Design and Implemetion Vehicles Information System Supported by GSM Network

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Abstract

Vehicles information system are one of the most important infrastructure projects of countries because they have a great impact on the preservation of citizens' lives and the security of society. This paper presents the design and implementation of vehicles information system based on GSM network that has goal to build a new ideal of vehicles information technology system, which is efficient, flexible, and able for monitoring information and querying about any vehicles at any place. Additionally, mobility monitoring and query as it is supported by GSM network. Therefore, the query of vehicle owners' hobbies by security and traffic patrols contributes to avoiding many security and traffic problems.

Keywords: Vehicles information; GSM; Android ; SQL database; Data center computer.

INTRODUCTION

In recent years, vehicles are considered a social rank in the Iraq society such many person owns multiple vehicles and therefore vehicles number on the streets has raised immensely. On other side, this matter considers as a development in the living level of people. Thus, it seen clearly that there are a hugely raise of vehicles accidents, air pollution rise by the vehicles and felonies related to the vehicles like the explosive vehicles etc. The proposed idea looks to evolve a system that facilitates notification about any car information to the appropriate agencies and in tracking the vehicle in case of theft and controlling the air pollution and reduce the explosive vehicles. There are not been much work in this field. The proposed system based on GSM network in finding solution to the mentioned cases. The main aim of the proposed project system are to enable notification car information to appropriate agencies, provide a system for querying vehicle any time and any place in case of theft and explosive vehicles.

PROPOSED SYSTEM DESIGN

Vehicles have great advantages in mobility and travels, but many problems and negatives have been generated from the use of vehicles. As the number of vehicles has increased and their use has increased. The total dependence on traffic has resulted in many traffic accidents [1]. The traffic problems caused by the use of vehicles congestion in the streets and long waiting at intersections, and the problem of traffic regulation and congestion and control of traffic accidents. This entire problem mentioned above considered for building a new car information system.
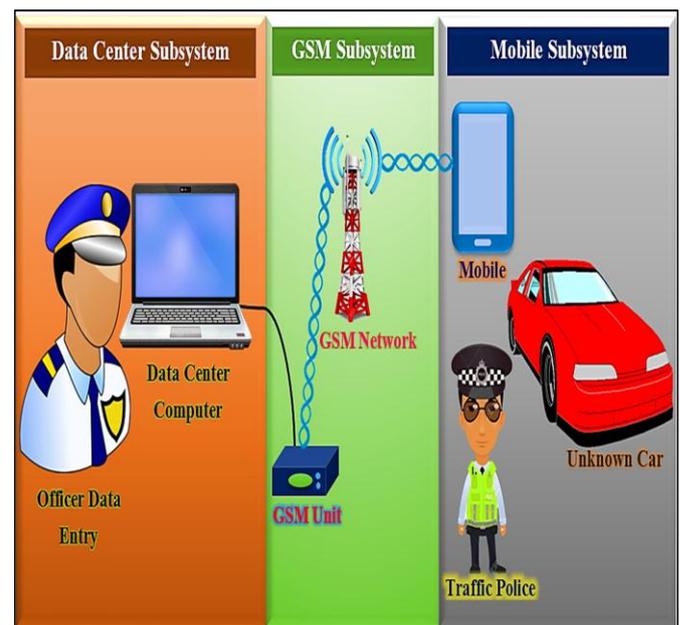

Figure 1. General block diagram.

Referring to overall block diagram motioned above. The system is divided into three subsystems according to each function of them. It is Mobile subsystem, GSM subsystem, and Data center subsystem.

