" An Overview on Automobile Speed Violation Detection System using RFID and GSM Technologies"

Prof. Mukesh Mahajan[#1], Digvijay Patil[*2] ,Nikhil Mayral[*3], Rajendra Rana[*4]

[#]Assistant Professor, E & Tc Department
SITRC, Nashik, Maharashtra.
[*]Student, E & TC Department

SITRC, Nashik, Maharashtra

Abstract

in our project our intention to work on the topic of this nature is emanated from the interest to explore alternative technological solution to achieve effective speed control. The objective of the study is to design and develop a new system that can effectively detect speed violations on the road and supports the driver to obey traffic rules while driving by maintaining the speed according to the speed limit prescribed. Based on the detailed review of the literature and also based on the comparison among the prevailing approaches in addressing the core issues, the study has introduced an efficient system with an enhanced scope. The proposed system consists microcontroller With ESP32-Cam Module, Radio Frequency Identification (RFID) and Global System for Mobile Communications (GSM). The system is having two RFID readers along with a passive tag that is attached to the vehicle and GSM is utilized to notify the vehicle's owner and Police through Short Message Service (SMS). Furthermore, a picture of a vehicle is taken via the Camera which we access the camera by Cloud and Memory Card Images to Show and Identify the Vehicle and a fine is charged when the speed limit is exceeded. The system offers low cost, reliable, efficient results and real time notification. The system was operating successfully and performed accurately

Keywords: GSM, RFID, ESP32, Microcontroller, Webcam, RADAR

INTRODUCTION

The earlier years many devices and technologies has been utilized to provide road safety and accordingly to reduce accidents occurring due to speed violation, for example: RADAR technology, Police Scan Speed systems, Average Speed Safety Camera, etc. This Project presents an automobile speed violation detecting system using Global System for Mobile Communications (GSM) technology and Radio Frequency Identification (RFID) technology, as a solution to the general problem of road speed violations and related accidents on the roads.

The idea is to design a system that can be employed to detect any speed violation occurring on the road and then send SMS to both the owner of the car and the Police, also take a snap using the following components RFID readers, camera and GSM modem linked to microcontroller of inbuilt controller which in ESP32-Cam Controller The key factor of selecting RFID technology as a core component of the proposed system is to proposing a cost effective, accurate, flexible system to help in preventing over speeding violations and to reduce fatal accidents.
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Need of Project

- RFID tag Reader which help to read all Information about Vehicle and owner.
- ESP-32 CAM for Vehicle Snap after over speeding.
- Automatic data transfer after violation of over speeding and transfer data by the GSM Module.

Objectives

- Real-time Over speeding Information monitoring.
- Transmitting the information over wireless Network from GSM Module.
- Speed Violations alert to both owner and Police Also Capture Image of vehicle.

LITERATURE SURVEY

1. A SYSTEM FOR TRAFFIC VIOLATION DETECTION (Octomber-2014)

This paper describes the framework and components of an experimental platform for an advanced driver assistance system (ADAS) aimed at providing drivers with a feedback about traffic violations they have committed during their driving. The system is able to detect some specific traffic violations, record data associated to these faults in a local data-base, and also allow visualization of the spatial and temporal information of these traffic violations in a geographical map using the standard Google Earth tool. The test-bed is mainly composed of two parts: a computer vision subsystem for traffic sign detection and recognition which operates during both day and nighttime, and an event data recorder (EDR) for recording data related to some specific traffic violations. The paper covers firstly the description of the hardware architecture and then presents the policies used for handling traffic violations.

2. VEHICLE TRACKING AND SPEED ESTIMATION SYSTEM (June 2012)

This project is intends to develop a vehicle tracking and speed estimation using digital image processing technique. Therefore this project needs a video input to make the system work. The system is designed to track the vehicle position and calculate its moving speed. The method that uses to estimate the speed of the moving vehicle currently is RADAR (Radio Detection and Ranging). But this method requires high end equipment, which means the cost for this method is high. Therefore an alternative way is needed. This proposed method is using the image processing technique. This system consists of 4 major steps: 1) image acquisition 2) image background subtraction 3) location detection 4) speed estimation. The rate of accuracy for this system is expected to have 99%.

