Multilevel Car Security Through Multimedia Messaging Service

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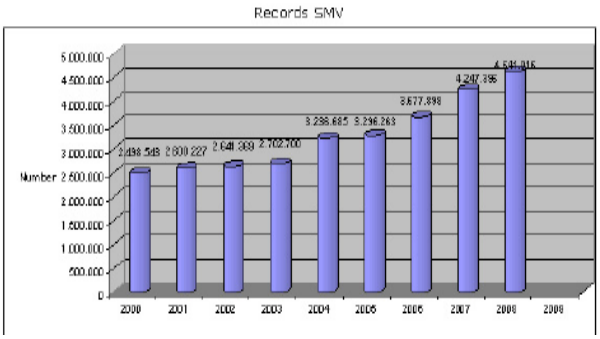
ABSTRACT: For "Car Monitoring and Tracking System" two most crucial elements are integrated, they are monitoring and tracking system. In case any intruder tries to breach security, this security system can send SMS and MMS if the owner is nearby. This system mainly features the use of MMS and database technology. Further, the local GSM/GPRS service provider can send photo of an intruder to user or/and police. Moreover, GPS is used to track the car when a theft has occurred. The implementation and testing results show the success of prototype in sending MMS to owner within 40 seconds and receiving acknowledgement to the database within 4 minutes. The timing and results are suitable to owner and police to take appropriate actions against intruder.

KEYWORDS: Car Monitoring; Car Alert; Tracking System; MMS; Database.

1. INTRODUCTION

For the security of Cars number of security systems had been produced but the results are not satisfactory. Since intruders are inventing cleverer techniques for vehicle stealing, for this purpose, there is a need to devise a powerful and strong security system. Car alarms are not showing their proper use in this area. These car alarm system do not cover large areas. The area remains in less than 100 m of range [1]. Interpol web results on vehicle crime shows that vehicle crime [2] has become the highly organized criminal activity which in turn affects the entire world. This crime is often linked to further crimes and terrorism. The main reason behind stealing vehicles is not only for the own sake of intruders. Sometimes the reason remains trafficking them to finance other crimes. They can also be used as bomb carriers or in the perpetration of other crimes [2]. End of December 2008, the database held more than 4.6 million record of reported stolen motor vehicles as in "Fig. 1". Close to 151 countries use the database regularly, of whom 122 countries share their national stolen vehicle database records with INTERPOL. In 2008 more than 31,000 motor vehicles have been discovered worldwide through the Automated Search Facility-Stolen Motor Vehicle (ASF-SMV) database.



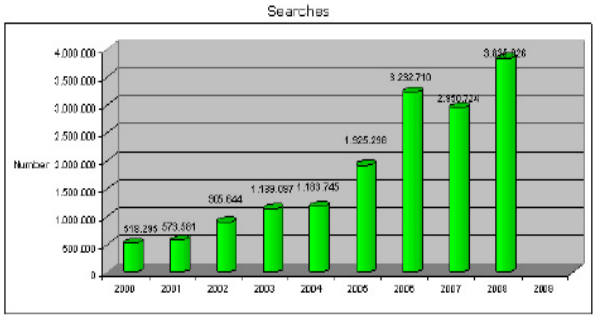


Figure 1(a, b): Number of stolen & search cars in the world

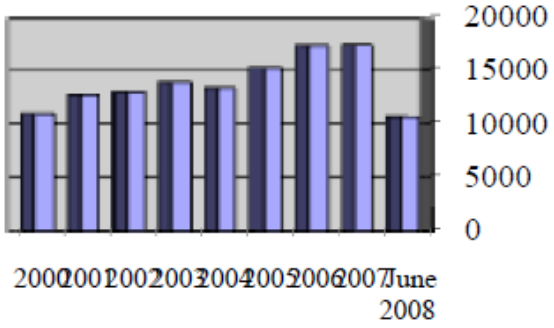


Figure 2 Number of stolen cars in Malaysia

"Fig. 2" shows number of stolen cars in Malaysia [3]. Most popular cars being stolen are Proton Wira, Perodua Kancil, And Luxury cars (Toyota Harrier, Mercedes & BMW) [4,5]. Stolen cars can be used in number of ways. They are exported either as full unit, break into parts for locals and foreign market, modified and sell for locals or ride and they are deserted somewhere else. There are different techniques for a thief to steal a car, like smashing the window and unlock the door, removing key slot from the boot and file a new key, using steel ruler and insert it between the rubber lining at the door to unlock central locking system and finally using tow truck to tow the car away. The factors behing stolen vehicles are often unreliable alarm system installed in the car, careless user and syndicate activities.