A.   Mobile subsystem

It consists of a smart phone that operate with Android operating system. It connects with data center computer for exchanging vehicles information by an android application. This application is built by an Android Studio that provides an integrated environment for building as this application. After the application was designed, the application is installed in a smart phone. Android application consists of two-text box. The first one is for entering the number of GSM unit, which exists in data center subsystem. The second box is for entering an information of car registration plate. Also the sent button for sending SMS to GSM unit.
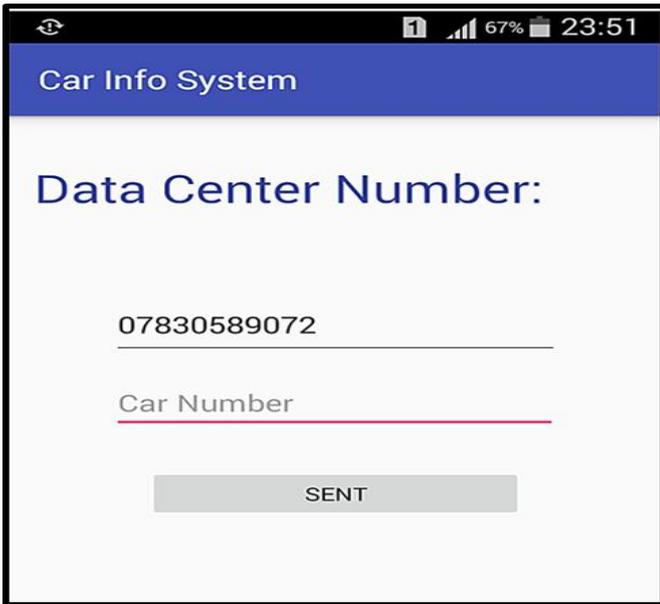
Figure 2. Car information android application.

B. GSM subsystem

GSM Subsystem is used for connecting the data center computer with mobile subsystem, which means that traffic police patrols able to connect with the main data center for requesting an information about specific car. GSM unit is the most important in this subsystem. GSM unit consists of Arduino GSM Shield CE 0700 [2] that support connection with GSM network to send and receive to or from SMS between data center subsystem and mobile subsystem.
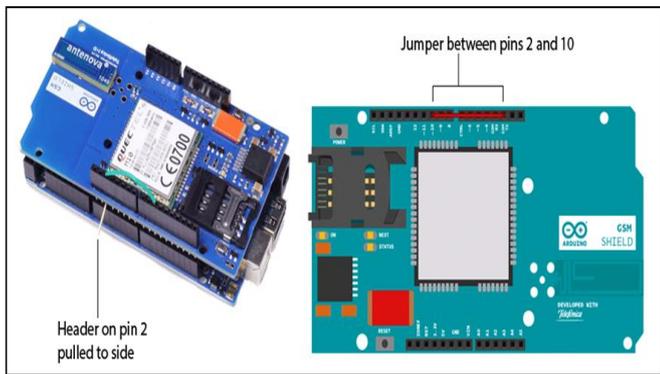

Figure 3. GSM shield.

C. Data center subsystem

Data center subsystem is a most important part because it plays role of mind in the overall system. This subsystem consists of laptop with the software program which is designed as windows application to perform the main function of the system as well as it represents the main GUI of data center subsystem. This windows application is designed by visual C# 2013 program that provide integrated environment to make windows applications. In addition, the SQL Database is built in Microsoft SQL Server Management Studio program. It is to

save an information about each car in Iraq. The main GUI based on SQL database. As it was run, it is directly called the built SQL for getting all required information about each car. Therefore, the user can add a new information, update last edits, save information, search about specific name or a specific car. As well as the main GUI is serially connected to GSM unit to exchange data with police patrols through GSM network. The main GUI provide all specification that is needed by general traffic corporation. Therefore, the user can insert the data of vehicles, which is (owner name, his phone number, personal information, car information). As well as the main GUI allows to the user can edit inserted information about each car. The main GUI synchronize with SQL database so as any change or update is saved in SQL database. Figure below shows the main GUI of data center subsystem. The main GUI of data center computer always connects to GSM unit through the serial port to connect the data center computer to the GSM network for exchanging information about any car with police patrols. When the SMS is received by GSM unit, which consists of the car number. Therefore, the car number is speared form SMS and it sends to the main GUI of data center computer. After that, the main GUI makes comparison between the received car numbers with car numbers that is saved SQL database [3]. If there is one car matched with the received information. The main GUI send the all information about matched car to police patrols. When there is not car in database matched with the received information, the main GUI send SMS told police patrols there is not information about this car.
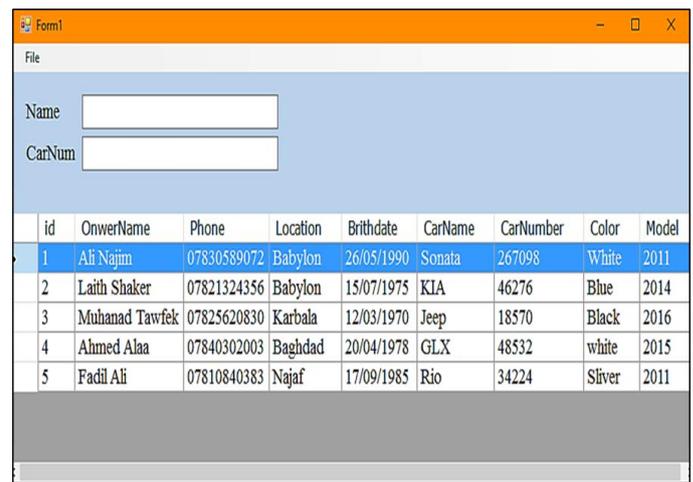

Figure 4. Main GUI of data center subsystem.

