

# **Android-based Mobile Summon System**

by

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Dissertation submitted in partial fulfilment  
of the requirements for the  
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(Information & Communication Technology)

SEPTEMBER 2011

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# **CERTIFICATION OF APPROVAL**

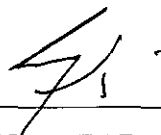
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A project dissertation submitted to the  
Information & Communication Technology Programme  
Universiti Teknologi PETRONAS  
in partial fulfilment of the requirement for the  
**BACHELOR OF TECHNOLOGY (Hons)**  
**(INFORMATION & COMMUNICATION TECHNOLOGY)**

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UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

SEPTEMBER 2011

## CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the reference and acknowledgments, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



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(NOORZAINI ILHAMI BIN MOHD NOOR)

## ABSTRACT

This project addresses the enhancement of current traffic summons system and process in Universiti Teknologi PETRONAS. Traditional paper-based approach is still being adopted by UTP security services for issuing summons tickets to the students. The usage of this paper-based approach introduces several limitations.

From the security service's point of view, the summons details need to be manually written by hand outdoors. The security personnel will need suitable places to write down the ticket. By manually writing down the details, the summons tickets are prone to errors, ink fading, and bad handwritings. At the end of the day, these summons tickets will be collected to be inputted again into another system. Again, the integrity of the summons details will be greatly reduced when the details are incorrectly entered due to bad handwritings or the loss of the summons ticket.

From the student's point of view, the process of settling the summons is lengthy and time consuming. Currently, the students have no methods of checking their pending summonses online. These pending summonses can only be checked at the finance or security office. To clear their summonses, the students will need to visit the finance office to pay the summons and later to the security office to complete the process.

By introducing a new traffic summons system, security personnel will utilize Android based-devices to issue summons which will greatly enhance summons details with photos and location. These details will be directly submitted to the server which will further reduce errors. The moment the summons is issued, the students will receive a notification to view the summons. Administrative personnel will also be able to disseminate notifications to the security personnel via the system. The Android based-devices will retrieve these notifications at a fixed interval. Simple statistics are also included in the client interface for measuring summons count. For the students, this system will allow them to check their pending summonses through online methods and optionally pay using their online bank account.

## **ACKNOWLEDGEMENTS**

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# TABLE OF CONTENTS

CERTIFICATION OF APPROVAL .....	ii
CERTIFICATION OF ORIGINALITY .....	iii
ABSTRACT.....	iv
ACKNOWLEDGEMENTS .....	v
TABLE OF CONTENTS.....	vi
TABLE OF FIGURES .....	viii
ABBREVIATIONS AND NOMENCLATURES .....	x
CHAPTER 1 INTRODUCTION .....	1
1.1 Project Background.....	1
1.2 Problem Statement .....	1
1.3 Project Objectives .....	2
1.4 Project Scope.....	2
1.5 Project Significance.....	2
1.6 System Architecture .....	3
CHAPTER 2 LITERATURE REVIEW .....	4
2.1 Android Operating System.....	4
2.2 Android-based Devices .....	4
2.3 Android Applications .....	4
2.4 Android SDK.....	5
2.5 Android as Development Choice .....	5
2.6 GPS Technology .....	5
2.7 PHP: Hypertext Pre-processor .....	6
2.8 Traffic Ticket.....	6
2.9 Traditional System Problems .....	6
2.10 Advantages of Mobile Applications.....	7
2.11 Smartphone Statistics in Malaysia (November 2010 – 2011).....	7
2.11 Paperless Benefits.....	8

CHAPTER 3 METHODOLOGY .....	9
3.1 Required Tools .....	9
3.2 Project Increments .....	9
3.2.1 Planning and Requirements Gathering .....	9
3.2.2 Client Application Design and Development .....	10
3.2.3 Server Development.....	13
3.2.4 Evaluation, Testing, and Enhancements .....	14
3.3 Flowcharts .....	15
CHAPTER 4 RESULTS AND DISCUSSION.....	17
4.1 Survey Results.....	17
4.2 Security Personnel Informal Interview .....	23
4.3 Client Prototype.....	24
4.4 Server Prototype .....	31
CHAPTER 5 CONCLUSION AND RECOMMENDATION .....	36
REFERENCES .....	37
APPENDICES .....	39
6.1 Appendix I: Planned Gantt Chart for Semester 1.....	39
6.2 Appendix II: Planned Gantt Chart for Semester 2 .....	39
6.3 Appendix III: Student’s Survey Form.....	40
6.4 Appendix IV: SEDEX Poster.....	41
6.5 Appendix V: Project Development Log.....	42

