Smart License Plate

Shruthi Y S
Department of CSE
Rajiv Gandhi Institute of Technology
Bangalore, India

Mr M Nagesh
Department of CSE
Rajiv Gandhi Institute of Technology
Bangalore, India

***Abstract*—This project is an attempt to create an Android Application which would monitor the theft and the speed of the vehicle under scrutiny. The combination of two platforms like the embedded system and the android is used here to build the project. The MEMS sensor based sensing of the vibration that is the tampering in the license plate. The license plate if tampered would disturb the MEMS output, which is an accelerometer that gives the output of the gravitational disturbances occurred due to the x, y and z directions on the accelerometer. This will trigger the microcontroller to act .The ARM microcontroller is used to get the current GPS data and send that through the GSM modem. The GSM modem will send a message to the Android based mobile. The message API of the android will be used to read the message having the GPS data and the position API would get the position of that vehicle on the google map. Then the speed of the vehicle can also be monitored by the use of the position API by continuously getting the GPS data from the GSM modem**

Keywords— ARM microcontroller, Android, GPS, GSM modem, MEMS sensor.

I. INTRODUCTION

In shipping industry vehicle tracking systems were first implemented to know where there vehicle was at any given time. These days, however, with rapid growth of technology variety of ways are there to track and display vehicle locations in real time. Technologies like Bluetooth were used it covers only short range of distance in existing system. In tracking system one of the most important components is vehicle location to track a specific target objects.

Incidents of vehicle theft are on the rise in our country more than 40,000 vehicles are stolen in our country every year, mainly in the metropolitan cities and less than 15,000 vehicles were traced. All motorized road vehicles in India are tagged with a registration or license number. The license plate commonly known as number plate. License plates are used for identification of vehicles all over the nation so it is illegal for two vehicles to have the same license number. Vehicles are identify either manual or automatically.

In all fleet management system [1] the most basic function is vehicle tracking. For company's transportation fleet is required. The major goal of fleet management system is to improve the quality and efficiency of the industry by recognizing important barriers on road.

The need of security and monitoring of vehicles is necessary. To resolve such problems, a system is developed using GPS and GSM technologies and an application is introduced in this research work.

Various problem that we face:

1. In critical condition (when vehicle is stolen), one is focused what to do.
2. If one has something expensive and he wants to check it regularly.
3. To find the shortest path available.

II. RELATED WORKS

Security system is very essential for vehicles and available with many modern features. Transportation faces many issues like high accidents rate, traffic congestion, criminal activity etc. The vehicle tracking device is a standalone system that displays the real-time location(s) of the vehicles. An incorporated GPS-GSM system is used to track vehicles using google earth application. The co-ordinates received by the GPS are filtered using kalman filter [2] to improve the precision of measured position. To improving public transportation management services based on GSM and GPS [3] the system consist of four modules: In-bus Module, BASE station module, BUS stop module and BUS station module. The proposal of a smart onboard GPRS/GPS system attached to vehicles for observing and calculating their speed. Violated vehicles is ticketed, first system supporting both tracking and ticketing [4]. It uses the standard social network as a rate added services for outdated tracking system. Network sites like twitter, Facebook, hike have fascinated millions of users, and many of them have unified these sites into their daily life style [5]. This system structures the finding and distinguishing of license plate using smart phones [6]. Using smart phones the images of a license plate is taken and person gets to know whether the license plate is unique. It also provides the information of vehicle and owner. Correct recognition of vehicles violating traffic rules and regulations is a major problem in the present complex traffic environments [7]. It uses image processing technology which is having 5 major steps that are image acquisition, image pre-processing, number plate localization, character segmentation and optical character recognition.

III. SYSTEM ANALYSIS

A. *Problem Statement:*

The GPS based location system has been used usually in order to find the position of the object or vehicle. But there is no option of finding that whether there is a theft happening and any tampering of the license plate is happening. And also the speed in which the vehicle is not mentioned for the user.

B. *Goal and motivation:*

To create a fast, efficient and exact smart license plate containing vehicle number and other details. With an everyday increase in the number of vehicles on our roads and highways, we are facing numerous problems for example

1. Identification of stolen car
2. Smuggling of cars
3. Invalid license plate
4. Usage of cars in terrorist attack/illegal activities.

IV. HARDWARE SPECIFICATION

An embedded system is a grouping of computer software and hardware, either fixed in capability or programmable, that is specifically designed for an exact kind of application devices. The hardware requirements are accelerometer, GPS receiver, GSM modem, ARM7 microprocessor, power supply and LCD display.

A.ARM 7 microprocessor

A microprocessor is also known as a CPU or central processing unit .It is a device in which a complete computation engine that is fabricated on a single chip. An ARM processor is one of a family of CPUs based on the RISC architecture developed by advanced RISC machine. Microcontroller has all the features that are in microprocessor.