**3.** AUTOMATIC PENALTY CHARGING FOR VIOLATION OF TRAFFIC (February -2013)

Through this project we are aiming to provide a system, which will continuously monitor the vehicles using RFID reader and RFID transceivers and automatically incur penalty for violation of any of the traffic rules. If a driver violates any of the traffic rules, the driver will be charged according to the RTO rules. The charging amount will be automatically stored in a smart card which will be fixed in the vehicle. If a driver fails to pay the charges in a given period of time, his/her license will be suspended and the car won't start. Thus in this project, we are to some extent compelling people to follow the traffic rules. This will definitely reduce the problems to Designing and Control Mechanism of ZigBee based Automatic Meter Reading (September – 2012)

4. IOT BASED FRAMEWORK FOR VEHICLE OVER-SPEED DETECTION (August -2018)

This project targets to propose a system, which detects speeding vehicles over a specific speed limit and immediately report to concerned authorities. At present, road accidents rates have raised so, there is a necessity for developing a system that detects an over speeding vehicle. The implementation of present Smart Vehicle Over speeding Detector using Internet of Things determines all the road traffic information automatically with intelligence. The smart vehicles are suitable with over speeding detector that has capability for recording, storing and information sharing about the vehicle's speed. The system contains GPS module, Radar, Google maps and IoT module. The safe regions are identified automatically using GPS and IoT technologies. Electronic tracking device runs in 12 V lithium batteries with network of GPS sensing and IoT implementation. The battery life of this device is range from 5-10 hours. A smart vehicle over speeding sensor is employed and is combined with IoT in order to decrease the vehicle's speed at particular places like accident prone zones. If this smart sensor technology is used the safety parameters, then avoidance of accidents may be attained. The system sends the data wirelessly. If the over speeding vehicle is detected, then the sensor alerts by sounding an alarm. The purpose of the proposed sensor is to decrease high death rates because of accidents.

DESIGN APPROACH

Block Diagram
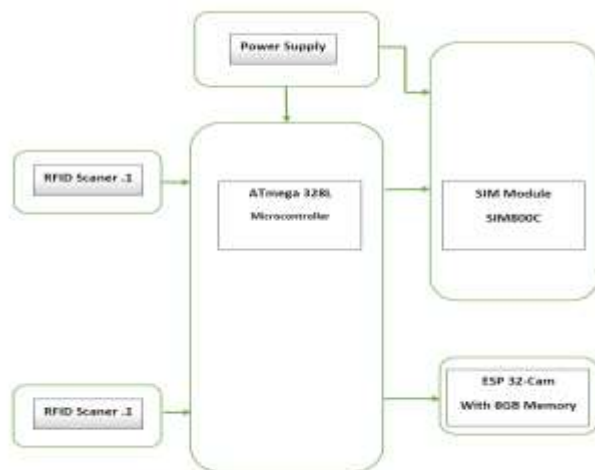
Circuit Diagram
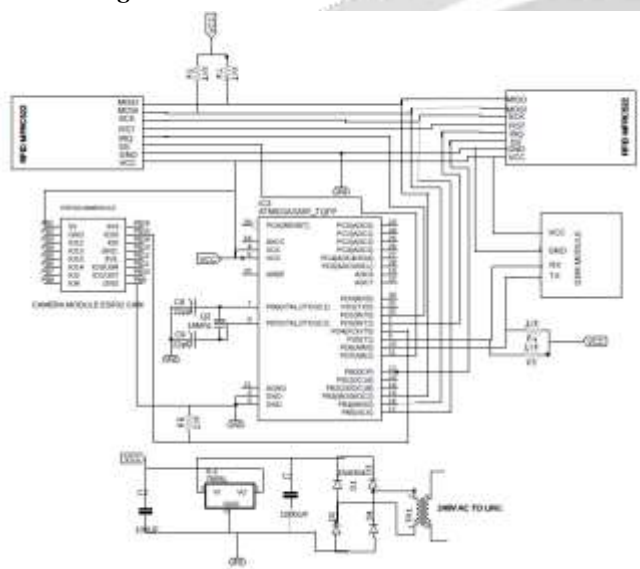
Working

