# Smart Highway System for Future Cities Based on IoT

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**ABSTRACT**:A smart roads using IoT devices is a special idea which makes the drivers to drive safer than before .The goal of smart road is to provide safety,alert the drivers, reduce traffic and provide a comfortable journey. This can be implemented by using advanced technologies with the help of sensors like MEMS Sensors, Ultrasonic Sensors,LDR and IoT devices in Arduino UNO development Board. In the existing system one have to reach the spot to know about the accident,also connected vehicle technology is difficult to implement on roads. In this project, we present a low cost effiecient technology for smart roads.When a vehicle meets with an accident or if a car rolls over, accelerometer detects the signal and immediately sends it to microcontroller. Microcontroller sends the alert message through IoT (Internet of Things) in cloud to police control room or a rescue team. So, the emergency team can arrive immediately for help. In The RSSI(Recieved Signal Strength Indicator) Zigbee network the Zigbee transmitter is used to transmit the entire data collected by sensors to take actions under emergency conditions.At the receiver part the transmission data has been collected by Zigbee module and displayed through LED(Light Emitting Diode) as prior Information in Highways.

**KEYWORDS:**LDR sensor:MEMS sensor:Microcontroller:Ultrasonic sensor:Vibration sensor:Zigbee network:,Zigbee transmitter.

## I. INTRODUCTION

Accidents are common everywhere,accidents results in the major cause of deaths,injuries and property damage every year.High Speed is an obvious factor for the high death rate on highways,but there is no agreement on the exact relationship between speed and the traffic hazard.Safe driving speed is now considered as a relativematter,depending on road,weather conditions and volume of traffic.To prevent accidents it is necessary to know what causes them.The unexpected natural disaster on the highways may also cause severe damage to the automobiles. The three major factors are the weather,the road and the alerts given to the driversA proper intimation at the right time can save many lives. Here the drivers uses the sensor installed vehicles for various purposes such as the accident detection ,Headlight automation and the object detection,whereas sensors are also installed on the highways to detect any natural disaster such as Landslides. The accident updates are informed to the other drivers in the display boards with the help of zigbee network. The cloud notification to the remote rescue team or police station helps in immediate help and recovery.Vehiculr cloud computing and wireless zigbee network enables a safer transfer of sensor data

## II. RELATED WORK

In[1] In vehicle sensor can enable many functionalities without the use of inter vehicle communication vehicle to everything communication enables an accident free cooperative automated driving In[2] Traffic incident detection studies are concerned with the change of traffic conditions after an incident occurrence,besides the automatic detection system ,manual incident detection methods detects accident from the motori report,transportation department or aerial survelliance.In[3] The widely available consumer grade GPS receivers do not provide the required accuracy of many safety application and Combining visible light communication is Similar to collision warning and avoidance application,when the driver at one lane passes cross the other lane lighting position tends to be dim and drop.When the light emission is detected and automative dim and drop is performed.This provides a safety to both drivers passing a

opposite lane on highwayIn[4]Vehicular networking combines wireless communication. Vehicle sensing module and GPS to enable a variety of applications in road safety and traffic efficiency.The current technologies are based on (DSRC) dedicated short-range communication global standard.The control channel(CCH) is used for sending short messages and communication management for safety applications,whereas the servicechannels(SSHs) is reserved for traffic efficiencyIn[5] The paradigm of connected vechicles in moving from research to implementation,thus enabling new application from safety implementation and so called Internet of vehicles.The connected vehicles on the road exchange information one with each other, This collobration will permit safer ,more efficient traffic management in vechicles.In[6] Method to automatically detect relevant hypotheses, a data mining technique to extractrelevant information and visualization techniqueIn [7] Traffic is the passage of motorized and non-motorized vehicles on road.Data visualization employs visual channels to represent data sets transforming various types of data,so that data understanding an analysis can be done efficiently.Traffic data sets are generally high dimensional or spatial temporal.