System Operation

As a monition above, the system consists of three main parts and each part has specific role in the system performance, these parts are connected together to achieve the main goals of system, so we go to explain the system operations in the following points:

• When the traffic policeman needed to know an information about car which is stand in street for long time, the policeman enters the car numbers to Android application which is installed in his phone.

- After policeman made sure from the car number, he sends the car number to data center computer to inquiry about car's information.

- The android built text message and send it to data center number.

- The message is received by GSM unit in data center subsystem, which always connected to GSM network for sending and receiving information.

- GSM unit analyses the received SMS which contains information about the car number and send it to data center computer by serial connection.

- Data center program receive the car number and make comparison with vehicles that are saved in SQL car database.

- In case of the received information matched with the data of one car which is saved in database, the data center program built text message consists of (owner name, his phone number, personal information and car information) and send it to the GSM unit.

- GSM unit received text message from computer and send SMS to phone number, which requested car's information.

- In case of the received car's number is not matched with car numbers that saved in database, the computer sends message told the policeman there is no information about this car.

System Features

The system feature illustrated in following points:

- Real time system.

- Any car information can be queried at anytime and anywhere because of using the GSM network for sharing information among police patrols.

- High security of the shared data thought GSM network.

- A database for storing, editing, deleting and inserting vehicles information.

- Unlimited vehicles information can be added to database system.

- The system supports receiving data from multiple police patrols.

- The system is flexible and can be developed according to the new requirements.

- The system is supported by GSM subsystem makes it more flexible and reliable.

- The main GUI designed is easily used.

- The system is supported by android application makes more efficient.

RESULTS

As mentioned above, that the viewed system is a prototype and designed to monitoring and alarm about any vehicle at any place. The following results are showing according to real several testing of each subsystem.

A. Mobile Subsystem Test Section

Android application consists of two textbox, the first text takes information about number of data center, and the second text box takes information about car number, which is present in car registration panel. Therefore, the android application built SMS from datacenter's number and car number. Figure below shows the received SMS from car information android application. This proved that the android application is validity for working.
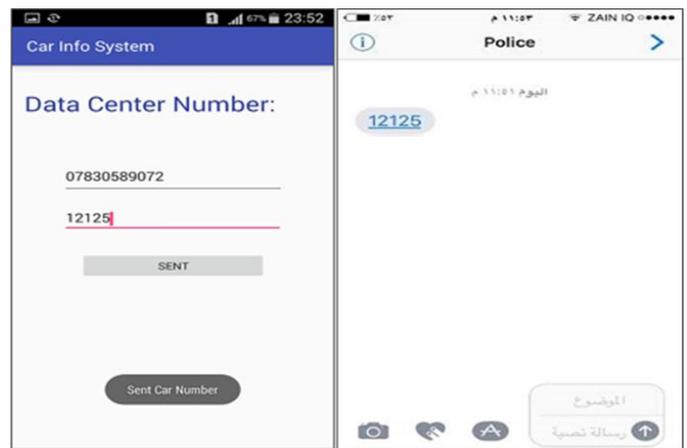

Figure 5. Testing car information application functions.

B. GSM Subsystem Test Section

In this section, we test the performance of GSM unit, which is built from Arduino Uno and GSM shield. After that, the unit is program for transmitting and receiving SMS with police patrols.
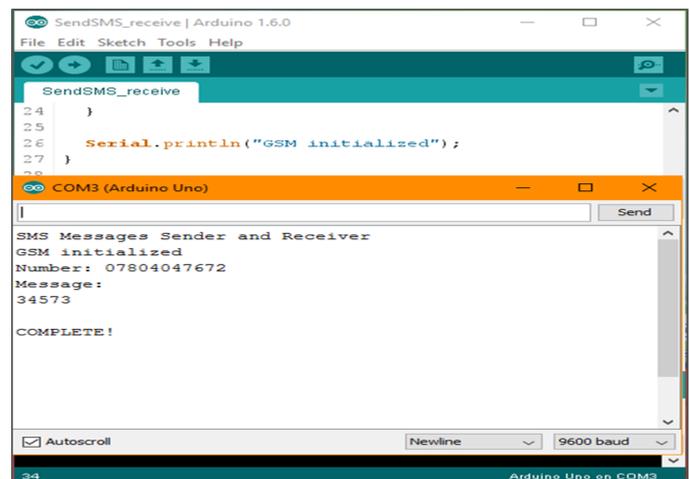

Figure 6. Testing GSM subsystem.

