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# Vehicle Registration and Summons on the Move (VROOM)

***Nur Shamilla Selamat[1], Alex Tze Hiang Sim*[2]***

*Department of Information System, Faculty of Computing, Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia*

*[1]nurshamillaselamat@gmail.com, [2]alex.utm@gmail.com*

**Abstract**

*Nowadays, it is vital for businesses to have an online presence, especially one that is optimized for mobile. This includes UTM Safety Division. Due to that, Vehicle Registration and Summons on the Move (VROOM), an iOS-based mobile application, which facilitates vehicle registration and summon issuance in UTM is developed. In developing VROOM, Evolutionary Delivery model was employed. The system development methodology was chosen because it provides control and flexibility, striking a balance between Waterfall model and Evolutionary Prototyping. VROOM is a transaction processing system and is aspiring to be of assistance and convenience to its users where numerous tasks concerning vehicle registration and summon issuance, which incorporates location and photo tagging, is able to be accomplished in a single application, at anytime and anywhere. All in all, VROOM is developed in order to facilitate UTM Safety Division in ensuring UTM to be in a safe, secure and harmony environment. In addition, VROOM was tested and well-received by the UTM Safety Division's Director of Security, and assistant security officers. Their comments are inclusive of VROOM enables paperless vehicle registration and summon issuance work process, integrate VROOM with HRFin in order to implement VROOM in UTM, other than VROOM to be available on other platforms such as Android, which are put into consideration as VROOM's future extensions.*

**Keywords:** Vehicle Registration, Summon Issuance, iOS Mobile Application

## 1.0 Introduction

Over the years, smartphone usage in Malaysia has proliferated. According to Union Bank of Switzerland (UBS) research, mobile penetration in Malaysia is higher than that in Indonesia and United States, with one in two adults in Malaysia are smartphone users (Wong, 2014). In addition, 35 percent of Malaysia's smartphone users are exclusively depending on their smartphone for Internet access, according to a joint study by Google and Taylor Nelson Sofres (TNS). This makes Malaysia a nation which favours mobile-based Internet and it is vital for businesses to have an online presence, which are optimised for mobile in fulfilling the needs of their customers, as stressed by Sajith Sivanandan, Managing Director of Google Malaysia (Lee, 2014). This includes UTM Safety Division.

Here and now, the task of registering vehicle and issuing summon is handled manually by UTM Safety Division. Due to that, a number of problems arises such as vehicle registration becomes a lengthy and repetitive process. There are also such cases where summon records become untraceable due to a misspelled in plate numbers or unregistered vehicles, resulting in unresolved summons.

Therefore, Vehicle Registration and Summons on the Move, or VROOM, a mobile application which facilitates vehicle registration and summon issuance in UTM is developed. VROOM comprises of a number of modules, which encompasses vehicle registration and summon issuance work process that incorporates location and photo tagging. The objectives of this project include: (1) to identify and analyze the work processes that are involved in vehicle registration and summon issuance in UTM, (2) to design a mobile application which supports vehicle registration and summon issuance in UTM, and (3) to develop a mobile application which supports vehicle registration and incorporates location and photo tagging in summon issuance.

We highlight the methodology and its outcome, followed by a discussion before concluding it in the last section.

## 2.0 Methodology

In developing VROOM, the system development methodology chosen is Evolutionary Delivery model. Evolutionary Delivery model strikes a balance between Waterfall model and Evolutionary Prototyping by providing control, such as in Waterfall model and flexibility, equivalent to Evolutionary Prototyping (McConnell, 1996). There are four phases in Evolutionary Delivery model which are inclusive of the planning phase, analysis phase, design phase and prototyping phase before the delivery of the final product. The prototyping phase is an iterative process of developing and delivering prototypes, eliciting customer feedback, and incorporating customer feedback into prototypes.

### 2.1 Planning Phase

The planning phase is the first phase in developing VROOM. In this phase, problem background, objectives and scopes are identified and established based on the result of observation. Gantt charts for work planning purposes in the duration of PSM 1 and PSM 2 are also developed through the utilisation of Microsoft Project 2013. Gantt charts are vital in ensuring this project goes as plan.