TABLE 1: ALARM SYSTEMS SPECIFICATIONS

No	Products	Alarm System	Remote Control	Sensor/s	Tracking	Camera	SMS	MMS
1	Normal Alarm	Yes	Yes	No	No	No	No	No
2	2-Way Car Alarm	Yes	Yes	No	Yes	No	No	No
3	GSM-Video	Yes	Yes	No	No	Yes	Yes-via GSM Modem	Yes
4	GPRS /CDMA	Yes	Yes	Yes	No	Yes	Yes	Yes
5	CCTV safe Video	Yes	Yes	Yes	No	Yes	Yes	Yes
6	Security for Automo	Yes	Yes	Yes	No	No	Yes- via RF transcei	No
7	Autonomous Vehicl	Yes	Yes	Yes	Yes	No	Yes	No
8	GPS/GSM/GPRS Vehicle	No	Yes	Yes	Yes	No	Yes	No

The different kinds of alert and monitoring products for car are: CARALL Multi Function Alarm System with Build in Key [6], Way Car Alarm with LCD Monitoring Pager [6], GSM Video Alarm C [7], GPRS/CDMA Wireless Surveillance Image Transmission [8], CCTV Safe Video Alert System [9], Security System for an Automobile via Mobile Phone [10], Autonomous Vehicle Monitoring and Tracking System [11], GPS/GSM/GPRS Vehicle Locator [12]. More details related to LR and specifications of security systems and components used in this project are described in references [13-19].

2. CONCEPT AND DESIGN OF CMAT MODEL

The crucial elements like monitoring, alerting and tracking are integrated to create a powerful security system which can send SMS to have fast response especially if the car is nearby. The picture of intruder will be sent via local GSM/GPRS service provider to police or security unit by using camera and MMS technology. To understand the proposed CMAT model, it is good to first to view the flowchart and components of the prototype of the model.

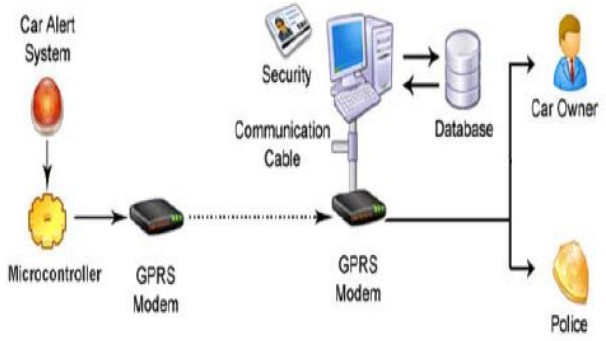


Figure 3 – CMAT model Flow Diagram (Components)

There are two parts of the model: the first part is installed in car and second part comprises of the outside car or PC system. The description of main components is as follow:

2.1 Side Part of Car

The side part of car consists of the microcontroller which is connected to a voltage supply, trigger button, camera and TTL to Rs 232 convertor connected to GPRS modem.

2.2 Programming and connection of PIC

The code is compiled then inserted to the PIC using the PIC Kit which converts the code into the HEX form and save in the PIC microcontroller.

