

Automatic E-Challan Management System

Manoj Kumar Srivastava, Shyam Singh, Binoty Sharma, Saksham Pratap Singh

Information Technology
SRM University, NCR CAMPUS

ABSTRACT:

Science and technology has made it possible to achieve everything for mankind. The advancement of medical science leads to reduction in death rate, but even though it fails when it comes to road accidents. Road safety authorities all around the world devote considerable resources to address the speeding problem particularly complaints with speed limits. The existing methods to deduce over speeding have not shown major contribution to road safety as they are few countable inspection points with radar guns as a way to deduce over speeding. And the number road accidents that results to death injury disability and loss of properties is frightening. In this research paper a new procedure to design a system that generates an E-challan and the adoption of automatic challan system has been discussed. The main components of this system consists real time speed sensor, GPS, GSM, PiC18F2550 microcontroller. We propose to design a system that generates an E-challan recording the speed of the vehicle and location by GPS that will send a message to the server of the traffic police department and the owner to notify that the challan has been issued due to over speeding.

KEYWORD: Pic18f2550, GPS, GSM, Database, Real Time Sensor.

INTRODUCTION:

Considering road lethality an epidemic that will become the world's 5th biggest killer by 2030, the report said while almost every first world country had been able to minimise their death rates, these were sharply on the rise in the developing and drastic in undeveloped countries. It said ninety percentages of deaths on the world's roads occur in low and average-income countries and all though they have just 48% of all registered vehicles.

The statistics for India are quite chilling. At least 13 people lost their lives every hour in road accidents in the country which is revealed by the latest report of the National Crime Records Bureau reveals. In 2010, 1.75 lakh people in India lost their lives in road mishaps that is significantly higher than the 2008 road death figures in China, 89,455. Over-speeding of vehicles is posing a threat to both the pedestrians and other vehicle-users in the city. Though the traffic cops stop the vehicles at the traffic signals and challan them for violation of traffic rules, they are unable to control the speeding of two-wheelers resulting in the death of a number of youth. In majority of cases, youth are indulging in rash driving causing inconvenience to other vehicle users and often are racing on the main roads with powerful motorcycles despite the presence of traffic cops.

Reports of road accident statistics do not always able to find difference the between these kind of speeding but it is expected that most investigated cases involves excessive speed.

This paper discusses about the implementation of Automatic Electronic-Challan management system, that would help the traffic police department in monitoring the over speeding and violence of the traffic rules and amendments.

ARCHITECTURE:

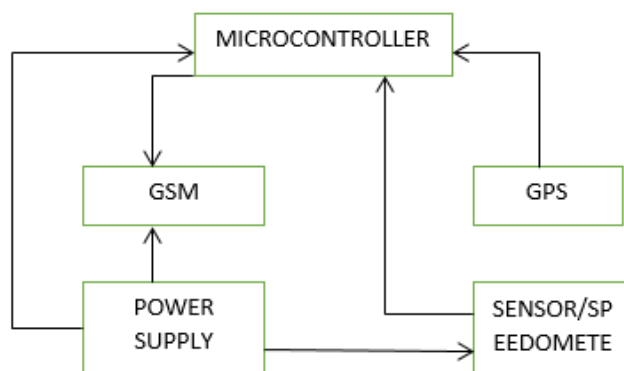


Fig1. Block diagram of ACMS device

Main components of ACMS are Microcontroller, GPS, GSM, Database and real time sensor.

A. Micro-controller (Pic18f2550)

It is a 28-pin Flash-based 8-bit microcontroller with FS-USB (12Mbit/s) feature.

A.1 Features & Specification:

24 I/O pins individual direction control, internal 8 MHz oscillator and external 48 MHz oscillator, 10 Ch, 10 bit A/D converter, 1x A/E/USART 1 x MSS (SPI/12c) , 2 x ccp (Capture/Compare/PWM) , 1 x 8 bit Timer 3 x 16-bit timer ,32kb program memory 2,408 bytes RAM and 256 bytes EEPROM , manageable voltage range – 2.0v to 5.5 v.

The microcontroller’s memory contains the data of the Roads speed limits, vehicle’s owner information and traffic police department information.

Road Maps
Speed Limits
Data of vehicle owner & Traffic Police Departments

Fig.2- Database contents

B. GPS

The Global Positioning system is a satellite based system used for navigation and made up of a network of 24 satellites placed in earth’s orbit by U.S. Department of Defence. At a time four GPS satellites are used to calculate the position of the object in which the GPS is fitted.

The GPS used in the device is GPS L-80 (Quectel). Its description is given below.

