MICROCONTROLLER BASED VEHICLEANTI-THEFT AND SECURITY SYSTEM

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ABSTRACT
In the present scenario,safety of the vehicles is very important. The vehicles parked in a market or near a shopping complex may not be secure and proper security measures are needed. The paper is aimed to design a system to trace out the exact location of any vehicle during vehicle theft and intimate the its position to the concernedthrough an SMS to registered mobile number using microcontroller controlled thro keil compiler programming This system includes a GPS modem which retrieves the location of the vehicle in terms of its longitude and latitude in the event of theft. This data is fed to the microcontroller which is interfaced with a GSM modem. Microcontroller retrieves the location details from the GPS and sends it to the concerned authority in the form of an SMS over GSM modem on periodical intervals so set by the user. An LCD display is interfaced to the microcontroller for displaying and verifying the data received before being sent over GSM. This technology will be highly useful to vehicle owners to keep tracking of their vehicles.
Key words: vehicle safety,gsm,gps,microcontroller,keil compiler

I. INTRODUCTION

Nowadays, quick and easy transport has been an essential part of our daily life. As the dark side of this phenomenon, vehicle theft has become one of the costliest property crimes of modern society. According to the U.S. National Insurance Crime Bureau, a vehicle theft occurs every 33 seconds; that is, roughly one million vehicles each year wind up in the hands of thieves at a cost of nearly 6.4 billion dollars. The indirect charge is even much more expensive. To each and every one of us, it is a numbers game where one has to pay hundreds of dollars each year in higher insurance premiums.

In order to prevent theft, some people install anti-theft systems in their cars, such as LoJack, ProScout, and TravelEyes2. Most systems combine wireless communication and GPS localization techniques. After a car has been stolen, the device in it will pinpoint the location, send radio signals to the owner, and help the owner or the police retrieve the car. However, the GPS-based anti-theft systems have their own problems. Firstly, with a cost of $400 to $1300, they are too expensive to many users. Secondly, they cannot operate in tunnels, garages, underground parking lots, or dense urban areas, where GPS signals are screened or disturbed. Thirdly, they are easy to defeat if the thief knows where the device is. For example, the thief can simply cover it with a metal can and then localization will be impossible.

Besides vehicle theft, we are also suffering from a surfeit of electronic waste. In modern society, people upgrade their mobile phones every 18 months on average, either because of the incentives in provider contracts or to keep up with the fashion trend. Only in the U.S., there are 125 million phones discarded each year, which results in 65,000 tons of waste and represents a significant and growing environmental impact. Since many obsolete phones are smartphones, which still function normally, they can be reused as a vehicle-mounted anti-theft device, instead of expensive special equipment. Today's smartphones are not only programmable but also come with network interfaces and a rich set of embedded sensors, which enable great sensing and communicating abilities to play the role of protector for vehicle safety.

In a vehicle tracking approach, the difficulty first arises from how to locate a vehicle with a smartphone inside. A naive solution is to mount the smartphone on vehicle dashboard, where it can easily receive GPS signals for

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positioning. This design is incredibly fragile, for professional thieves will disable all suspicious devices after entering a car. Hiding the smartphone deep in vehicle body could relieve this problem, but it means GPS signals may be unavailable and more positioning methods should be considered. The RF-based methods, such as cellular/WiFi localization, are far less accurate than GPS and can make large errors in the regions without dense deployment of cell towers and access points (APs). With the support of motion sensors such as accelerometer and gyroscope, dead reckoning can be used to estimate a trajectory from a known past position to current position. However, this method suffers from fast error accumulation over time, for small errors in the measurement of acceleration are double integrated into increasingly larger errors in displacement. It is found that smartphone motion sensors have surprisingly low accuracy, generating errors up to 100 meters within a minute, at a rate super-linear with time [1].

Even if the vehicle can be accurately located during the whole driving, the problem of theft detection still exists, as how to decide a driver, or a driving, is unauthorized. Most driver verification methods based on biometric features, such as vision, voice, fingerprint, and iris, cannot be used for a smartphone in vehicle body. On the other hand, it is impossible to ask the owner to manually turn off the system before driving and turn it on after driving. Even a user-defined timetable (e.g., the system is merely turned on at night) will finally bring terrible user experience, for long unprotected periods or tiresome false alarming.

In this paper, we propose the idea of PhoneInside, which does not need a special device but leverages an obsolete smartphone to build a low-cost vehicle anti-theft system. After being fixed in vehicle body with a car charger, the smartphone can detect vehicle movement and adaptively use GPS, cellular/WiFi localization, and dead reckoning to locate the vehicle during driving. Especially, a novel VA-DR method is presented, which utilizes map knowledge and vehicle's turns at road curves and intersections to estimate velocity for trajectory computation. Compared to traditional dead reckoning, it reduces accumulated errors and achieves great improvement in localization accuracy. Furthermore, based on the learning of the driving history, our system can establish individual mobility model for a vehicle and distinguish abnormal driving behaviors by an LSTM network. With the help of ad hoc authentication, the system can identify vehicle theft and send out timely alarming and tracking messages for rapid recovery. The realistic experiments running on Android smartphones prove that our system can detect vehicle theft effectively and locate a stolen vehicle accurately, with average errors less than the sight range.

