehicle Communication

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Abstract— In day to day life, the occurrence of accidents has become enormous. To reduce accidents and to improve the road safety, vehicle to vehicle communication is essential. This is an embedded model system to indicate the over speed and automatically control the over speed condition. This is constructed with the RF wireless communication. The RF transmitter is used to transmit the signal by using the encoder. The RF receiver will receive the signal by using the decoder. The signal is given to the microcontroller, which is a programmable IC. The keypad is used to transmit the request signals like vehicle brake failure, heavy load, etc. The microcontroller will indicate the actual condition (eg. heavy load, brake failure) and by displaying on the LCD. The ultrasonic sensor is used to sense the distance between the two vehicles. The microcontroller will automatically reduce the speed. One more feature updated in our project is the accident identification and transmission to the nearby vehicles, so that upcoming vehicles can get an alert signals. The vibration sensor is used to sense the accident, and then the signal is fed to the microcontroller. The information will be automatically transmitted to the backend vehicles successfully with suitable alertness as well as the SMS alert to the nearby hospital or ambulance through GSM modem with help of GPS module. The GPS is used to track the location.

Key words: Vehicle to Vehicle Communication

I. INTRODUCTION

V2V is a technology designed to allow automobiles to communicate to each other. They can be effective in avoiding accidents and traffic congestion. One third of fatal or serious accidents are associated with excessive or in appropriate speed, as well as changes in the roadway (like the presence of road-work or unexpected obstacles).

Reduction of the number of accidents and mitigation of their consequences are a big concern for traffic authorities, the automotive industry and transport research groups. These systems are inoperative in case of unexpected road circumstances (like roadwork, road diversions, accidents, etc.), which would need the use of dynamically. The key idea offered by this project is to use Radio Frequency Identification (RFID) technology to tag the warning signals placed in the dangerous portions of the road.

The main motivation for vehicular communication systems is safety and eliminating the excessive cost of traffic collisions According to World Health Organizations (WHO), road accidents annually cause approximately 1.2 million deaths worldwide; one fourth of all deaths caused by injury. Also about 50 million persons are injured in traffic accidents. Preventive measures are to be taken otherwise the road deaths are likely to become the third-leading cause of death in 2020 from ninth place in 1990.

In 2005, Marc Torrent described his idea on vehicle to vehicle communication fair transmit power control for

safety critical information. This system is based on direct radio vehicle to vehicle communication. Direct radio-based vehicle-to-vehicle communication can help prevent accidents by providing accurate and up-to-date local status and hazard information to the driver. Two types of messages are used for traffic safety related communication: 1) Periodic messages that are sent by all vehicles to inform their neighbours about their current status and 2) event-driven messages that are sent whenever a hazard has been detected. The main drawbacks of this system was that it did not contribute to the original goal of improving road traffic safety as in uncontrolled saturated channel conditions, both types of messages might not be received.

II. PROPOSED SYSTEM

This proposed system makes use of PIC Controller for controlling the whole setup. The controller accepts 5V of dc voltage and it supplies to other parts of the controller. The ultrasonic sensor is used for sensing the distance between vehicles. With the help of this sensor, distance of about 3m can be sensed. In the case of unavoidable accidents, vibration sensor is used for sensing the accident. GSM is used for sending and receiving the messages and GPS is used for finding the location.

In addition to this, the system also comprises certain additional features like keypad, LCD and buzzer. When problems like brake failure, heavy load, they can be informed to other vehicles pressing the keypad and it will be displayed in the LCD. Also, when accident occurs, buzzer will operate indicating the occurrence of accidents.

A. Block Diagram

The main objective of the project is to improve road safety especially when it is operated beyond the limit in the speed restricted area and to reduce the number of accidents and leading vehicle accident identification system.

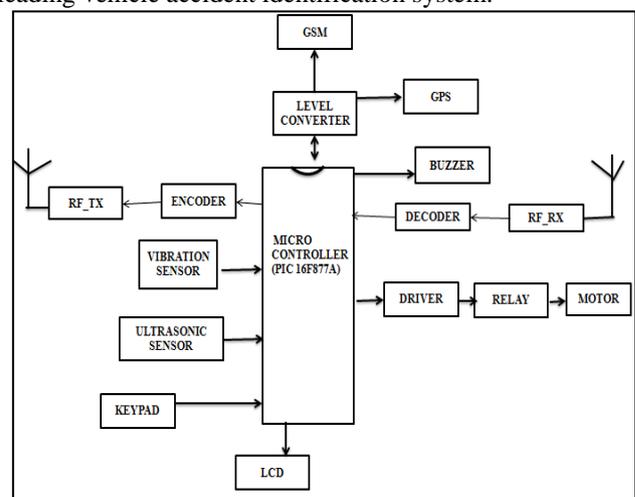


Fig. 1: Block Diagram

Car to car communication between two vehicles are done by using RF communication for transmitting and receiving the data's. Keypad is used as switch for alerting and sending information between vehicle (i.e 1 → Break failure, 2→ heavy load etc) there is a key and SMS will be sent to the hospitality persons. Speaker and voice board is placed for communicating when vehicles come near to the user vehicle. Similarly vehicle2 also works but we are not using relay and motor for lacking of cost. Zone unit is used for automatically controlling the speed of the vehicle in the zone areas with the help of RF transmitter, encoder and code selector. The code selector is used for limiting the speed of the vehicle. Here code selector is used as a switch in the kit.

