

Vio Issuer

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Abstract:

The goal of this project is to design and implement a system that would automate the traffic violations issuing process in Saudi Arabia, using the smart existing hardware that can read the citizens IDs and assign the violations to the ID number. With the many great feature those devices offer, we aim to develop a system that will help the police officers with the process of issuing traffic violations by making the process easier, faster and more secure for the officers and citizens. The reasons to develop this system are on two folds; first thousands of traffic violations are issued every day in Saudi Arabia, and we would like to take advantage of the technology available today to make the process easier and more secure; second, to keep effective track on traffic violations in order to avoid confusion or forgery. This research discusses many points about existing and similar systems – software and how do they work, existing hardware or devices with their features, weaknesses, strengths, prices, and many other points, the research also analyzes the need for such a system, and explore ways for implementing and improving it.

Keywords: Augmented reality; AR; sensor; glass

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1. INTRODUCTION

With the increase of number of people driving, the numbers of accidents and violations have increased a lot recently. Many and many traffic violations are issued daily on streets [1]. The process of issuing the violations through paperwork has become very basic and dull comparing with the technology achievement.

A traffic ticket is a notice issued by a police officer to a motorist or other road user who fails to obey traffic laws [2]. It usually has two types; the first one is citing a moving violation like exceeding the speed limit, and the second type is a non-moving violation like a parking ticket [3]. Also moving violations can be classified as infractions or misdemeanors, and serious violations are considered felonies.

The traffic violation in the database must have the traffic violation ticket ID, the issuing date and time, the address or site, the violation type, citizen ID and name, the vehicle company name, name, ID, and color. On the ticket, it can have only some of the previous information [4].

Traffic violations in Saudi Arabia have 4 classes. The first class -Class I- violations cost not less than five hundred riyals and not exceeding nine hundred riyals, or take vehicle in custody plus the fine [5]. The second class -Class II- violations penalties is a fine not less than three hundred riyals and not more than five hundred riyals, or takes vehicle in custody plus the fine. The third class -Class III- violations penalties is a fine not less than one hundred and fifty riyals and not more than three hundred riyals. The fourth class -Class IIII- violations cost not less than one hundred riyals and not more than one hundred and fifty riyals [5,6].

Studying and knowing all the systems Saudi Arabia is using, working on, or developing to issue the violations helps to create and develop a better system. A new system called Saher System was found. It is an Automated System to manage traffic with ESystems. The system covers the major cities in Saudi Arabia like Riyadh and Jeddah [7]. It uses connected digital cameras network technology to the National Information Center (NIC) [8]. The system consists of 6 systems connected to the command and control centers in the major cities. Those 6 systems are The Traffic Management System (TMS); The Auto Vehicle Location System (AVL), The License Plate Recognition System (LPR), The Variable Messaging Signs System (VMS), The Close Circuit TV System (CCTV), The Law Enforcement System (LES). The system should be able to monitor violations using cameras, and then send the picture of the vehicle plate and send the violation to the Violation Process Center. Then it will access the vehicle and issue the violations ticket [7-10].

From the previous description of Saher system, it is very obvious that Saher does not cover all the violations in Saudi Arabia [7-10]. It covers only the most important ones; Exceeding speed limits, and breaking traffic signs. Saudi Arabia has 73 violations divided into 4 classes. So Saher does not seem to be covering all the violations like; non tying safety belt, using mobile while driving, Parking in places not intended for parking, and others [7-10].

With the increase of number of people driving, the numbers of accidents and violations have increased a lot recently. Many and many traffic violations are issued daily on streets. The process of issuing the violations through paperwork has become very basic and dull comparing with the technology achievement. Thus, in this work was done to design and implement a system that would automate the traffic violations issuing process in Saudi Arabia, using the smart existing hardware that can read the citizens IDs and assign the violations to the ID number.

The software proposed is intended to issue traffic violations tickets. It runs on devices that the officers will have. The processes of issuing and checking violations cannot run without the ID of each citizen except in some situations like having a ruined ID or not having it at all.