An Embedded System is a combination of computer hardware and software, and also additional mechanical or other sensors, designed to perform certain specific functions. An embedded system is a microcontroller-based, software driven, reliable, real-time control system, autonomous, or human or network interactive, operating on diverse physical variables and in diverse environments and sold into a competitive and cost conscious market.An embedded system is not a computer system that is used primarily for processing, not a software system on PC or UNIX, not a traditional business or scientific application. High-end embedded & lower end embedded systems. High-end embedded system - Generally 32, 64 Bit Controllers used with OS.

Block diagram :

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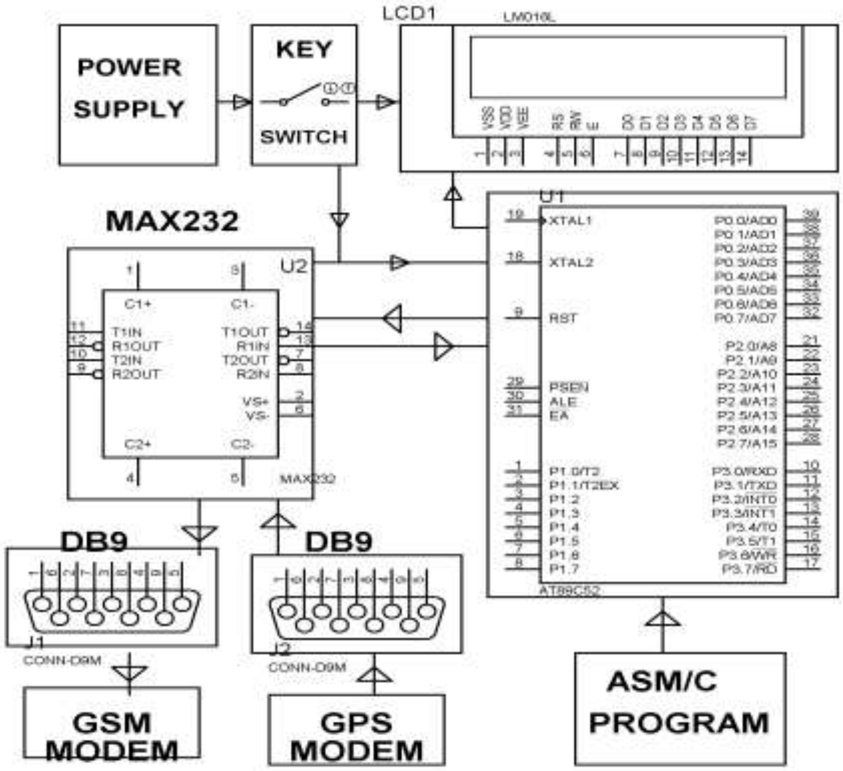

Fig1. Block diagram

II. Literature Survey

Vehicle tracking is often discussed with mobile tracking, due to the wide deployment of smartphones among drivers and passengers. Some phone tracking services, such as Apple MobileMe, and Samsung Dive, can help a user find a missing smartphone, which supports GPS and cellular/WiFi-based localization. However, cellular localization is not really accurate. The accuracy of this method ranges from 100 meters to several kilometers, mainly depending on the number of cell towers detected [2, 3]. WiFi-based localization suffers from low coverage, especially in rural areas and many developing regions. Thus, dead reckoning has become a popular localization method for mobile tracking.

In [4], vehicle trajectory is estimated by an odometer and a gyroscope, and a single data-fusion process based on particle filter performs both positioning and map matching. In [5], a context-aided Kalman filter for urban vehicle navigation is proposed, where contextual knowledge as sensor quality and driving context is used to carry out a continuous estimation and correction of sensor drift errors. In [6], a cellular network-based vehicle tracking scheme is proposed, in which vehicle velocity and heading direction, obtained by a speedometer and a heading sensor, are directly employed in the optimization for position determination.

vTrack [7] builds a system to estimate a users' trajectory and travel time by WiFi and GPS, in which a Hidden Markov Model- (HMM-) based map matching scheme and travel time estimation method are performed. Since the HMM and Viterbi algorithm are robust to noise, later studies [1, 8–11] also adopt these techniques to model a vehicle trajectory over a map area. Thiagarajan et al. [8] describe a crowd-sourced cooperative transit tracking system using an individual smartphone. For subway or vehicles in tunnels, it detects vehicle mobility by accelerometer and calculates the most likely vehicle location through dead reckoning. CTrack [9] achieves energy-efficient trajectory mapping using raw position tracks obtained largely from cellular base station fingerprints, which also fuses data from low-energy accelerometer (to detect movement) and magnetometer (to detect turns) on smartphones. WheelLoc [10] provides a continuous outdoor location service without GPS, which discusses driving and cycling patterns, respectively, and generates a rough mobility trace with accelerometer and magnetometer. AutoWitness [11] designs a small INS tag that can be embedded into stolen property. In mobile tracking, the tag establishes a sequence of movements, stops, and turns and estimates trajectory through dead reckoning, and then the trajectory data are sent to a server to complete a map matching process. Bumping [1] proposes an inertial navigation method for driving in parking garages, which exploits smartphone's accelerometer to detect bumping caused by