## TABLE OF FIGURES

Figure 1: System Architecture .....	3
Figure 2: Smartphone statistics.....	7
Figure 3: Proposed Client User Interface.....	10
Figure 4: Second draft of client user interface.....	12
Figure 5: Announcement draft interface.....	12
Figure 6: Statistics draft interface.....	12
Figure 7: Proposed previewable summons details in a browser or email.....	13
Figure 8: Summons Issue Process.....	15
Figure 9: Viewing Summons Process.....	16
Figure 10: Methods of receiving summons tickets.....	18
Figure 11: Summons ticket conditions when received.....	19
Figure 12: Summons ticket contents.....	20
Figure 13: Duration student settle summons upon receiving ticket.....	21
Figure 14: Desired notification method when summonsed.....	22
Figure 15: The Summons Process.....	23
Figure 16: Main Menu UI.....	24
Figure 17: Issue Summon UI.....	24
Figure 18: Location Picker UI.....	25
Figure 19: Error popup message.....	25
Figure 20: Settings UI.....	26
Figure 21: Android notification bar.....	27
Figure 22: Upload on going notification.....	27
Figure 23: Summons issued notification.....	27
Figure 24: Summons not issued notification.....	27
Figure 25: Sample Notification Email.....	28
Figure 26: Share picture action dialog.....	29
Figure 27: Notifications List UI.....	30
Figure 28: Statistics UI.....	30
Figure 29: Server Front page.....	31
Figure 30: Search Results.....	31
Figure 31: Issue Notification UI.....	32



Figure 32: Summon Notice .....	33
Figure 33: Sample online payment page.....	34
Figure 34: Database relationship .....	35
Figure 35: Database description.....	35
Figure 36: Advanced Car Sticker.....	36

## **ABBREVIATIONS AND NOMENCLATURES**

API	Application programming interface
GPS	Global Positioning System
IDE	Integrated development environment
JSON	JavaScript Object Notation
PHP	PHP: Hypertext Pre-processor
QR	Quick Response
SDK	Software development kit
SMS	Short Message Service
UI	User interface
URL	Uniform Resource Locator
UTP	Universiti Teknologi PETRONAS

# CHAPTER 1

## INTRODUCTION

### 1.1 Project Background

Universiti Teknologi PETRONAS enforces several traffic and parking laws for the students and staffs. For any traffic or parking violation committed, a summons ticket is issued. The details of the violation are later relayed to UTP Finance department after several days. All payments are made through the finance department.

### 1.2 Problem Statement

Traditional-based summoning method is still being used by security personnel in Universiti Teknologi PETRONAS. As of now, they issue paper-based summons tickets to students by handing them on the spot or by affixing them to vehicles that are in parking violation. The summons tickets are often damaged before the summons payment takes place. As a result, incorrect details are entered to the central system where all the summons information is stored. The current summons settling process is lengthy where the students need to visit several places to settle the summonses issued. There were also several cases where the students are unaware of the issuance of summon. The students often realize they have been summoned during the clearance at the end of the study period.

### **1.3 Project Objectives**

The objectives of this project are:

- To automate the process of issuing summonses by UTP security personnel by utilizing newer mobile technologies.
- To provide detailed summons information by including additional data such as photos, GPS coordinates provided by the Android-based device.
- To ease the students to view, pay or settle their pending summonses through online methods.

### **1.4 Project Scope**

The scope of this project will be mainly on developing an application usable on an Android operating system. This project will also cover some of the basic features of an Android-based device that will be used by the application. A small PHP-based server will be developed to facilitate some of the application's features. The application developed is targeted to be used by security personnel for issuing summons. Meanwhile the PHP-based server will be used both by the security personnel and students. The security personnel are responsible for handling the server operations while the students may use the server as an application for checking their pending summonses.

### **1.5 Project Significance**

The significances of this project are:

- Potentially reduce errors in summons information
- Potentially reduce paper consumption
- Speeds up the summons process for all parties
- A summons system that utilizes handheld devices (Android devices)

## 1.6 System Architecture

This project employs the client-server model as briefly described in the figure below. Security personnel and the students will act as the clients (using the Android device and personal computer respectively). Meanwhile, the administrative personnel will maintain and operate the server.