### 2.2 Analysis Phase

The analysis phase is the second phase in VROOM development. It involves gathering and analyzing information that are essential in order to develop VROOM. Literature review is one of the ways of gathering and analyzing information. In this phase, research on numerous summons and vehicle registration mobile applications is carried out in order to study their design and framework, to take into account what should or should not be incorporated into VROOM. Research and analysis on various models of a transaction processing system is also carried out as VROOM is identified to be a transaction processing system. Hence, it is imperative to study how transaction processing systems work. Apart from literature review, consultation with users through a series of interviews are conducted to study and analyse the

requirements of VROOM's users. Encik Shahwalludin Ghazali and Encik Mohammad Firdaus Wahyudin, UTM Traffic Unit officers, Encik Nazam Isa, Assistant Manager to Kolej Tun Razak (KTR) College Principal, as well as Halimah Mohd Hanafi, a student of Faculty of Computing who resides in KTR were interviewed.

### 2.3 Design Phase

In this phase, the architecture of VROOM is designed in an object-oriented approach by using Enterprise Architect 8. Use case diagrams are utilized in describing processes in VROOM, in which relationships between actors or users and functional requirements of VROOM are mapped. Hierarchy model is utilized in describing modules in VROOM whereas database is described by using class diagrams, relationship schemes and data dictionary. Input and output interface for VROOM, on the other hand, are designed by using Xcode's Interface Builder.

### 2.4 Prototyping Phase

Prototyping phase is a phase of prototypes refinement and iteration. In this phase, Swift, PHP, as well as MySQL programming languages are utilised in developing a prototype for VROOM. Initially, the prototype is presented to Dr Alex Sim Tze Hiang, thesis supervisor and alterations to the prototype are made according to feedback from thesis supervisor in order to uphold the objectives of the project. Subsequently, the refined prototype's modules are tested in two phases. In phase one, the refined prototype's normal user modules are tested by a random user whilst in phase two, modules of the refined prototype are tested by four UTM Traffic Unit officers acting as normal user, application reviewer, as well as summon issuer. The final version of the prototype, one that is accepted by user is delivered as the final product.

## 3.0 Result

The result of the study is a prototype of an iOS mobile application entitled Vehicle Registration and Summons on the Move, or VROOM, which is aspiring to facilitate the tasks of registering vehicle and issuing summon in UTM. With VROOM, a user will be able to register vehicle, renew vehicle sticker, revoke vehicle sticker, check summon, issue warning or summon, as well as review application including vehicle registration application, sticker renewal application, and sticker revocation application. Thus, a user will be able to save more on time and energy as a number of tasks associated with vehicle registration and summon issuance are able to be accomplished by utilizing VROOM, at anytime and anywhere.

VROOM comprises of eight modules, which are inclusive of Login module, Register User module, Register Vehicle module, Renew Sticker module, Revoke Sticker module, Check Summon module, Review Application module, and Issue Summon module. Modules in VROOM are available for the utilization of normal user, application reviewer, and summon issuer.