## III. PROPOSED SYSTEM

The goal of our system is to provide a faster clearance and recovery from the accidents ,when an accident has occured on one lane of the highways , it should be cleared as soon as possible.The landslide occurrence is also intimated to the recovery team as well as theother drivers in the lane.The Zigbee network technology is used for alerting the other drivers on the highway lane. There are implementations of IoT (Internet Of Things) techniques in our systems.By using IoT based system it provides a faster and secure transmission of data.The sensor data collected are securely stored in cloud for analysis and processing. The updates about the accident can be used to clear the traffic as soon as possible before causing a traffic jam.The headlight automation unit provides automatic dim of the head lamps which avoids manual process

ADVANTAGES:
 1.Instant notification results in faster help and recovery
 2.Saves timeand effort of the drivers
 3.Secure data transfer via cloud

LIST OF MODULES:
 1.Accident detection
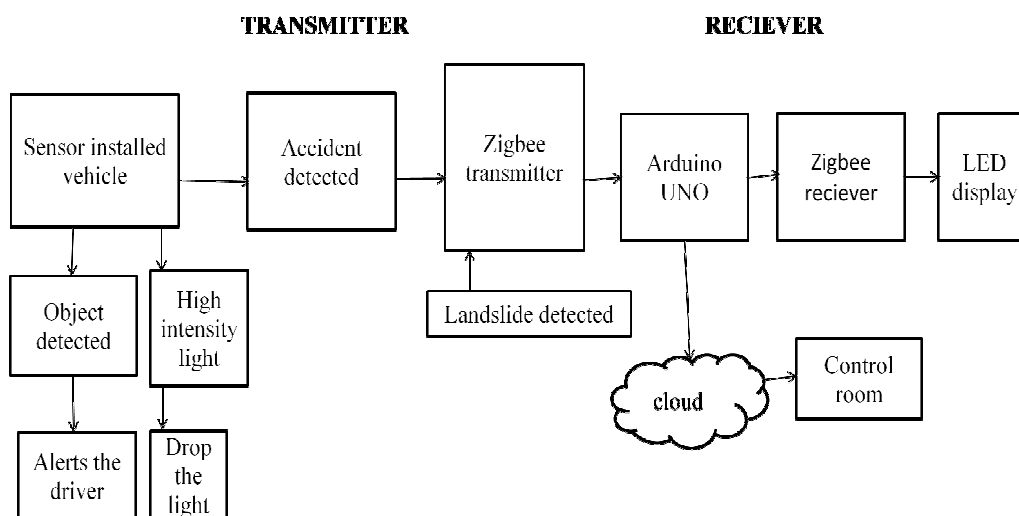 2.Object detection
 3.Landslide detection
 4.Headlight automation



Fig:1 Overall architecture diagram of the system

The sensor installed vehicle initially remains in normal state whenever the sensor detects an axis change or greater acceleration it is considered as an accident the sensor data is processed in the microcontroller and it is transferrredacrosss thezigbee network for prior intimation to the other drivers similarly when a landslide is detected it follows the same process

A.MODULE DESCRIPTION:

ACCIDENT DETECTION:Once the accident occurs in the highway the update is passed to the zigbee network to intimate or to alert the other drivers on the highways.MEMS sensor analyse the axis change and send electrical signal if the car gets tilted,this signal is given as input to the microcontroller.The collected sensor data is also passed to the nearby rescue team or nearby police station through internet to cloud system for a faster recovery The data collected in the cloud is also used for the analysis and processing.The location of the accident occurred place is also used for assigning the accident hotspot zone based on previously collected data of the road accidents
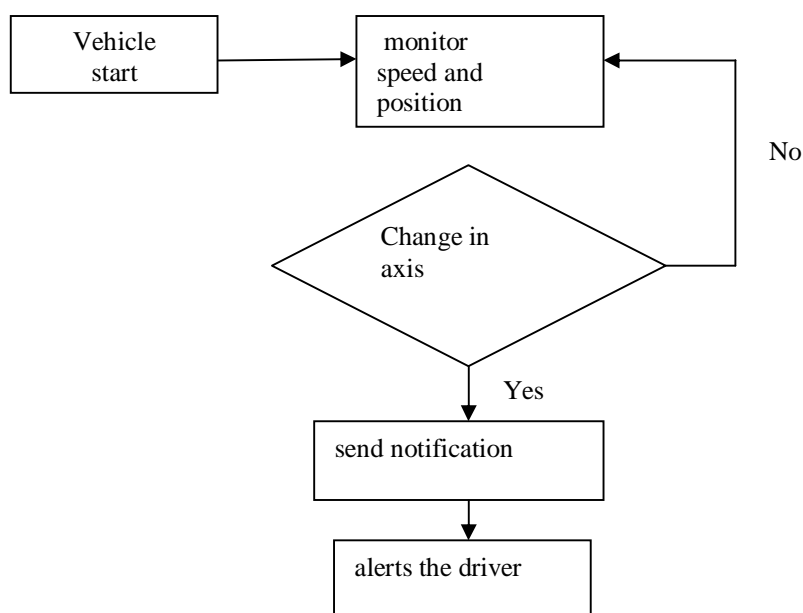