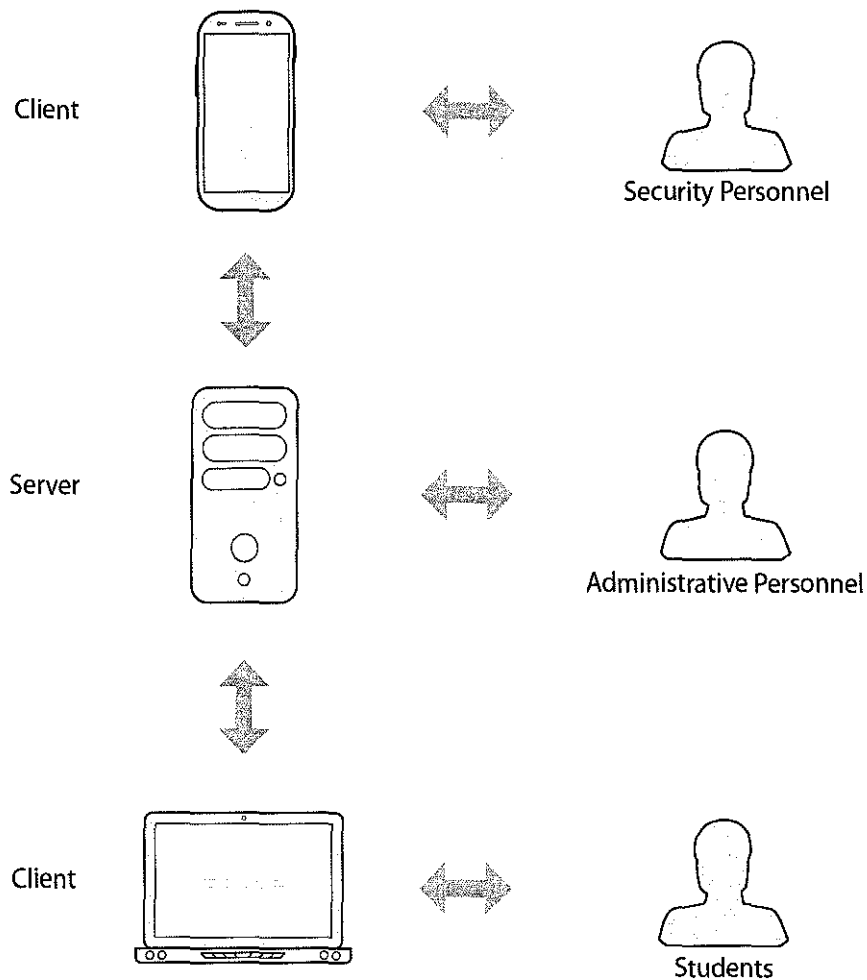


Figure 1: System Architecture

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Android Operating System**

Android is a software stack for mobile devices that includes an operating system, middleware and key applications [1]. Android platform is of open system architecture, with versatile development and debugging environment, but also supports a variety of scalable user experience, which has optimized graphics system, rich media support and a very powerful browser. It enables reuse and replacement of components and an efficient database support and support various wireless communication means [2].

#### **2.2 Android-based Devices**

Android also supports global positioning system (GPS), video/still camera, compass and 3D-accelerometer and provides rich APIs for map and location functions. Users can flexibly access, control and process the free Google Map and implement location based mobile service at low cost [2]. Android devices are mostly available in a form of smartphones or tablet computers.

#### **2.3 Android Applications**

Android applications are used to extend the functionalities of Android devices. These applications are primarily written in Java language [3]. Typical usage of Android applications includes games, communication and personalization applications.

## **2.4 Android SDK**

The Android SDK is a variety of custom tools that helps in developing mobile applications on the Android platform [4]. The SDK includes a debugger, libraries, a handset emulator, documentation, sample code and tutorial. The SDK is currently supported on computers running Linux, Mac OS X, and Windows XP or later.

## **2.5 Android as Development Choice**

The Android SDK is freely available to everyone and is currently supported on any modern computers. As compared to Apple iOS for the iPhone, the iOS SDK is only supported on Mac OS X computers [5]. For development purposes, Android SDK allows applications to be tested on Android devices for free, while the iOS requires a fee before applications can be tested using Apple devices [6].

Android applications can be distributed through Android Market (USD 25 for registration fee) [7] or by simply download the compiled application for free. As for the iOS, the application can be distributed through Apple's App Store (USD 99 per year). The application can be distributed using ad hoc distribution but limited to 100 devices and with a fee of USD 99/year) [6].

## **2.6 GPS Technology**

The Global Positioning System (GPS) is a global navigation satellite system deployed by the US Department of Defense and maintained by the US Air Force. GPS is a space-based radio navigation system that provides accurate location and timing services to anyone with a GPS receiver. The service was made available to civilians in 1996 for navigation purposes, and functions anywhere in the world [8]. The GPS receiver can determine its position by locking on to the signals of at least three GPS satellites. By using several more satellites in view, the receiver can determine the user's latitude, longitude, and altitude [9].