Features of microprocessor are:

- A 32 bit microprocessor (CPU).
- A small amount of RAM 512 mb
- Programmable ROM and/or flash memory.
- Parallel and/or serial I/O.
- Timers and signal generators.
- Analog to Digital (A/D) and/or Digital to Analog (D/A) conversion.

B.GPS Receiver

GPS (Global Positioning System) receiver is to capture the current location and speed of the vehicles. The information provided by GPS is not in human understandable format. This raw data needs to be processed to convert it into useful information that can be displayed. CPU is required to process the raw data. Global Positioning System is composed of satellites and GPS receivers. GPS receivers receive signals from the satellites orbiting in space in 6 different planes 20 kilometers away from Earth. There are 24 satellites orbiting in space at present originally owned by United States government for military purposes and are now opened for commercial use. The GPS receiver installed in the mobile handsets will receive radio signals from satellites and compare with the local duplication of geo data to calculate its actual location on Earth. To increase the accuracy, data received from three satellites can perform the calculation of two- dimensional location, including the longitude and latitude. For three dimensional location information, consisting longitude, latitude and altitude, data from at least 4 satellites are required.

C.GSM modem

In wireless data transporting, Global System of Mobile (GSM) and Short Message Service (SMS) technology is a most common feature with all mobile network service provider. Utilization of SMS technology has become popular because it is an inexpensive, convenient and accessible way of transferring and receiving data with high reliability. Modem stands for modulation and demodulation. A GSM modem is a wireless modem that works with a GSM wireless network. Wireless modem sends and receives data through radio waves. The unit sends an SMS using Hayes command (AT Command). AT stands for ATtention, computer use AT command to control modems. AT command set is the industry standard set of commands used for setting up and communicating with a modem.

D.Accelerometer

Micro-electro mechanical system [MEMS] is a technology that can be defined as miniaturized mechanical and electro-mechanical elements that are made using the techniques of microfrabrication. Sensor depend upon the pressure it will give some values like x, y and z directions. The dimension can vary from microns to millimeters. Creation of 3-dimensional structure. Typically done on silicon wafers. It has many applications like healthcare, aerospace and etc. It is low cost and having high precision.

E.LCD Display and power supply

It displays name plate number on the LCD screen and power supply is given to all the components it energies the circuit and supply is given through wires or battery.

V. SOFTWARE SPECIFICATION

Android [Automated Numeration of Data Realized by Optimized Image Detection] is a software stack for mobile devices that includes an OS, middleware and key applications. Android applications are initially written in java and compiled into .DEX format. Embedded C is easier and less time consuming to write in C than assembly. It is easier to update and modify. C code is portable to other microprocessor with little or no modification. Keil C Cross Complier provides the software development tools for the 8051 family of microprocessor. The tool kit includes 3 main tools assembler, complier and linker.

Microprocessor accepts the values measured by the sensors via ADC and send these values to the android app through GSM modem. All this are done with the help of coding. This coding is done in Embedded C and Keil software provides the software development tools for the 8051 family of microcontrollers. With these tools embedded applications for the multitude of 8051 derivatives is generated.

VI. PROPOSED WORK

A smart chip attached to vehicles creating a smart license plate with which vehicles details and information can be quickly read. It can deliver more information accurate and gives real time vehicle information. Accelerometer sense the vibration that is tampering or removal of license plate. The gravitational disturbance occurred due to x, y and z direction on the accelerometer which would disturb the MEMS output. This will trigger the microprocessor to act. From GPS current location and speed of the vehicle will be sent to microprocessor. The ARM microprocessor is used to get the current GPS data and send that through the GSM modem. The two API's are used position API which gets the location of that vehicle on the google map and message API is used to read the message having the GPS data. The GSM modem will send a message to the android based mobile.
The block diagram of system is shown in the Figure

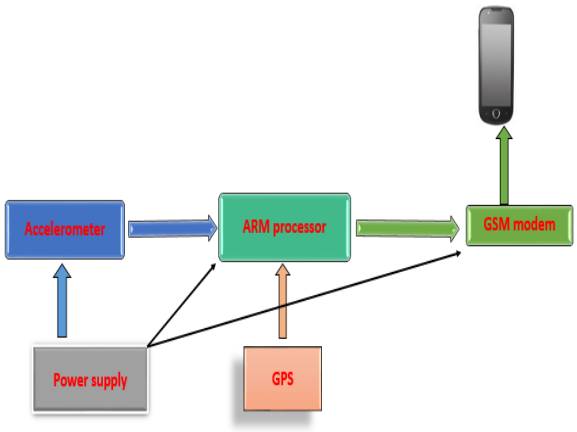

Figure 1: Block diagram of proposed system

When an application is installed in android mobile phones the flow starts. From the inbox the message is read which is having more priority. By used SMS API the message is read which consist of latitude, longitude and altitude. Using position API it finds the current location and calculate the speed. Later it updates the new position.