C. Data Center Subsystem Test Section

In this section, we test the performance of main GUI system, as well as providing the main function of the purposed system. When we run the main GUI program of data center, the program requests the user name, password, and port com to connect with GSM subsystem.
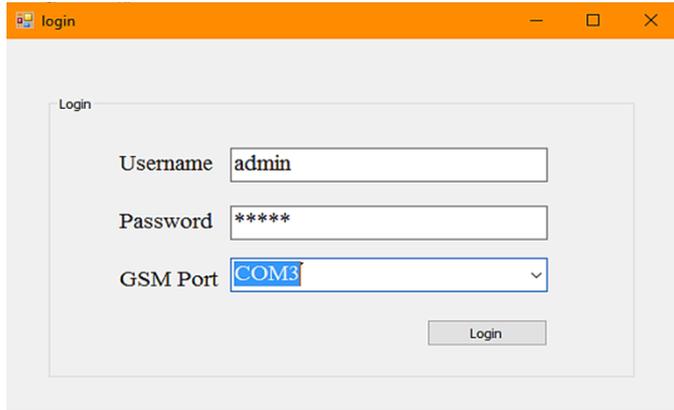

Figure 7. Authentication panel.

When click on "File" in main bar, it consist of multifunction such as add new car information, edit any car information, as well as uploading the vehicles database. For example we go to file and click on the add car, the add car panel directly open which consists of all required information must be inserted to database.
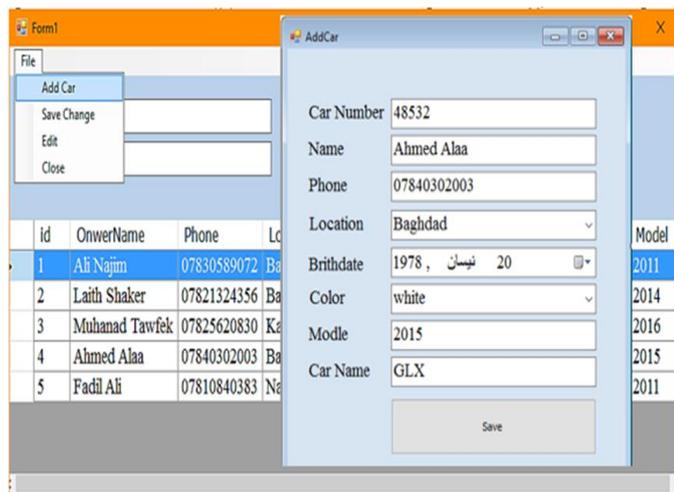

Figure 8. Testing main GUI.

Finally, we need to get information about any car, we open android application with writing car number and send it to data center subsystem, the main GUI replay all information about any car, if this car's information saved in database matched with receiving information.
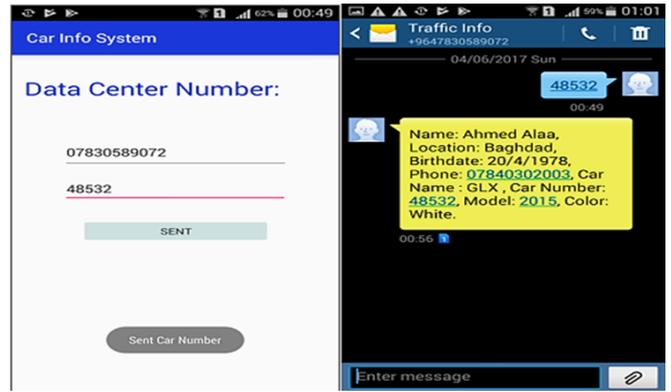

Figure 9. Testing purposed system.

CONCLUSION

In this paper, we studied new idea that manage vehicles information and real time query about any vehicles and any place. These projects make the recent progress in traffic management systems.

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