speed bumps to find reference positions. It also proves that such bumping can provide precise velocity estimates for positioning.
Although we adopt accelerometer and gyroscope, our scheme is different from previous approaches. Our scheme tries to enhance dead reckoning, by introducing more measurable landmarks, such as road curves and intersections, to reduce accumulated errors, not simply using advanced algorithm in map matching.
In addition, ad hoc localization of vehicle [12–14] comes as a natural result of vehicular ad hoc networks. Each vehicle estimates intervehicle distance and localizes itself among its neighbors, which aims at accurate relative positioning for driving safety. Generally, these approaches assume onboard device equipped on every vehicle to support ad hoc communication, which may need a long time for wide deployment of hardware.
Many recent research schemes have been demonstrated to achieve vehicle electronic immobilizers. Guo et al. [15] designed an automotive security system to disable an automobile and its key auto systems through remote control when it is stolen, in which four layers of security features are written in the form of firmware and embedded on the electronic control units. Sadagopan et al. [16] presented an anti-theft control system use of an embedded chip that has an inductive proximity sensor, which senses the key during insertion and sends a text message to the owner's mobile device stating that the car is being accessed. Hongzhi et al. [17] proposed an auto-guard system which combined RFID and the global mobile communication network. The system could identify the car owner quickly and then realize the function of keyless entry and keyless start-up at the same time. The infrared sensors and vibration sensors completed the monitoring function. Although they deploy different hardware equipment, they exploit cellular communication and GPS localization and have similar disadvantages as the anti-theft devices discussed above.
At the same time, the use of biometric measures is heavily promoted for driver identification purpose. POLLUX [18] is proposed as an anti-theft system based upon machine vision technology, which can locate and recognize the driver's face and send the unauthorized driver's image to car owner or police through CDMA or GPRS networks. In CMAC [19], driver profiles are created using the cerebellum model articulation controller feature map taking inputs from the brake and gas pedals pressure signals. These features can be used to verify drivers using multilayered perceptron as classifiers. Some researches [18, 20] try to deploy smartphone sensors to evaluate driving behaviors for driving safety, but there is no evidence to support that such driving recognition is accurate enough to identify the driver.
Alternatively, approaches based on ad hoc communication to guarantee vehicle safety have also been considered. In SVATS [21], each vehicle has a wireless sensor node, and each node is monitored by its neighbors, for identifying possible vehicle thefts by detecting unauthorized vehicle movement. In SPARK [22], some sensors are employed as parking lot infrastructure, to surveil and manage the whole parking lot through vehicular ad hoc networks. Once a vehicle is illegally leaving the parking lot, the infrastructure can quickly detect the anomaly. Similarly, these approaches require onboard device on every vehicle, which is still an obstacle for current users.

III. METHODOLOGY

The main concept in this design is introducing the mobile communications into the embedded system.Thevehiclethief takes only a few minutes to deactivate the security system. Furthermore, nobody will pay an attention when the car alarm goes off. Based on these reasons, it is proposed that a GSM-based vehicle anti-theft system development is designed and developed to improve the performance of the current vehicle security system. Somehow if there is another way of transmitting the alarm to the vehicleowner that is not limited to the audible and line of sight, the system can be upgraded. SMS is a good choice of the communication to replace the conventional alarm, because it can be done and does not require much cost. Although most of people know GPS can provide more security for the vehiclebut the main reason people does not apply it because the cost. Advance vehiclesecurity system is too expensive. Cost for the gadget is too high. Besides that, people also must pay for the service monthly. The main objective of this project is to design, construct and test a GSM-based vehicle anti-theft system that can be used to improve the performance of vehiclesecurity system.

IV. RESULTS:

Overview of hardwaresystem

Fig 3OverView

LCD displaying GSM module

Fig4 LCD Displaying GSM Module

LCD displaying of LAT&LONG

Fig 5 LCD Displaying LAT& LCD

Displaying of message sending :

Fig 6 Representing Message Sending

V. CONCLUSION

An automated vehicle theft alarm system with real time monitoring is developed. The system guarantees the uniqueness of the security by combining the function of location identification system putting forward the design of combination vehicle theft intimation by GSM and GPS.This can be used as effective tool for searching any vehicle stolen to exact latitude and longitude.Immediate SMS alert will be sent to registered owner along with exact location details.Vehicle theft location intimation by GSM and GPS provides safety of system for cars and other vehicles as well.

VI. FUTURE SCOPE

The technology will be highly useful to vehicle safety to keep tracking of their vehicles. This can be further enhanced by making an arrangement to stop the vehicle ignition by the owner remotely by sending an SMS in theft situations.

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