2.3 Programming and GPRS modem connection

We connect the GPRS modem with the PIC Kit, the following is the final complete circuit “Fig. 4”

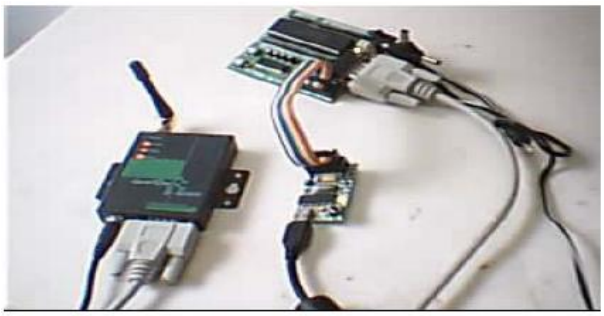


Figure.4- final complete circuit

2.4 Database side

In this we program the database; all the information about users and their cars are stored in it. A small graphical interface is used to deal with the GPRS modem and to receive the MMS and store it in the PC.

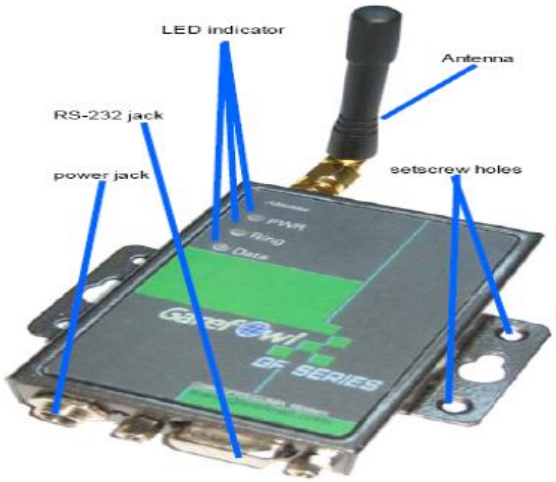


Figure. 5- GF-5000W MMS/GPRS MODEM

2.5 Programming

Here Microsoft Visual Basic is used where we program a gate to receive an MMS from the GPRS modem and insert it to the database which is compiled using Microsoft Access [6]. The following table 2 shows the description of the database table.

TABLE 2. THE DATABASE TABLE DESCRIPTION

ID	Date	Time	File name	Car plate	Message

3. CMAT MODEL TESTING

The procedure for testing the CMAT model is as follows:

- Connect the power suppliers to all parts.
- Open the database graphical interface.
- Connect the PC with the GPRS modem by choosing the right port and click connect.
- Click the trigger button from the car side circuit.
- Wait the results.

The following “Fig.6” shows the main screen design or Database graphical interface for the CMAT model.

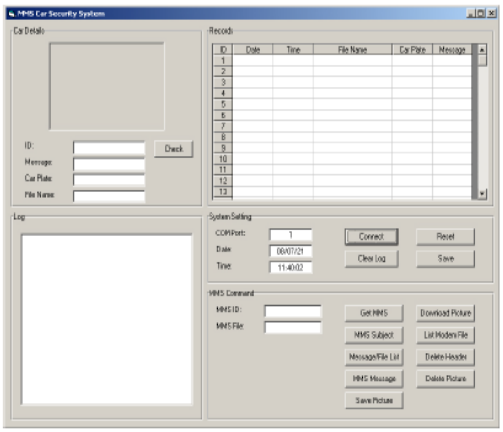


Figure. 6 - Database graphical interface

Following are the results obtained from CMAT testing.

3.1 Test No. 1

The first test was performed by clicking the trigger button which resulted in a MMS alert received to the mobile phone with a total delay of 45 seconds. “Fig.7” shows the mobile screen shoot as a test 1 result.

Figure. 7 - Test one mobile shot

The MMS alert received to the database with a total delay of 6 minutes and 12 seconds. “Fig.8” shows the database screen shoot for the test 1.

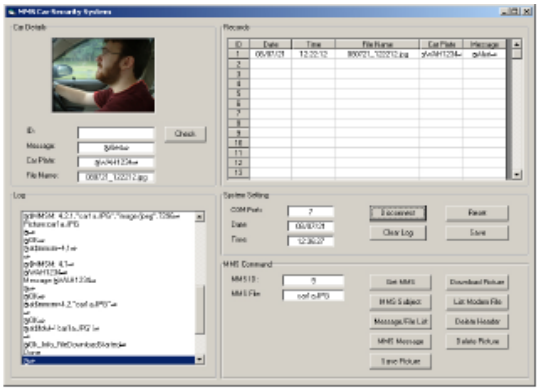


Figure. 8 - Test 1 database shot

3.2 Test No. 2

The second test was performed by clicking the trigger button which resulted in a MMS alert received to the mobile phone with a total delay of 36 seconds. “Fig.8” shows the mobile screen shoot as a test 2 result.