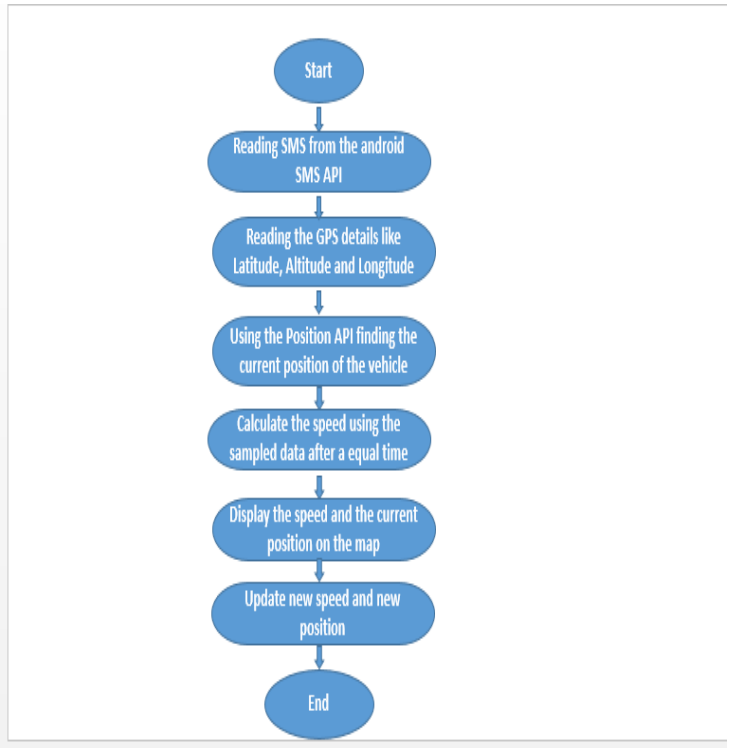

Figure 2: Flow chart of proposed system

If tampering of name plate the message will go to RTO, vehicle owner and nearby police station. Location of the vehicle is displayed in google map and speed of the vehicle is calculated.

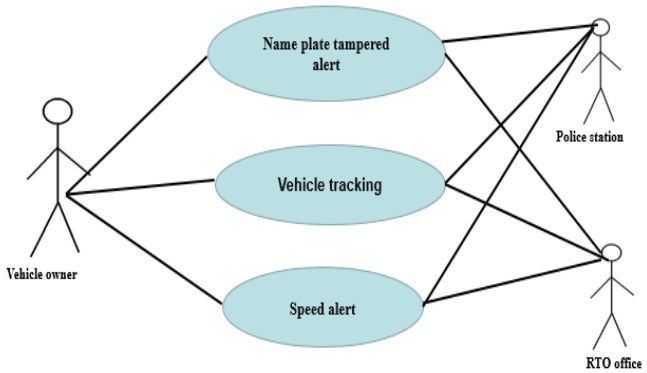

Figure 3: Use case diagram of proposed system

CONCLUSION

The project is all about controlling theft and misuse of a vehicles. The system is about making vehicle more secure by the use of GPS, GSM technology and an android application. Its gives real time and more accurate information

REFERENCES

[1] Jithin V mohan, Minu Balan, Sharoon Thomas, and Lynn Mariette Mendonza, "Fleet Mangement System", B.Tech Degree Thesis, College of Engineering, Munnar, Idukki, Kerala, India, 2009

[2] Mohammad A. Al-Khedher, "Hybrid GPS-GSM Localization of Automobile Tracking System", International Journal of Computer Science & Information Technology (IJCSIT) Vol 3, No 6, Dec 2011

[3] G. Kiran Kumar, A. Mallikarjuna Prasad, "Public Transportation Mangement Service using GPS-GSM", International Journal of Research in Computer and Communication Technology, IJRCCT, ISSN- 2278-5841, Vol-1, Issue -3, Aug - 2012.

[4] Saed Tarapiah, Shadi Atalla, and Rajaa AbuHania, "Smart On-Board Transportation Management System Using GPS/GSM/GPRS Technologies to Reduce Traffic Violation in Developing Countries",

International Journal of Digital Information and Wireless Communications (IJDIWC) 3(4): 96-105, The Society of Digital Information and Wireless Communications, 2013 (ISSN: 2225-658X)

[5] Ahmed ElShafee, Mahmoud EIMenshawi, and Mena Saeed, "Integrating Social Network Services with Vehicle Tracking Technologies", International Journal of Advanced Computer Science and Applications, Vol. 4, No. 6, 2013

[6] Amita Mundhe , Jayashree Otari, " Automatic Number Plate Recognition Using Smart Phones", International journal of Engineering Research & Technology , Vol. 2 Issues 4, April-2013.

[7] Priyamvadha Krishnakumar, "Automatic Number Plate Recognition (ANPR) through smart Phones using Image Processing Techniques", IQSR Journal of VLSI and Signal Processing (IOSR-JVSP) Volume 4, Issue 4, Ver. III (jul-Aug. 2014), PP 19-23 e-IISN: 2319-4200, p-ISSN No.:2319-4197.