- Extremely compact size: 16.0 × 16.0 × 6.45mm
- Embedded patch antenna: 15.0 × 15.0 × 4.0mm
- Automatic antenna switching function



Fig.3- GPS L80 (Quectel)

- Support short circuit protection and antenna detection.
- Built-in LNA for better sensitivity.
- EASY™, advanced AGPS technology without external memory.
- Ultra low power consumption in tracking mode, 20mA.
- Always Locate™, a quite intelligent controller of periodic mode.
- LOCUS, innate logger solution with no need of host and external flash.
- High sensitivity, 165dBm at Tracking, 148dBm at Acquisition.
- 66 acquisition channels, 22 tracking channels.
- FLP mode, approx 50% power consumption of normal mode.
- Balloon mode, for high altitude up to 80km
- Support DGPS, SBAS (WAAS /EGNOS /MSAS /GAGAN).
- Anti-Jamming, Multi-tone Active Interference Canceller.
- PPS VS. NMEA can be used in time service.
- Support SDK command developed by Quectel.[1]

C. GSM

Global system for mobile communication is a digital telephony system that is widely used these days. GSM digitalizes and compress data, and then send it through a channel with two other streams of user data each in its own time slots.

In Automatic E-challan Management System, GSM is used for the purpose of sending message to the traffic control room and to the owner of registered vehicle that a challan has been generated for your vehicle.



Fig.4- GSM M66 (Quectel)

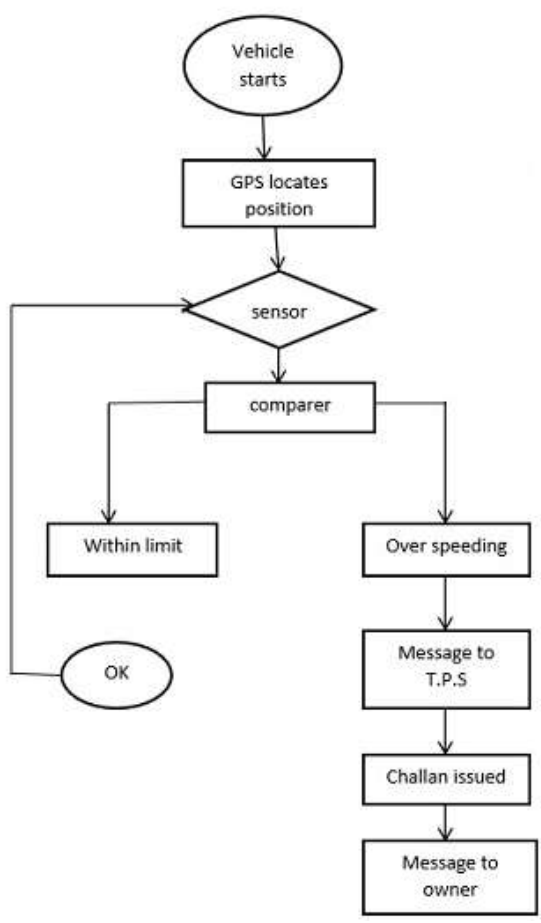
The GSM used in the device is GSM M-66 (Quectel), its key features are:

- The world's tiniest Quad-band LCC GSM/GPRS module.
- Easier soldering process with LCC package.
- Power consumption as low as 1.3mA.
- Support Voice, Bluetooth*, QuecFOTATM and Quectel.
- Open CPU function.
- Embedded with multiple Sockets, powerful Internet service protocols, and IP addresses. [2]

WORKING:

When a vehicle starts, the device will start gaining power supply from the battery, within few minutes the GPS will locate the position of the vehicle and the sensor will keep check the speed. Then both GPS and sensor will transmit the input (i.e. location by the GPS and vehicle speed by sensor) to the microcontroller, where the databases of the speed limits of all the regions are stored. The comparator of the controller compares the present speed of vehicle provided by the sensor or (speedometer of vehicle) to the speed limits of that particular region. Till the vehicle speed is within the speed limits no action will be performed, but as the vehicle's speed exceeds the limit, the controller will generate an interrupt, that will send a signal to the GSM, stating the location of the vehicle. Now the GSM will send a penalty message, to the registered mobile number of the user, containing the location of the vehicle, vehicle's number, speed and penalty message and to the Traffic Police Department of that particular region.

