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Vehicular Emergency System and V2V Communication using IOT

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Abstract*: IoT is an emerging technology that changes everyone's life. IoT (Internet of Things) is the advanced technology that helps people to live in a new world. In the IoT vision, each of the things has the ability to talk to each other, which makes the idea of the Internet of Everything a reality. Even people who have no technological knowledge cannot wait to get their hands on the next lock, thermostat, sensor, security system, etc. Many IoT-based services can make our daily life easier, smarter and even safer. The IoT with some design implementations can even save the lives of many people. Using the enabled IoT approach, we presented a small approach to the vehicle emergency during an accident. The IoT allows objects to be detected or controlled remotely through the existing network infrastructure, creating opportunities for a more direct integration of the physical world into a computerized system. we present a system of real-time location of communication and localization in a remote car that is facing an unfortunate accident or any emergency with the use of Raspberry Pi. Immediately, the system automatically sends critical information to emergency services, such as the hospital, police station, fire brigade, etc. The track tracking system provides the exact location of the incident that occurred. The proposed system monitors the condition / environment in real time.*

Key words — Internet of things; Rescue system; Location tracking system; Raspberry Pi.

INTRODUCTION

The present world is equipped with rapid internet connection, mobile devices, and network. Now we are living in an era of internet and rapidly moving towards a smart planet where device will be connected to each other, Smart world can be achieved using IoT which can change our life vision, cyber physical system also can be used for the same.

Vehicular Ad-Hoc Networks (VANETs) are a one of a kind sort of MANET. In VANETs individual vehicles work as nodes. This network self-configures and messages are passed by multi-hop communication. VANETs for the most part utilize Wi-Fi for communication, despite the fact that research has also looked at cellular and satellite for underlying communications. VANETs require a unique Wi-Fi protocol IEEE 802.11p as they are highly mobile, for example the differential speed between two nodes could be as high as 240 kmph. VANETs are not true MANETs as they depend on some infrastructure. One new range of research which incorporates VANETs is Smart Cities. Machine to machine communication is rapidly growing to make the machines more intelligent and shared in nature .Similar to it we use Vehicle to Vehicle communication and Vehicle to infrastructure communication for safety and security which is one of the main key in IoT. In vehicles safety is one important criteria. A study says that in India more than one lakh people die yearly due to some kind of vehicular accident, where most of them die due to late arrival of rescue team or no alert send to the rescue team about the location of accident. So if the location of accident is sent immediately to the respective teams the lives could be saved.

2. LITERATURE SURVEY

2.1 Emergency application for V2V communication using Named Data Networking.

In emergency applications for vehicular networks, warning messages usually included car accidents, road traffic flows, etc. When large amount of messages flow through the vehicular network, users only interest the content in the messages that are related to them. This system addressed the requirements that users only interest the content in the messages that are related to them in emergency applications . High number of duplicate packets can congest the network which increase in packet delay.

2.2 Emergency vehicle signaling using VANET.

Here road traffic scenario is created & the emergency vehicle needs to reach its destination as soon as possible and must avoid waiting in the traffic signal junctions by communicating with the nearby vehicles, road side units and the traffic signals in its path. The vehicle is directed where the traffic congestion is less. There is wastage of bandwidth. Redundant alerts are received by all nodes.

2.3 RFID and GPS based Automatic Lane Clearance System for Ambulance.

A RFID and GPS based automatic lane clearance system for ambulance. The goal of this work is to reduce the delay in the arrival of the ambulance to the hospital by automatically deleting the lane, where the ambulance travels, before it reaches the traffic light. This system is that you need all the information on the starting point, at the end point of the emergency vehicle route.

3. PROPOSED SYSTEM

The proposed system consists of different modules which are interfaced to the arduino board and raspberry Pi which is used as base station.

