

# Vehicular Communication And Accident Prevention By Using Multiple Sensors And Zigbee Technology

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*Abstract: The project aims to detect and prevent the vehicle from the accident. The Vehicular communication and accident prevention system is built with Ultrasonic Sensor, Vibration Sensor, and ZIGBEE Technology. ZIGBEE based units is installed at necessary waypoints, transmitting relevant information to the corresponding ZIGBEE units installed in particular vehicles. The Ultrasonic Sensor detects the obstacles and ZIGBEE is used in the area of speed breakers, school zones and accident zones. If any accident detected by sensor network the information is send to the back coming vehicle through ZIGBEE technology.*

**Keywords: ATMEGA328, ULTRASONIC SENSORS, VIBRATION SENSOR and ZIGBEE**

## I. INTRODUCTION

Transportation has great importance in our daily life and its development has made many of our chore much easy. But it can cause disaster to us and even can kill us through accidents. during 2008, road traffic injuries ranked fourth among the leading causes of death in the world. Nearly 1.3 million people die every year on the world's roads and 20 to 50 million people suffer non-injuries, with many sustaining a disability as a result of their injury. Road traffic injuries are the leading cause of death among people. If no action is taken, road traffic crashes are predicted to result in the deaths of around 1.9 million people annually by 2020. This accident detection system using ZIGBEE Technology has gained attention.

This project aims to detect and prevent the vehicle from the accident by using Ultrasonic Sensor, Vibration Sensor and ZIBGEE Technology. The Ultrasonic Sensor is placed in front of the vehicle to measure the front vehicle distance if it is beyond the limit distance, the buzzer indicate the driver to be alert. If the vehicle met an accident then the Vibration Sensor sends the

information to the vehicle through ZIGBEE technology and it would indicate and alert the driver as safe.

### A. ULTRASONIC SENSOR

The Ultrasonic Sensor signals which are similar to audible sound waves, except its frequencies are much higher. Ultrasonic Sensor can provide the initial information on distance to obtain the parameters for further methods to perform task. They are signals that are almost like audible sound waves, except those frequencies are higher. The Ultrasonic transmitter has a piezoelectric crystals which reverberate to a desired frequency. This converts the electric energy into acoustic energy and also vice versa. The sound waves, which are transmitted in the shape of a cone, are reflected back from the target to the transducer. The output signal is fabricated into perform some kinds of designating or control function. Minimum distance from the sensor is necessary to issues a delay in time so that the echoes can be elucidated. Ultrasonic transducer produces an ultrasonic signal. These signals are generated through a sensing medium. The very same transducer is used to detect receiving signals. The ultrasonic sensor measures the distance from the selected point of the ground to the vehicle. The measurement of the ultrasonic sensor

is based on the time of flight of an ultrasonic pulse to its reflected wave from the ground. This sensor is adaptable for any kind of weather condition.

#### B. VIBRATION SENSOR

The Vibration Sensor detector is designed for the security practice, when Vibration Sensor alarm recognizes movement or vibration, it sends a signal to either control panel. Developed a new type of omni-directional high sensitivity security vibration detector with omni-directional detection.

This sensor buffer a piezoelectric transducer. As the transducer is displaced from the mechanical neutral axis, bending creates strain within the piezoelectric element and generates voltage.

#### C. DC MOTOR

A DC motor relies on the facts that like magnet poles repels and unlike magnetic poles attract each other. A coil of wire with a current running through it generates field aligned with the center of the coil. By switching the current on or off in a coil its magnetic field can be switched or by switching the direction of the current in the coil the direction of the generated magnetic field can be switched 180 degree. A simple DC motor typically has a stationary set of magnets in the stator and an armature with a series of two or more windings of wire wrapped in insulated stack slots around iron poles pieces (called stack teeth) with the ends of the wires terminating on a commutator.

The armature includes the mounting bearings that keep it in the center of the motor and the power shaft of the motor and the commutator connections. The windings in the armature continues to loop all the way around the armature and uses either single or parallel conductors (wires), and can circle several times around the stack teeth. The total amount of current sent to the coil, the coil's size and what it's wrapped around dictates the strength of the electromagnetic field created. The sequence of turning a particular coil on or off dictates what direction the effective electromagnetic fields are pointed. By turning on and off coils in sequence a rotating magnetic field can be created. These rotating magnetic fields interact with the magnetic fields of the magnets (permanent or electromagnets) in the stationary part of the motor (stator) to create a force on the armature which causes it to rotate. In some DC motor designs the stator fields use electromagnets to create their magnetic fields which allow greater control over the motor. At high power levels DC motors are almost always cooled using forced air. The commutator allows each armature coil to be activated in turn. The current in the coil is typically supplied via to each coil via two brushless DC motors have electronics that switches the DC current to each current to each coil on and off have no brushless to wear out or create sparks.