Fig:2 Flow diagram for accident detection module

OBJECT DETECTION:The sudden or unexpected interrupts on the highways leads to collision and may result in huge damage,hence to avoid such situation ultrasonic sensors are installed on the vehicle so when a sudden object or interrupts occurs it alerts the driver to slow down the vehicle and hence the collision can be avoided

LANSLIDE DETECTION:When landslide occurs in the mountainous highway or terrains, the alert is passed to the zigbee network to intimate the other drivers on the highways.The collected sensor data is also passed to the nearby rescue team through the internet to cloud system for a faster recovery .The data collected in the cloud is also used for the analysis and processing
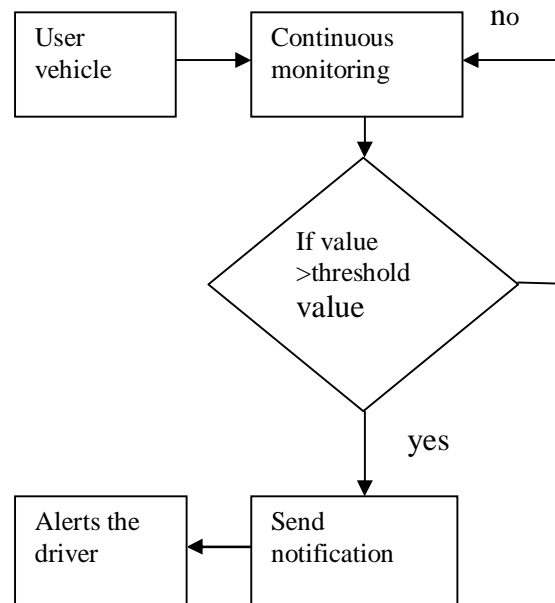
Fig:3 Flow diagram for landslide detection module

HEADLIGHT AUTOMATION:To keep a motor vehicle under control and to notify the driver different type of controls and accessories are provided.in an automobile around the driver seat and on the dash board.A high intensity light from the opposite vehicle can cause temparory blindness for the drivers hence to avoid that an automatic headlight controller is used,here the LDR sensor helps in automatic dim and bright the light based on the light intensity which falls on the sensor,by which the sensor automatically judge when to drop the light and to increase the light.

B.METHODOLOGY:

Accident detection: The accelerometer provides acceleration due to movement and also acceleration due to gravity.The MEMS sensor is involved in detecting the axis change.By measuring the static acceleration caused by gravity, the tilt angle can be calculated. The angle to which the vehicle tilted can provide the heading in-formation of the vehicle. With three-axes accelerometers,the tilt angle can be determined for the accelerations in x, y and z axes.Initially set the threshold values for the sensor,collect the sensor data from the embedded sensor system,feed the received data to the system if the received values exceeds the threshold value it is determined that an accident has occurred.