FLOWCHART:



ACMS OVEROTHER SIMILAR DEVICE:

1. In Automatic Number Plate Recognition - one problem is the potential conflict of interest when private contractors are paid commission based on the number of tickets they are able to issue that is Proofed from the San Diego red light camera systems were ruled in inadmissible as court evidence in September 2001. The judge stated that the total lack of sight made evidence from the camera so untrustworthy and unreliable that it should not be admitted. There is no such problem in ACMS.
2. In RADAR detectors - Some driver uses passive radar detectors or LIDAR detector to detect police radar or LIDAR signals with the intensions of avoiding or evading prosecution by slowing down the acceleration before entering an enforcement zone.

3. Authorities are not able to keep a dogwatch on every vehicle on every road – limited resources generally mean that enforcement need to be targeted.

ADVANTAGES:

1. Cost benefits in challan (government fund).
2. Reduction in fuel consumption.
3. Lesser the accident rates.
4. Reduction CO₂ emission.
5. Fetching exact location of the vehicle.
6. Theft-Deduction (by getting exact location of car).

DISCUSSION:

Automatic Challan Management System is the application of embedded system to the road traffic sector. ACMS gathers data about the vehicle position, its current speed, speed limit of that vary area, process it, and then use the processed data to generate an e-challan if vehicle found violating the speed limits. It generates an e-challan in the form of a text message which is being send to the Traffic Police Department of that vary area and to the owner of the vehicle. This helps the traffic police to keep a 24hour watch on the vehicles without using the human resources and improves the management of the traffic system.

The device main content of device is Microcontroller Pic18F2550 which is a 8 bit microcontroller which servers the main the function of controlling the accuracy of the device.

The GPS L80 is used in the device which is highly accurate and reliable.

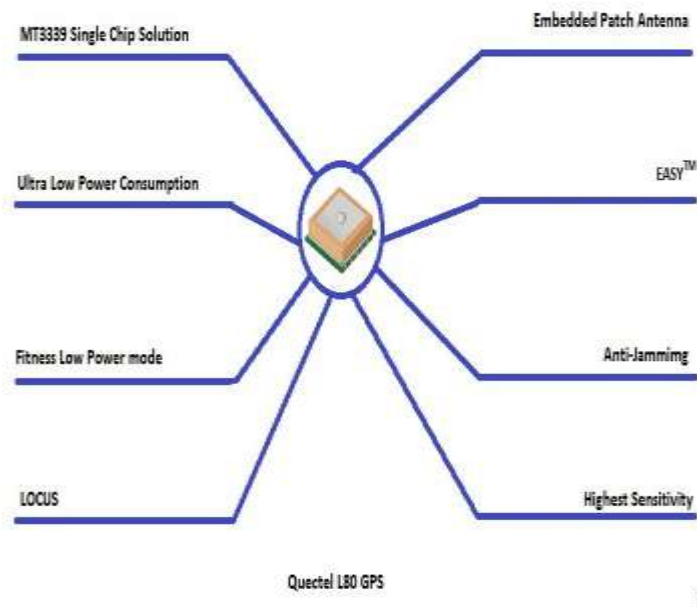


Fig5. Quectel L80 GPS key features

The message transmission of e-challan issued is done by the GSM M66 module with the help of serial communication.

Why do drives speed?:

Some of the common the reasons that drivers give for over speeding are intentionally exceeding the speed limit are that they are in a hustle that they need to speed up to overtake, that they get a thrill by speeding or that their vehicle/driving ability is better than the most other drivers. Some claims that they will slow the traffic or inconvenience other drivers if they driver at the limits. For this reason speed limit database will help them out to control their over speeding problem and rash driving.

REFERENCES:

1. <http://www.quectel.com/product/prodetail.aspx?id=62>
2. <http://www.quectel.com/product/prodetail.aspx?id=73>
3. Microprocessor and Interfering Lab Manual ,Department of Information Technology, SRM UNIVERSITY
4. Tammy Noergaard, Embedded Systems Architecture-A comprehensive guide for engineers and programmers, Elsevier, 2005.
5. Dr.K.V.K.K.Prasad, Embedded/Real-Time Systems:
 - a. Concepts, Design and Programming-The Ultimate Reference, Dream Tech Press, 2004
6. Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinley, The 8051 Microcontroller and Embedded Systems-Using Assembly and C, second edition ,Pearson Education.
7. Theodore.S.Rappaport, Wireless Communications-Principles and practice, Prentice Hall, second edition, 2010
8. MartynMallick, Mobile and Wireless Design Essentials, Wiley Dreamtech India pvt ltd., 2003
9. Geoff Varall, Roger Belcher,3G Handset & Network Design, Wiley Dreamtech India pvt ltd., 2003
10. Jochen Schiller, Mobile Communications, Addison Wesley, 2000