2. SOFTWARE DESIGN

2.1 Architecture Design

The following Figure 1 is the architecture design of the software. It displays the structure of the software and shows the different sections and subsections. Also it shows an obvious understanding of the software's components and parts.

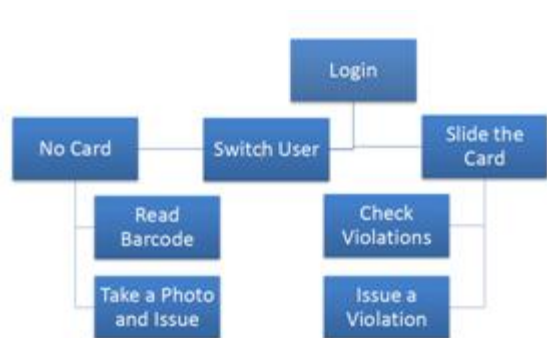


Figure 1. Architecture Design of the software

2.2 User Interface

User interface was developed using Visual Basic 2008. When first the program runs, it asks the user (The officer) to enter his ID and the password. Also in case of inactivity, it asks the user to enter his password. The switch users button appears in case of inactivity, but the login button is always there and it takes the user to the ID Card Number Form. After logging in, the program shows the ID card number Form and asks the user to slide the driver's ID card into the device, and it displays the ID card number as the user slides the card into the device. This form has 3 buttons; Switch user button which takes the user to the Login form; No card button which takes the user to a form to deal with issuing a ticket without the driver ID card number; Next button which takes the user to the Main Menu. After getting the driver's ID card number and clicking Next, the program shows the Main Menu Form. It has 3 buttons; Check Violations and Costs which checks the number of unpaid violations and the total costs of the unpaid violations on the driver; Issue a violation; which issues a violation ticket for the driver; switch user which takes the user to the Login Form. When clicking on Check Violations and Costs button, the program shows the Check violations Form. This form shows the number of unpaid violations and the total costs of unpaid violations on the driver. The form has 2 buttons; More Details button which takes the user to a form that displays the unpaid violations; Main Menu button which takes the user to the Main Menu Form. When the user clicks on

Issue a violation button on the Main Menu Form, the Issuing a violation ticket Form appears. This form asks for different information about the user and the violation, the violation ticket number cannot be modified, so the driver's ID number and the driver name. It also has 2 buttons; Menu which takes the user to the Main Menu; Next which takes the user to the next step of issuing a violation ticket. This form is the second step of the issuing process. It contains a list of violations that lets the user to check the violations needed. It also contains 2 buttons; Menu that takes the user to the Main Menu; Save and Print button which record the issuing and print a receipt for the driver.

2.3 Sequence Diagram

The Figure 2 represents the main scenario to issue a violation and the following points will explain this scenario. 1. The user enters the ID number with the PIN code. 2. The Vio issuer will then interact with the database to validate the ID number with the PIN code. 3. The Database then will respond and send the validation state back to the Vio issuer which will display the Welcome message with the user Switch Option Menu. 4. The Vio issuer will then wait for the user to slide an ID card. 5. The user slides an ID card. 6. The Vio issuer will then interact with the database to validate the ID card. 7. The Database then will respond and send the validation state back to the Vio issuer which will display the Violations' Option Menu. 8. The Vio issuer will then wait for the user to select the desired option. 9. The user selects Issue Violation. 10. The Vio issuer will then display the Violations' Type Menu. 11. The Vio issuer will save the operation in the Database. 12. The Vio issuer will print the receipt and will then restart and wait for the user to insert an ID card.



Figure 2. Issuing Violations Process Sequence Diagram

3. IMPLEMENTATION

3.1 Tools

Many tools were used in implementing the software. As mentioned in 1.5.B, VisualStudio 2008, SQL server 2005, Wise Icon Maker, and Photoshop CS3 are the tools used during the implementation. Also, Windows Mobile 6 Professional SDK, and Windows Mobile 6 Standard. SDK Refresh was installed in order to use Windows Mobile 6. Windows Mobile 6.1.4. Standard Image was also installed to enable the use of Camera. Microsoft .Net Compact Framework and Microsoft SQL Server Compact 3.5 SP1 for Devices were also installed for the Mobile Devices Database.