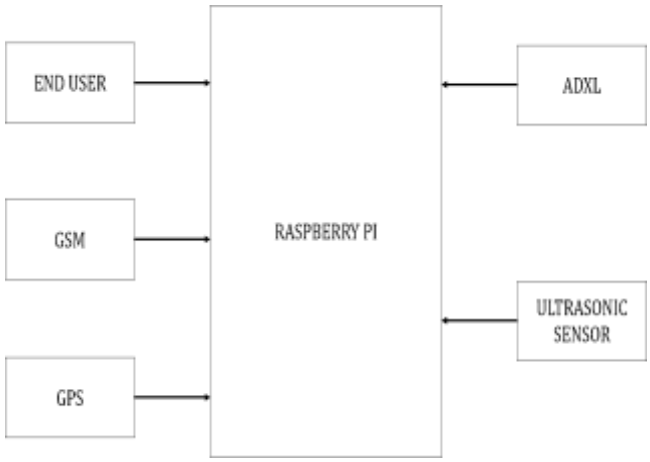

FIG-1: Proposed system block diagram

The system has a "module on board" located in the vehicle to be tracked and a "base station" that monitors the data of the various vehicles. A server computer in the (remote) monitoring station, which continuously waits for system data, must record the actions of the vehicle in a database. It contains the information about the speed, position, identity and temperature of the vehicle in two modes. The information given to the control room is continuous and when the accident takes place. Raspberry pi acts as a base station and server that connects to an external network (internet, etc.).

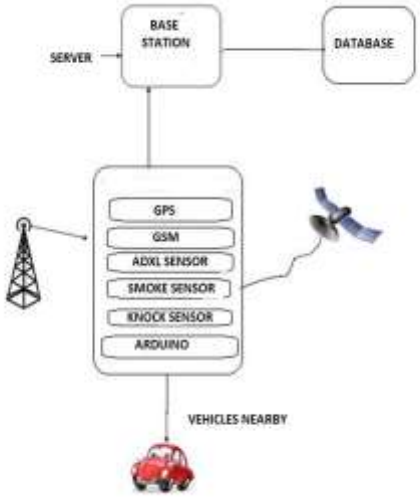

FIG-2 : Overview of proposed system

The data collected or detected by the sensor node is sent to the base station and inserts the data received from the sensor nodes into the raspberry p1 database. Multiple users can access the raspberry pi via an Ethernet or Wi-Fi connection within the LAN or anywhere on the Internet. In this system the MQ2 sensor is used to detect the external carbon dioxide gas in the car as applications for pollution control. ADXL used for accident detection. When an accident is detected, the location is then sent via the GPS module to the nearby police station and to the hospital. And the message is sent to a member of the family via the GSM module. The ultrasonic sensor makes accurate measurements in many difficult environments and the most important application is traffic control. This user takes all the information from the vehicles and the base station, ie the slope of the road, the traffic information, the normal speed on the road.

The proposed system consists of different Modules

3.1 RASPBERRY PI

The Raspberry Pi has a Broadcom BCM2836 system on a single chip (SoC) that contains a four-core Cortex-A7 cluster. The Cortex-A7 MP Core processor is a powerful, low-power processor that implements the ARMv7-A architecture. The Cortex-A7 MPCore processor consist of one to four processors in a multiprocessor device which has an L1 cache system, an optional integrated GIC, along with an optional L2 cache controller. The Raspberry Pi is a computer that resembles many computers that you already know. It uses a different processor type, so you cannot install Microsoft Windows on it.

3.2 ARDUINO UNO

Arduino Uno is a single-card microcontroller which is designed to make the process by use of electronics in multidisciplinary projects more accessible. hardware consists of a simple open source hardware card designed around an 8-bit Atmel AVR microcontroller, although a new model was designed around a 32-bit ARM Atmel. The software consists of a standard programming language compiler and a boot manager that runs on the microcontroller.

3.3 GSM MODULE

The GSM connects Arduino to the internet using the GPRS wireless network. We just have to plug this module onto Arduino board, plug in a SIM card from an operator offering GPRS coverage and follow a few simple instructions to start controlling world through the internet.

3.4 GPS MODULE

The GPS (Global Positioning System) module is a small electronic circuit allowing us to connect to the board to obtain the both things that is position and altitude, as well as the speed, date and time in UTC (Coordinated Universal Time). Use

the NMEA standard protocol to transmit position data through the serial port.

