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Tracking and Recovery of the vehicle using GPS and GSM

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Abstract - *As more and more people migrates from village to urban area; the urban lifestyle is becoming more complex. The condition of the road is also become worse due to heavy traffic and high ratio of vehicles on roads. Every year, more than 1.25 million people are pronounced dead in accident in all over the world. Most of the time, it is realized that one of the major factor of the death is the unavailability of the essential medical services at the moment of emergency situations. In most accidents, people lose their lives due to unavailability of proper medical facility at that time and place. Today, most of the companies keep track of their vehicles and their mechanical conditions using various preinstalled smart sensing system in order to provide the more profiled services to their precious customers as well as provided an essential smart recommendation that help their customers to drive the vehicle with safety. By using all these preinstalled smart sensing equipment, we extend the safety of the individual by analyzing their position on the go and keep track of the vehicles by sending SMS. The position of the vehicle is send by GSM modem as a SMS. In case of any accident, our system will sense it and inform passenger's relatives, nearest Police Station and Medical Facility for performing required emergency action. To inform the accident and request for emergency action, GSM technology will be used to provide the essential information to the emergency services. In order to implement this system, an electronic device will be installed in respective vehicle which will track the vehicular GPS information that the Emergency Services will be received when that vehicle would meet an accident. This technology continuously track the vehicle and report whenever is asked and send rescue alert message after any emergency situation such as collision of vehicle take place. For this, we use Renessa's microcontroller and serially interfacing it to GSM modem and GPS receiver. GSM Modem sends the position of the driver which is provided by the GPS and the same data is send to the nearest Police Station, Emergency Facilities, and other per-registered Emergency Contacts.*

Key Words: GPS, GSM, Renessa's microcontroller

1. INTRODUCTION

There is a steep rise in the number of accidents and deaths due to accident because of drastic increase in the number of vehicles in last few years. According to W.H.O. (World Health Organization) every year around 1.25 million people loss their priceless lives due to car accident. India alone has 1% of the total roads in the world. But the accident recorded on Indian road are 16% of the worlds road accident. There are many possible reasons for these such as drastic increase in the number of vehicles without any increase in the road quality and facilities that is essentially required for it.

Another crucial factor that can be analyzed is due to unavailability of medical facilities at right time and at the right place. Most victim loss their lives due to this. Therefore, this idea of saving lives by curing the problem comes into existence. Information of traveling with their real-time position is informed by the system using the preinstalled smart sensing equipment. This data is analyzed and all the information can be observed by remote location to provide the required services to the people. Tracking of the vehicle can be done in all weather condition. GPS and GSM technologies are used in this system to provide all the data to the remote server which I then processed and the extracted information is used to provide the services to the individual at the time of emergency.

2. PROPOSED SOLUTION

The purpose of this system is to track the position of the vehicle, also this can be used in public transportation medium to know the position of the bus. The system will send the message automatically to ambulance, police and all the pre-registered contacts in case of any accident or emergency. From tracking the exact location of vehicle in few feet's this system uses GPS (Global Positioning System). To receive SMS and reply to this SMS with the location of the vehicle, GSM is used. All the parts in the system are controlled and coordinated by the *"Renesa Microcontroller"*. When any impact pressure is detected, sensors are triggered and system sends signal to the microcontroller. According to programing of the microcontroller, processing of the input signal is done and output is produced.

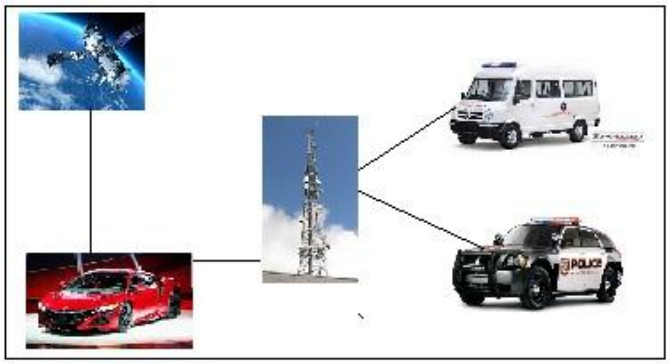

Fig -1: Tracking and Recovering vehicle using GPS and GSM

3. LITERATURE SURVEY

Vehicle tracking is more essential in now days. This can be done by using the GPS technology with the use of various other applications also [1]. It is also used in fleet management, anti-theft vehicle systems and accident recovery.

A.

Many applications use the vehicle tracking technology using the GPS. Such application tracks the vehicle and other web application monitors the vehicle continuously [1]. To find exact location, distance and estimating time to reach particular destination an android app is developed [2]. Obtained geographical coordinates are not be correct all the time to get exact longitude and latitude position, we can use Kalman filter [8].

B.