3.2 Database

The software should be linked with Traffic Violations Database. In order to test the software, a sample database is created and placed on the server. As shown in the figure 3, the database consists of 5 tables; Citizens, Officers, Vehicles, Violations, and VioTickets.

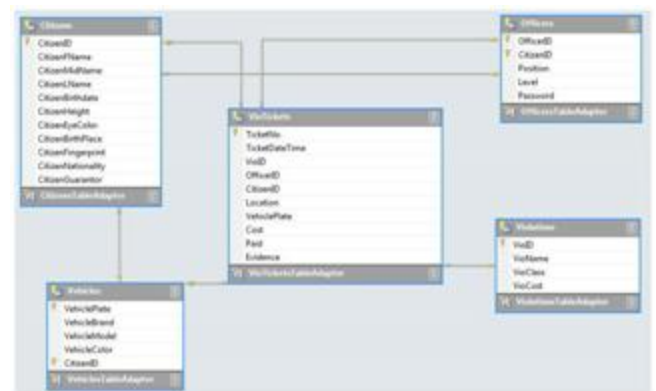


Figure 3. VioIssuer Updated Database

3.3 Design

The software consists of 9 forms; The Login Form, The Card Number Form, The Main Menu Form, The No Card Form, The Check violations Form, , the IssueViolations 1/2 Form, The Issue Violations 2/2, the Take a Photo Form, , and the Read Barcode Form .All the 9 forms have the same size which is 240 ×315, the same background color that is Lavender and almost the same title “VioIssuer” but with some changes according to the form. Figure 4 shows the Login interface



Figure 4. The Login interface

3.4 Coding

The software was created as a Smart Device Application using Visual Studio 2008. In order to record the violations and retrieve them later, about 19 queries were written and used to support the codes. The queries were distributed between the 5 tables in the database. Some of those queries were used to add violation tickets made to the database;

some were to retrieve the number of tickets for a specific citizen ID; some were to get all the violations to be added to the issuing form so the officer can select the needed ones; and some were to check and match the Login ID with the Password in the logging process

4. TESTING

This section discusses the testing of the Violation Issuer in many conditions.

4.1 Wrong ID Officer

When the user enters a wrong Officer ID, a message dialog is displayed as a Login Error that says “The UserID you entered doesn’t exist!” a shown in Figure 5.



Figure 5. Wrong ID warning message

4.2 Having a non empty Card No Textbox

Once the Card number is in the CardNo textbox, the Next Button is displayed to the user, in order to proceed to the MainMenu Form as shown in Figure 6 which enables the user to proceed to the Checking Violations Form and the Issuing Ticket Form



Figure 6. Wrong ID warning message

4.3 Reaching 24 Violations Tickets

Once the Violations’ Tickets number reaches more than 23 tickets within a year, a warning message is displayed for withdrawing the driver License in the Card No. Formas shown in Figure 7 for reaching 24 tickets.



Figure 7. 24 Tickets Warning

4.4 Reaching 27 Violations Tickets

Once the Violations’ Tickets number reaches 27 tickets within a year, a warning message is displayed for revoking the driver License in the Card No. Form as shown in Figure 8.



Figure 8. 27 Tickets Warning

4.5 Issue Violation Document

After the violation has been sent in the Issue Violation Form 2/2, a document has been saved in the device as shown in the Figure 9 which shows the ticket no., date and time, driver ID no., driver name, violation(s) ID, car Id, location and the total cost of the violations.



Figure 9. 27 Tickets Warning

5. CONCLUSION

Because of the growth of the traffic violations accuracy and trustworthiness, software to automate the process is needed. The aim of our project was to develop software to automate the issuing process that makes the issuing faster, easier, more trustworthy, and more accurate. Thus, the software was developed and tested. It will be soon used in the near future.

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