

GPS/GSM based Vehicle Tracing System

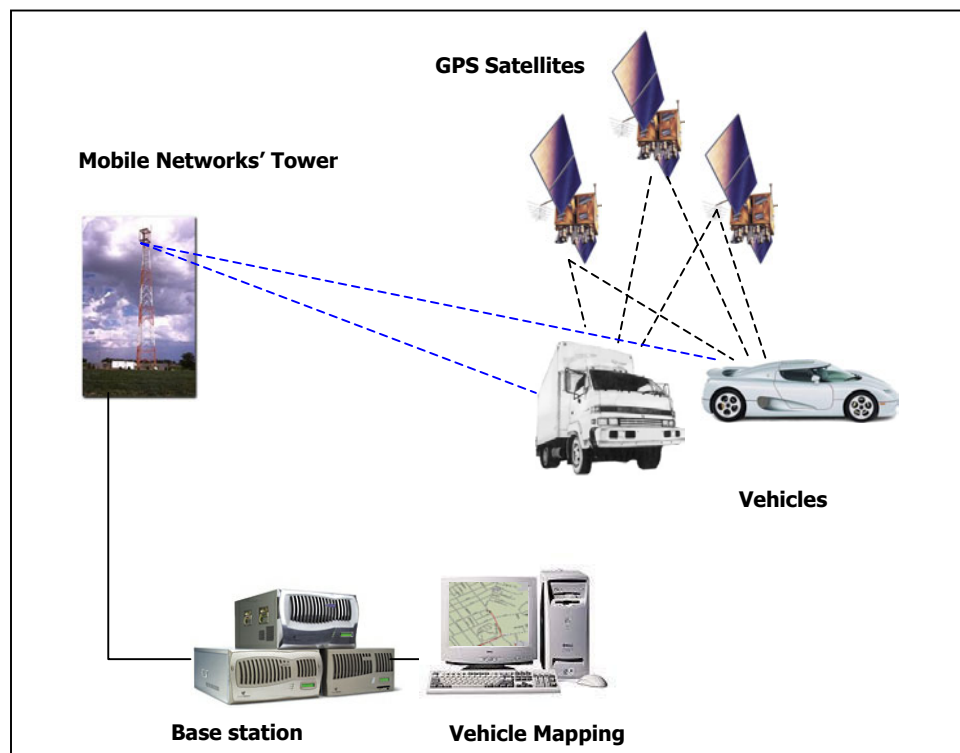
The customer is a US based company. They wanted Ushustech to develop a Product for them.

Business Objective

If you want to know; where your car or truck is, the routes and arrival time of your fleet of vehicles, if someone is abusing your vehicle or if you want to protect your vehicles from thieves, a vehicle-tracking device can be of help. A vehicle tracking system will provide effective, real-time vehicle location, mapping and reporting. This information value-adds by improving the level of service provided. Better information also leads to higher profits through better fleet management. A GPS-based vehicle tracking system will inform where your vehicle is and where it has been, how long it has been there, as well as the speed.

System Overview – Challenges and Solution

The system uses geographic position and time information from the Global Positioning Satellites. The system has an "On-Board Module" which resides in the vehicle to be tracked and a "Base Station" that monitors data from the various vehicles. The On-Board module consists of a Global Position System (GPS) receiver, a GSM modem and a call controller and resides in the vehicle. The base station consists of GSM modem(s) and GIS workstation. The information about the vehicle is received over normal telephone lines and is then displayed on a PC based map.



This was a complete turnkey project that involved the designing the system including the printed circuit boards, selecting the components, developing prototypes, designing the case and testing it in the real environment. We have selected an ARM processor for the system keeping in mind the future enhancements the client wanted to bring on to the

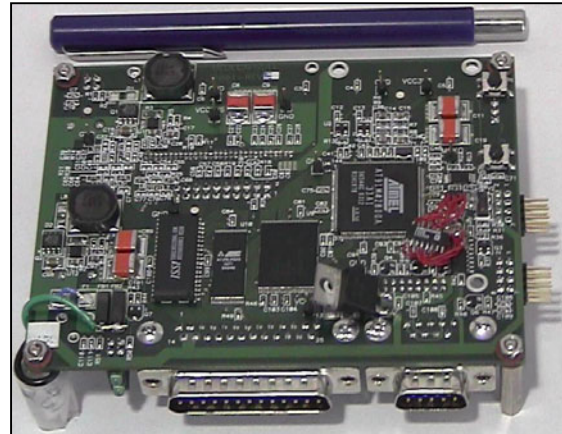
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system. It integrates high performance ARM processor (ATMEL 32 bit ARM core - 33MHz), a GPS receiver and a GSM terminal into a compact device for improved safety and security. The basic function of the in vehicle unit (IvU) is to acquire, monitor and transmit the Position- Latitude, Longitude, Speed, Time, Altitude, Direction, Distance traveled to the Fleet Management Center, either at fixed intervals or on demand.

IvU is realized as a single unit with following three modules.

1. Micro-controller Unit
2. GSM Engine
3. GPS Receiver

Microcontroller unit forms the heart of IvU, which acquires and processes the position data from the GPS module. From the position parameter, the IvU will calculate the cumulative distance traveled. The accuracy of distance calculation depends on the speed variation and gradient of the terrain. The present accuracy of this calculation to the actual reading on the vehicle meter is 95% or more. This data is locally stored in a flash memory. The frequency at which the GPS parameters are updated to the flash can be configured.



The device checks for alarms based on pre-defined configuration and in case of such events the data and alarm is sent to the base station through the GSM interface on a periodic/ demand basis. A commercial off the shelf GSM module is interfaced to the micro controller unit. This interface is also used for data (SMS) and voice communication with base station and authorized user. For security reasons, calls generated from the unit goes only to pre-programmed numbers.

Other Salient Features:

- i) General-purpose digital output pins: The IvU provides 4 digital output pins with drivers, which can be used by third party security devices for door locking, door opening, ignition control etc. The output port can be enabled using *output port enable* command from the base station.
- ii) IvU support non-volatile memory for data logging. The GPS data is stored in flash memory by the controller unit. The data-logging interval can be configured. The Fleet management software can upload data from the flash memory on command.
- iii) IvU derive power from the vehicle battery.
- iv) The IvU can be configured for alerts like speeding alert. If the speed crosses a specified value the IvU sends SMS alert to the base station. The *speeding* alert threshold parameter can be configured from the base station.
- v) The unit supports auto call receive feature. This feature enables the IvU to accept the incoming call automatically.
- vi) When the IvU detects a GPS failure for the specified GPS alert interval it sends GPS failure alert SMS to the base station.