#### D. BUZZER

A buzzer is an audio signaling device, which may be mechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of

users input such as a mouse click or key stroke. In mechanical a joy buzzer is an example of a purely mechanical buzzer. In electromechanical field early devices were based on an electromechanical system identical to an electric bell without the metal gong. Similarly, a relay may be connected to interrupt its own actuating current, causing the contacts to buzz. Often these units were anchored to a wall or ceiling to use it as a sounding board. The word "buzzer" comes from the rasping noise that electromechanical buzzers made. In piezoelectric field a piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.

#### E. LCD DISPLAY

LCD stands for Liquid Crystal Display. The LCD can display messages in two lines with 16 characters each. It display all the alphabets, Greek letters, punctuation marks, mathematical symbol etc. In addition, it is possible to display symbols that user makes up on his own. Automatic shifting message on display (shift and right), appearance of the pointer, backlight etc. are considered as useful characteristics.

LCD screen consists of two lines with 16 characters each. Each character consists of 5x7 dot matrix. Contrast on display depends on the power supply voltage and whether messages are displayed in one or two lines. For that reason, variable voltage 0-vdd is applied on pin marked as Vee, Trimmer potentiometer is usually used for that purpose. Some versions of displays have built in backlight (blue or green diodes). When used during operating, resistor for current limitation should be used like with any LCD diode. LCD is finding wide spread use replacing LEDs because of the following reason:

- ✓ The declining price of LCDs. The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.
- ✓ Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD.
- ✓ In contrast, the LED must be refreshed by the CPU to keep displaying the data.
- ✓ Ease of programming for characters and graphics.

#### F. ZIGBEE

ZIGBEE is a spine of Wi-Fi technology. It is a RF modem from digital international is wireless transceiver. The ZIGBEE uses a fully implemented Protocol for data communications. It is very suitable for high level communication protocols. ZIGBEE also known as WPAN (wireless personal access network). It is based on IEEE 802.15.4 standard technology. ZIGBEE is like Bluetooth technology whose area of communication is up to 20 meters with line of sight communication with low power consumption. ZIGBEE communication range can be increased up to 100 meters with high power consumption. ZIGBEE Works on 2.4 GHz radio frequency to transport the reliable and easy to use standard across the world ZIGBEE network use mesh network with 128

bit symmetric encryption keys. The transfer rate of ZIGBEE is around 250 kbps which is very suitable for intermittent data transmission from input devices like sensor. ZIGBEE chip include radios and microcontroller that have 60 – 256 kb flash memory. ZIGBEE mesh networking between broadcast communications, every time smart car read a new RFID tag, ZIGBEE module will be broadcast once, and broadcasting is According to CSMA / CD Sense Multiple Access / Collision Detection Technology. Specific workflow is: Uploading underlying Dashboard update RFID tag information; advanced control panel for data encapsulation process, sending encapsulated data to the ZIGBEE module; ZIGBEE module query the current usage of the channel, if it is idle, a connection is established, then transmit data. If the channel is occupied, the system would delay period of time, then testing whether the channel is idle.

## II. VEHICULAR COMMUNICATION AND ACCIDENT PREVENTION SYSTEM

This system deals with Accident prevention of vehicle by using multiple sensors such as Ultrasonic Sensor, Vibration Sensors and ZIGBEE Technology. The system comprised of Accident prevention Vehicular communication.

### A. ACCIDENT PREVENTION

The accident prevention module consists of ultrasonic sensor and vibration sensor. The ultrasonic sensor detects the obstacle and send the signal to the microcontroller and it will send the command to reduce the speed of the vehicle. The vibration sensor is used to vibrate along with the alarm system to alert the driver.

### B. VEHICULAR COMMUNICATION

The vehicular communication module consists of ZIGBEE transmitter and receiver which is fixed in the

particular way and it detects school zone areas and speed brakers. The transmitter send the information to the ZIGBEE receiver which is fixed in the vehicle through the microcontroller ATMEGA328. The message will be displayed in the LCD.

## III. CONCLUSION

Vehicular Communication and Accident Prevention System by Using Multiple sensors and ZIGBEE Technology is designed to prevent the vehicle accidents. When accident occurs, short message including location of accident obtained using ZIGBEE Technology. This system provides enhanced security for the vehicle and safeguard the lives of people while driving.

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