Figure. 9 - Test 2 mobile shot

The MMS alert received to the database with a total delay of 4 minutes and 16 seconds. “Fig.10” shows the database screen shoot for the test 2.

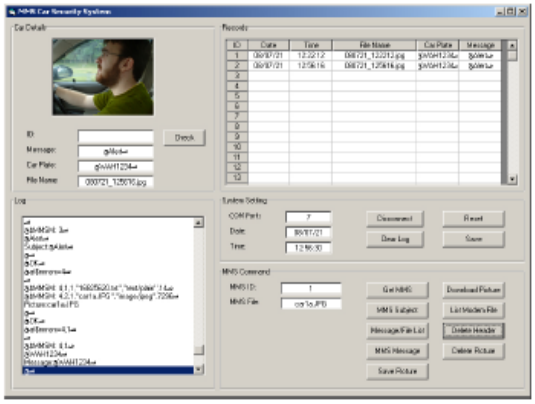


Figure. 10 - Test 2 database shot

3.3 Test No. 3

The second test was performed by clicking the trigger button which resulted in a MMS alert received to the mobile phone with a total delay of 37 seconds. “Fig.11” shows the mobile screen shoot as a test 3 result.

Figure. 11 - Test 3 mobile shot

The MMS alert received to the database with a total delay of 56 seconds. “Fig.12” shows the database screen shoot for the test 3.

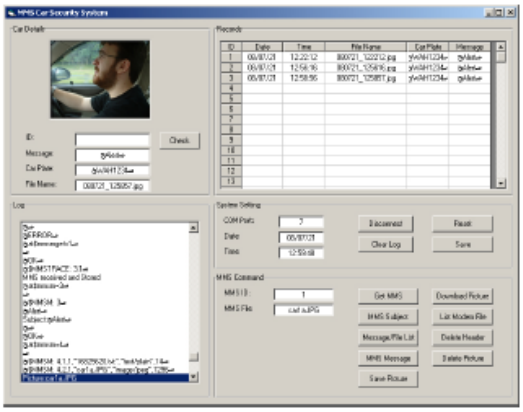


Figure. 12 - Test 3 database shot

The test results can be summarized in the given table 3 with 3 extra tests.

TABLE 3: TEST RESULTS

Test No.	Send Time	Receive time to mobile	Mobile Delay	Receive time to PC	PC Delay
Test 1	12:16:00	12:16:45	00:00:45	12:22:12	00:06:45
Test 2	12:52:00	12:52:36	00:00:36	12:56:16	00:04:16
Test 3	12:58:00	12:58:37	00:00:37	12:58:56	00:00:56
Test 4	10:12:00	10:12:43	00:00:43	10:16:12	00:04:12
Test 5	10:22:00	10:22:36	00:00:36	10:26:11	00:04:11
Test 6	10:38:00	10:38:33	00:00:33	10:41:56	00:03:56
Avarg	-	-	00:00:38	-	00:04:03

These results show that, the MMS sent to a mobile phone takes less time than the time taken in MMS sent to the GPRS modem connected to the PC. The mobile phone will receive SMS within 40 seconds on average, while GPRS system receives SMS alert within 4 minutes on average. The differences are due to network availability. These results are quite acceptable.

4. CONCLUSION

The conclusion derived from this paper is that the CMAT model can be upgraded to a more advanced, portable and cost efficient system. In CMAT model, the photo of the intruder can be received within 4 minutes which is very helpful for police to take further actions.

5. FUTURE PROSPECTS

Finally, the novel methods proposed in this paper can be explored as easy to use techniques for automatic car tracking contributing to the “work in progress” vehicle safety research area.

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