3.5 DATABASE

We use the database to store all the information about the car, control room and all the rescue centers we need during the emergency situation so we need a very well structured database to perform correctly. We have used three kind of databases to design the prototype :

- CAR DATABASE.
- CONTROL ROOM DATABASE.
- RESCUE CENTRE DATABASE.

TYPES OF DATA

1] The Car database may contain

-Car Id.
-Owner name.
-Registration number.
-Address.
-Vehicle type.
-Location.
-Image (optional).

2] The Database for Rescue Center

-Emergency Id.
-Car Id.
-Emergency Location
-Type.
-Image(optional)
-Teams for rescue

3] Emergency Message fields:

-Emergency type.
-Location
-Image (optional)
-Car Information

4. WORKING AT DIFFERENT NODES

Whenever an incident occurs, the respective sensor or sensor adxl or the knock sensor generate the signal above the threshold level. This signal is then passed to the controller on the hardboard which in turn turns on the LED indicator on the board and sends the signal to request details about the position to the GPS module. After receiving these details on the position, Arduino fills out the warning message and then sends it to the GSM module that sends and notifies the message to the mobile numbers of the emergency service already stored and which contains the vehicle position that informs about the incident. The GPS module for emergency service phone numbers and for the Android application installed in the mobile phone number of relatives or owners together with the vehicle position which is the latitude and longitude details using the form present at the blackboard with GSM technology. The functions in vehicle will help the user or the owner of the visual transport company in the vehicles of the transport company or in case of vehicle theft, etc. All you have to do is log in using the Android mobile app and start tracking the vehicle.

4.1 V2V2i Architecture

The vehicle-to-vehicle-to-infrastructure (V2V2I) architecture combines the benefits of both the vehicle-to-vehicle (V2V) and the vehicle-to-infrastructure (V2I) architectures, particularly the fault tolerant behavior of the V2V architecture and the quick inquiries and exactness of the V2I architecture.

In the proposed model we have shown a small vehicle to vehicle communication where an accident emergency vehicle sends the signal to the nearby vehicle which such system embedded in it .it send the alert message to the nearby vehicles by using the GPS .

Vehicle to Infrastructure communication is the communication from accident vehicle to the Base station .The message is an emergency message to station which forwards it to the nearby rescue center by comparing the list in the database.

The following chart shows how the normal working.

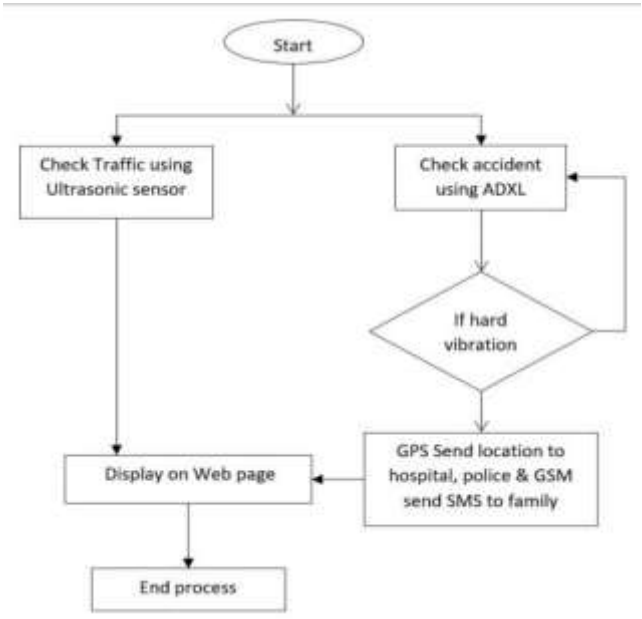

FIG -3 : Working

5. OUTCOME AND DISCUSSION

The given proposed system is automatic and is able to send automatic message to the Base station (Control room) in the form of emergency message with few information. This system can provide immediate help and rescue service to work in full flow inorder to save the lives of people.

6. CONCLUSION

The proposed model for the incident detection system can be an important help in building intelligent transport systems in the near future if implemented correctly. The system can also be used by owners of transport companies, etc. to check the vehicle speed, track its position in real time, etc. Using this system these features can also help in vehicle theft with updates in the proposed system. We can also implement this system using Android mobile applications in the future to enhance operations.

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