Now days most of the people own a car and they can be easily stolen from the parking. So many systems are being developed that either helps in recovering the vehicle or provide anti-theft measures. When an unauthorized person tries to start the vehicle, system sends the message to the owner by using GSM. The authorized person or owner can stop the vehicle. The owner of the vehicle send the password to start the ignition [3]. We can track the position of the vehicle by getting its altitude, latitude and longitude after deactivating the ignition [4]. Radio Frequency (RF) transmitter and receiver can be used to identify vehicle theft. SMS will be sent to owner when receiver stops receiving the signal from transmitter. Then the owner can send the SMS to stop the ignition of the vehicle. Position of the vehicle can be tracked using the GPS [5]. Also by sending SMS through GSM we can block the gas feed line of the vehicle. So, that vehicle will not start [6]. Image processing can be used by for tracking the vehicle. One camera is used to track the vehicle and second is used to identify the number on the number plate. By using various algorithms, vehicle can be tracked and movement of vehicle is captured from first camera [7].

4. METHODOLOGY

This accident recovery model consists of a microcontroller, software and hardware components such as:

A. Piezoelectric Sensor
This sensor is in built in various car for airbag system. This sensor senses the pressure and vibration during the accident and transmit the electrical signal to the encoder.

B. RF Encoder and Transmitter
Radio Frequency (RF) encoder codes the received electrical signals into suitable form so that transmitter can send it to the receiver of the vehicle.

C. RF Receiver and Decoder
Signal transmitted through the transmitter section is received by the RF receiver and RF decoder decode that signal.

D. Renesas Microcontroller
This microcontroller is brain of the Vehicle Tracking System (VTS). Renesas ports are used for GPS and GSM/GPRS modules. A software program is written to control them, and stored in microcontroller's flash memory.

E. GPS Module
The GPS module has Receiver with antenna which provide the location of the vehicle. The GPS system is commonly used to get information about coordinates, speed, time and distance. In this module, a GPS system is adopted to implement the in-vehicle device.

F. GSM/GPRS Module
It is responsible for establishing connection between vehicle device and remote device for transmitting the message which contains the information about the vehicle location. GSM/GPRS network uses TCP/IP connection.

G. LCD (Liquid Crystal Display)
LCD is the technology that is used since decades as flat panel display technology. LCD can be used to display the messages or alert to the user whenever he/she meets the emergency situation. It is one of the most important but basic display equipment in the System.

H. Transmitter Section embedded in helmet

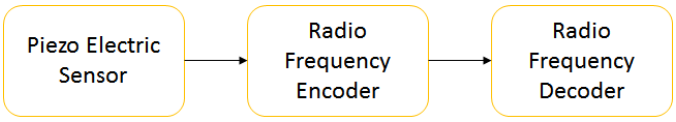

Fig -2: Transmitter Section

As Fig-2 represents, Transmitter Section consist of one Piezo Electric Sensor, One Radio Frequency Encoder and One Radio Frequency Decoder. All these components together make the integrated embedded transmitting system that will be deployed in the driver's helmet.
Helmet is the safety gear that is worn to protect the vital upper head organs. It is one of the most mandatory gear required by the driver to be worn when driving on the road.
Piezo Electric Sensor is the transducer. Transducers are the devices that converts the physical changes to equivalent electrical impulse. Piezo Electric Sensor are the sensors that detects the physical change in the pressure and produces the equivalent electrical impulse.
Radio Frequency Encoder and Decoder are responsible to convert and transform the piezo electric sensor signal to the desired format so that that signal can be sent to the receiver end and then the desired action can be performed.
Whenever the driver or the rider will meet the accident or any emergency situation the signal will be detected through the piezo electric senor embedded in the helmet and then these intensive signals are transmitted through the helmet using radio frequency. This signal is first transformed into the desired form and then transmitted and thus the distress signal is send to the server.

I. Receiver Section embedded in helmet
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Helmet is the safety gear that is worn to protect the vital upper head organs. It is one of the most mandatory gear required by the driver to be worn when driving on the road.
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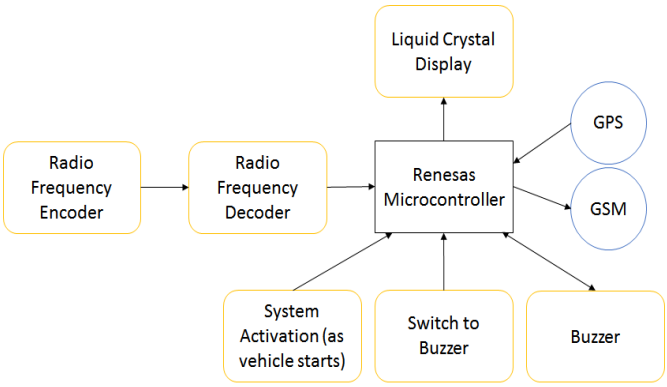

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5. CONCLUSIONS

Design and implementation of vehicle tracking system for giving information about the location of the vehicle and accident in real time is described in this paper. As in the car the air bag transmitter section detects the collision and sends the data to the receiver. After decoding the received signal by RF decoder, it is transmitted to microcontroller. Controlling and processing incoming signals and taking necessary actions using produced output by microcontroller as instructed by the program written in it. The message will be sent to ambulance and police station using the GSM module with GPS coordinates. Implementation of this system has a very low cost model and based on easily accessible off the shelf electronic module.

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