Landslide detection:The landslides can be determined by the vibration and MEMS sensor along with the weather condition in that area.When the vibration exceeds the threshold value it is considered as the occurrence of disaster,the MEMS sensor installed helps in predicting the axis change a vibration may also caused due to any rock roll over
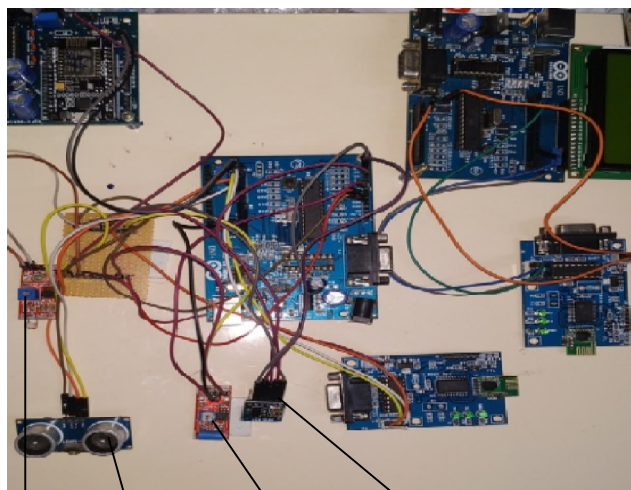
## IV. SIMULATION RESULTS

A.EXPERIMENTAL SETUP:The setup includes the MEMS sensor,vibration sensor,LDR sensor,Ultrasonic sensor connected to the microcontroller(Arduino UNO) along with the zigbeemodules.

LDR sensor    Ultrasonic sensor    Vibration sensor    MEMS sensor

Fig:4 Hardware implementation of the proposed system

B.EXPERIMENTALRESULTS:

The accident occurred is detected using the sensors and the data is sent over the zigbee network where the zigbee transmitter transmits the collected data to the zigbee receiver(wireless protocol)  provides a prior indication to  the display boards installed on the highways which helps the other drivers on the highway lane (which is indicated in the Fig:5)
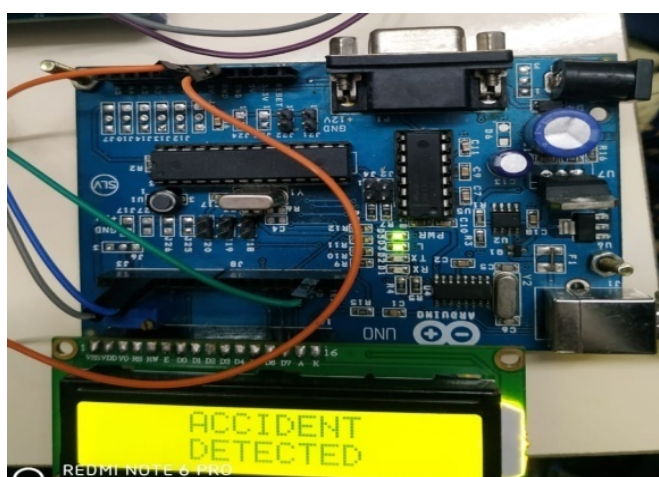


Fig 5:Accident detecetion message display by zigbee network

The collected sensor data is also sent to the cloud for the future analysis and it will be helpful in prior prediction of accident occurrence in such areas and helps in determing the accident prone zone.The cloud provides a secure storage and reliable data for future analysis

Fig 6: Notification via cloud to the police station

## V.CONCLUSION

In this paper, a novel idea is proposed for monitoring the accident on the highways. Landslide on the hilly side highways is detected with the help of using different sensors. Also with the help of zigbee transmitter, message will be sent to LED boards on the highways and through the cloud message will be sent to the natural disaster management, hospital, police station . Here landslide in hill area is detected by using vibration and mems sensor,accident on road is also detected by using mems sensor,The message can be transmitted to receiver separately using zigee technology in mesh networking.The object detection is done with the help of ultrasonic sensor.The automatic LDR sensor enables the driver to dim and bright the headlight automatically which provides an uninterrupted and comfortable journey at night time.

## VI.FUTUREWORK

The vehicular cloud computing enables a faster communication and alerts are provided with high reliability.By providing a high accurate GPS system location can be determined and the help assistance is provided as soon as possible.Advanced driver assistant systems and new sensing technologies can be highly beneficial, along with large body of work on automated vehicles.As technology improves,a vehicle can interact with anything that come in its way,Intelligent Transport system provides a more coordinated and a more efficient means of transportation.

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