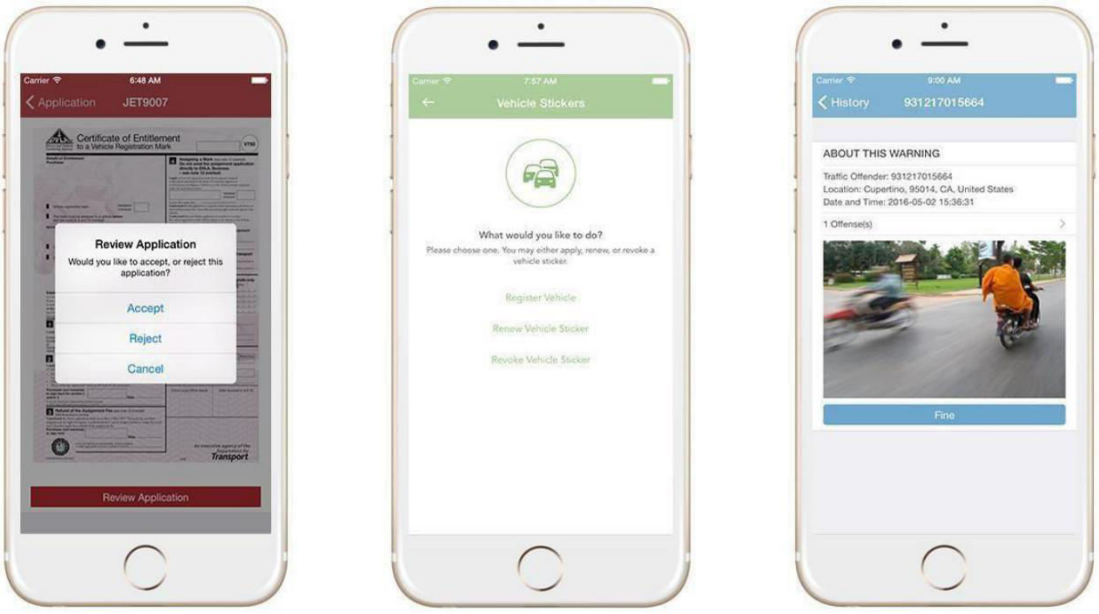


**Figure 4** The Interface for VROOM

Figure 1 shows the interface for VROOM where they describes the tasks of reviewing an application by an application reviewer, the Vehicle Stickers screen, whereby the normal user are able to choose either to register their vehicle, or renew, or revoke their vehicle sticker, as well as the interface on a warning that is issued to a traffic offender by a fine issuer, respectively.

The normal user refers to staff, students, and contractors in UTM. They are able to register their vehicle, check for summons received, as well as renew and revoke their vehicle stickers. Meanwhile, application reviewer refers to the principal of KTR, SPACE officers, Student Affairs officers, Asset and Development officers, as well as UTM Traffic Unit officers. They have the authority to specifically approve or reject vehicle registration applications whereas UTM Traffic Unit officers have the authority to approve or reject applications such as vehicle registration applications, sticker renewal applications, and sticker revocation applications. Summon issuer refers to the UTM Traffic Unit officers, and staff of KTR who have the authority to issue summon or warning to traffic offenders within the campus of UTM Skudai, Johor and KTR, UTM Skudai, Johor respectively.

## 4.0 Discussion

VROOM is developed on a local host server thus, MAMP is employed in order to start and stop the Apache and MySQL server when developing VROOM. Apart from that, Xcode 6.3.2, TextWrangler 5.0.2, and MySQL Workbench 6.3 were utilised. Xcode 6.3.2 is a tool used in VROOM development with Swift 1 programming language, whereas TextWrangler 5.0.2 for PHP 5.6.10 programming language in order to develop PHP web services for VROOM, whereby forms including multipart forms will be passed from Swift to PHP through an asynchronous request. The fetching, manipulating, and storing of data from and to a database server is then executed by PHP web services in which the result of the execution will be returned

back to Swift in JSON format. Database for VROOM, on the other hand, is managed by using MySQL Workbench 6.3.

For Register Vehicle and Issue Summon modules, MobileCoreServices is utilised in order to enable the taking of photo of a vehicle's Certificate of Entitlement (COE) and the traffic offence that is happening for documentation and summons issuance purposes, respectively. By utilising MobileCoreServices, a device's camera, as well as photo library will be available for utilisation for the UIImagePickerController whereby it allows a user to take a photo either by using camera, or from photo library. Additionally, for Issue Summon module, CoreLocationServices is utilised in order to tag the best accuracy location of the summon issuer to the summon he issued.

Apart from that, VROOM is tested by using the method black-box testing, specifically the Cause-Effect Graphing technique, white-box testing, and User Acceptance Testing (UAT) in order to ensure that modules in VROOM are functional, hence the objectives and requirements of the project are met. UAT for VROOM is conducted in two phases. In phase one, UAT is conducted with a random user acting as a normal user. Meanwhile, in phase two, UAT is conducted with four UTM Traffic Unit officers acting as a normal user, application reviewer, as well as summon issuer, in which VROOM received positive feedbacks from its testers. Their comments are inclusive of VROOM enables paperless vehicle registration and summon issuance work process, in order to implement VROOM in UTM, it would be best if there is an integration between VROOM and HRFin, other than VROOM to be available on other platforms such as Android to cater for non-iOS user, which are put into consideration as VROOM's future extensions.

## 5.0 Conclusion

VROOM is an iOS-based mobile application, developed in order to facilitate vehicle registration and summon issuance in UTM. VROOM allows user to register vehicles, renew and revoke vehicle stickers, review applications including vehicle registration, sticker renewal, and sticker revocation applications, as well as issue summons to traffic offenders. In essence, VROOM is developed to enhance campus experience and to ensure a secure and harmony campus environment for its user.

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