In our system, a micro controller is interfaced with an Atmega 328P Microcontroller and SIM800C and ESP32 CAM Module where as we seen the Block Diagram of working principle to the proposed system utilizes RFID readers (ID-20 Innovations), GSM/GPRS SIM800C module where a SIM card is inserted and camera Module ESP32-CAM which help to store image of vehicle. In the controller we are programed like when one RFID caner scan vehicle and some particular distance we are placed second RFID scanner then we calculate the speed of vehicle by distance /time between two tags scanned, are which are interfaced to SIM800C for communication to authority to inform and sending SMS which Include information about car Details which are on RFID Tag,. Based on the RFID passive tag placed into the vehicle as it passes by the first RFID reader where the information of the vehicle stored in the tag is extracted, the count-down timer within microcontroller is fixed to specific time according to the distance between two RFIDs and the speed limit will be activated and in case the vehicle's tag is read by the second RFID reader before timer reaches zero, then the microcontroller recognizes that a violation has occurred by this certain tag and then a signal via controller is sent to both camera to take a snap and GSM/GPRS SIM800C modem to send SMS to the number of the owner of the vehicle acquired from the tag and ROP to inform about the committed speed violation.

HARDWARE DESIGN

ATMEGA328P

ATMEGA328 is high performance, low power controller from Microchip. ATMEGA328P is 8 – bit microcontroller based on AVRRISC architecture .It is the most popular of all AVR controller used in ARDUINO boards.

POWER SUPPLY

The input to the circuit is applied from the regulated power supply. The a.c. input i.e., 230V from the mains supply is step down by the transformer to 9V and is fed to a rectifier. The output obtained from the rectifier is a pulsating d.c voltage. So in order to get a pure d.c

voltage, the output voltage from the rectifier is fed to a filter to remove any a.c components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage

SIM800C MODULE

This cost effective Quad-band GSM/GPRS Module (wireless modem) is specifically manufactured in a way that it can both appear and perform with a small dimensions of 33 x 33 x 3 mm like any cell phone with its own number by accepting the SIM card of any GSM network operator. It delivers communication services such as voice calls, sending Short Message Service (SMS), fax and Multimedia Messaging Service (MMS) through mobile network via connecting the SIM800C Modem to a microcontroller or computer, the offered services by SIM800C module are charged by the GSM network operator and requires instructions that are known as AT commands to control the modem and execute functions.

ESP32-CAM MODULE

ESP32-CAM is a low-cost ESP32-based development board with on-board camera, small in Size. It is an ideal solution for IoT application, prototypes constructions and DIY projects. The board integrates Wi-Fi, traditional Bluetooth and low power BLE, with 2 high performance 32-bit LX6 CPUs. It adopts 7-stage pipeline architecture, on-chip sensor,
Hall sensor, temperature sensor and so on, and its main frequency adjustment ranges
From 80MHz to 240MHz. fully compliant with WiFi 802.11b/g/n/e/i and Bluetooth 4.2 standards, it can be used as a master mode to build an independent network controller, or as a slave to other host MCUs to add networking capabilities to existing devices.

Photo of Project
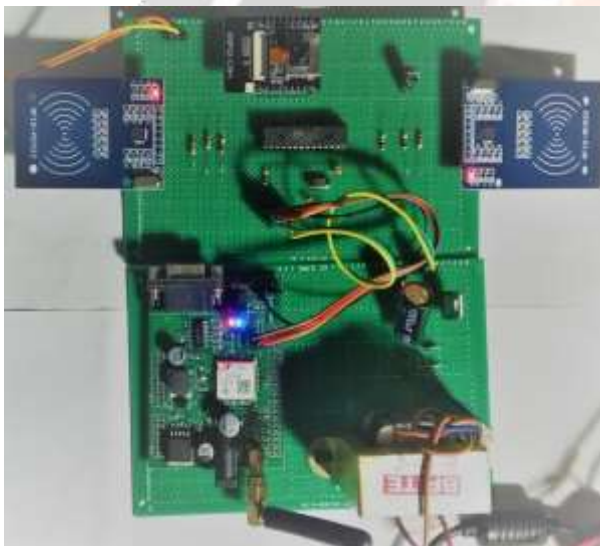
CONCLUSION

This Project a cost effective, accurate, flexible system to help in preventing over speeding violations, based on the literature survey and observing different traffic management systems with using diverse technologies and components. Generally, each system was divided into two units a transmitter unit and a receiver unit where one is place on the monitored road and the other attached to the automobile. Various technologies and protocols were utilized for several systems such as; Radio Frequency Identification (RFID), ZigBee, Global System for Mobile Communications (GSM), Global Positioning System (GPS), General Packet Radio Service (GPRS), etc. Based on the introduced system the transmitter unit is fixed on the road using RFID technology and the Receiver unit is attached to the automobile's plate number and communication between them occurs through radio waves, and GSM technology is used for notifying purpose.

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