The information is transmitted with the help of RF transmitter and encoder. The data cannot be transmitted directly to the RF transmitter so we are using encoder, the encoder IC we are using HT12E. The purpose of encoder is transmitting the many input data into single output data. An encoder can be a device used to change a signal (such as a bit stream) or data into a code. In general, the RF transmitter is an ideal for remote control applications where low cost and longer range is required. The transmitter operates from a 1.5-12V supply, making it ideal for battery-powered applications. The transmitter employs a SAW-stabilized oscillator, ensuring accurate frequency control for best range performance.

Similarly the RF receiver works with the help of decoder and RF receiver module we are using 433MHz. The data will be received by using Decoder and Buffer. A decoder is a device which does the reverse of an encoder, undoing the encoding so that the original information can be retrieved. Just reversing the same method used to encode is for decoding. In digital electronics this would mean that a decoder is a multiple-input, multiple-output logic circuit that converts coded inputs into coded outputs.. Decoding is necessary in applications such as data multiplexing, 7 segment display and memory address decoding. The HT12D is a decoder IC made especially to pair with the HT12E encoder. It is a CMOS IC made for remote control system application. The decoder is capable of decoding 8 bits of address (A0-A7) and 4 bits of data (AD8-AD11) information. The selection of a pair of either encoder or decoder should be with the same number of address and data format. The decoders will receive serial addresses and data from programmed encoders that are transmitted by a carrier using an RF or an IR transmission medium. They compare the serial input data thrice continuously with their local addresses. When no errors are detected, the input data codes are decoded and are then transferred to the output pins. The VT pin also goes high to indicate a valid transmission. The decoders are capable of decoding information that consists of N bits of address and 12_N bits of data. Of this series, the HT12D is arranged to provide 8 address bits and 4 data bits, and HT12F is used to decode 12 bits of address information.

Buffer is used for boosting the voltage and we are using 74541 IC for the buffer. RF receiver is an ideal for short-range remote control applications where cost is a primary concern. The receiver module requires no external RF components except for the antenna.

Driver is connected to the relay for switching up the load (Motor) for ON and OFF. Initially relay will be in closed

condition when supply is switched ON. The relay consists of 5 pins they are open, close, no connection and remaining two pins for connecting the load.

III. PERFORMANCE EVALUATION

With the help of ultrasonic sensor, any object that may be a vehicle /tree/human will be sensed and thus, the vehicle will be stopped. In this proposed system the speed of the vehicle is automatically controlled with the help of the microcontroller. If an accident occur, message will be sent to person whom to be informed. This is performed with the help of GSM module.



Fig. 2: Hardware Kit

In order to make understand the mechanism of V2V communication, two conditions were demonstrated. One is the brake failure condition and other is heavy load that comes near the vehicle.

When accident occurs, message is sent to the person whose number was provided.

A. Break Failure Condition

When brake failure condition occurs, the driver will intimate the problem to the nearby drivers of different vehicles by pressing the corresponding key from the keypad. Thus, the condition of the vehicle will be displayed as a message in the LCD placed in the other vehicles.

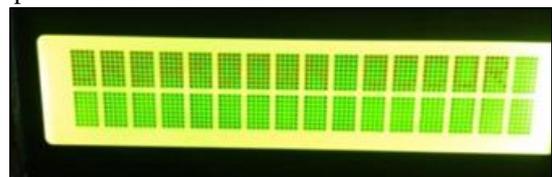


Fig. 3:

B. Heavy Load Condition

During the heavy load condition, the backend vehicles are intimated by pressing the corresponding key from the keypad. By this way, the message is received and displayed in LCD.

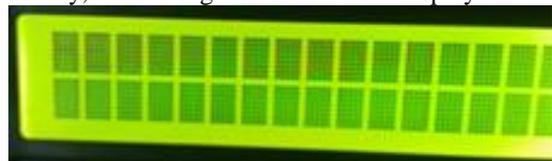


Fig. 4:

C. SMS

With the help of GSM, sms is sent to the person to whom it has been programmed. This will allow that person to know about the accident. With the help of this message, the location can be tracked from where it is being received. This is done by means of GPS provided with the model.

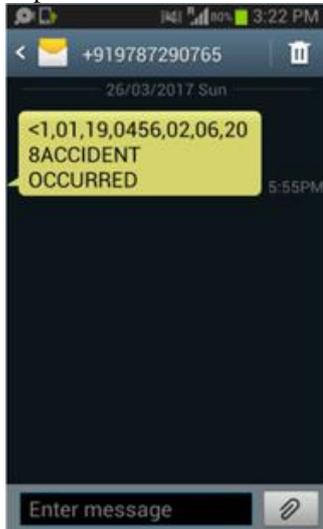


Fig. 5: SMS

IV. CONCLUSION

This proposed model has achieved the main objective stated earlier which is analyzing and implementing the wireless communication; Thus, this system would act as a benchmark rendering effective and quick response from the cops for reporting use of vehicle communication while driving by the drivers. Also, it could be fitted onto existing vehicles, requiring to special setups. This model could help to save precious human lives by reporting the use of heavy load, brake failure and etc., while driving, and then the success of our project would have been achieved. This may avoid many accidents on the spot as the life of human beings is more important than anything.

During a critical situation many vehicles may face accident, due to this lives are lost. With this project when a vehicle met with an accident the vehicle number and persons contact number will transferred to police control room or a rescue team immediately. So the police can as soon the information is received trace the location. After conformation of the location, necessary action will be taken.

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