## **2.7 PHP: Hypertext Pre-processor**

PHP is a general-purpose scripting language that is especially suited to server-side web development where PHP generally runs on a web server. Any PHP code in a requested file is executed by the PHP runtime, usually to create dynamic web page content [10].

## **2.8 Traffic Ticket**

A traffic ticket is a notice is a notice issued by law enforcement officials to road user, accusing violation of traffic laws [11]. In Universiti Teknologi PETRONAS, traffic tickets are issued to several offences. The offences include:

- Absence of UTP vehicle registration sticker
- Vehicles parked in inappropriate/disallowed parking areas
- Exceeding the speed limit
- Violating traffic signs

## **2.9 Traditional System Problems**

According to [12], the usage of manual system, i.e., paper-based summons tickets, has many disadvantages and weaknesses. In this case, the main disadvantage of the current system is repetition of work. The summoning process starts after a security person records a traffic violation in a summons ticket or form. The copy of the ticket is passed to the security and finance department. The details from the ticket are again entered into each respective system which later leads to inconsistency of data between them. Paper-based summons tickets are also prone to human errors such as spelling errors, bad handwritings, and possible damage to the ticket itself.



## 2.10 Advantages of Mobile Applications

The mobile applications (Android) are used in this project due to the advantages it offers. According to [13], by implementing mobile applications within this system, it can improve employee connectivity and productivity. The main mobile application benefit needed for this system is to eliminate communication delay. By reducing the communication delay, the information needed by the system will be available immediately rather after a few day of delay due to manual inputs of the information.

## 2.11 Smartphone Statistics in Malaysia (November 2010 – 2011)

The chart below shows the increasing usage rate of smartphones [14]. Non-smartphone (or feature phone) usage is decreasing, meanwhile smartphone usage are increasing (Android, iOS, BlackBerry OS).

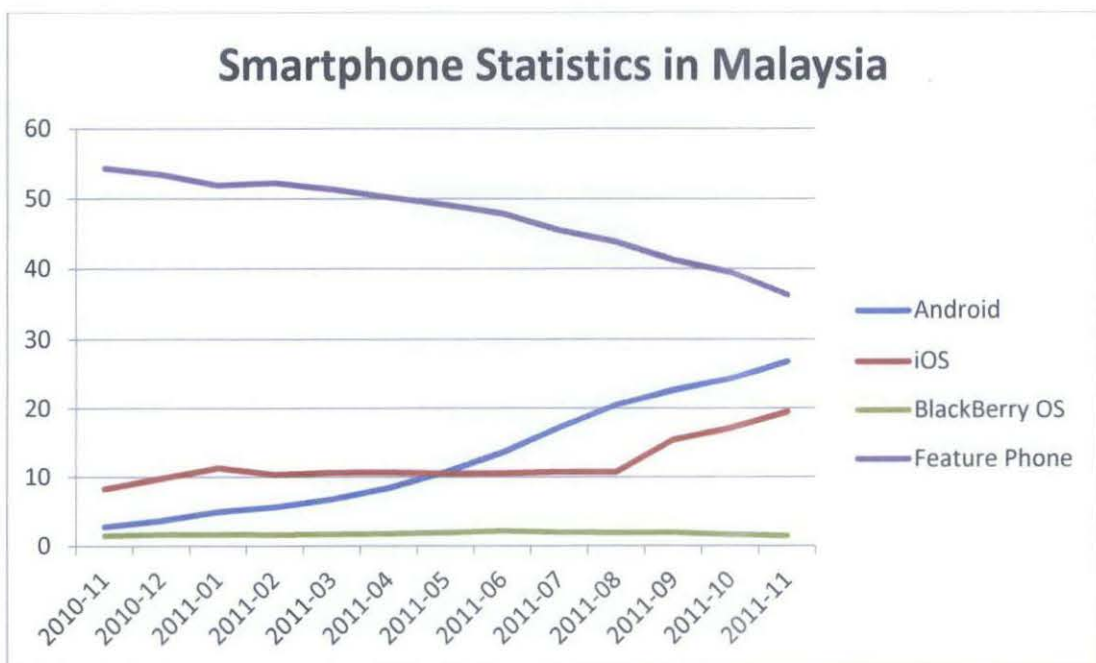


Figure 2: Smartphone statistics

## **2.11 Paperless Benefits**

As previously explained in the previous section, there are several disadvantages and weaknesses in the usage of paper-based summons tickets. By reducing the usage of paper in the summons system, several advantages can be gained apart from saving the environment. According to [15], by using electronic devices such as computers and mobile devices, dependencies on paper can be reduced. The following is a list of benefits that can be achieved if paper usage is reduced:

- Reduced costs and quicker access to information
- Document security and easy information sharing
- Able to access information anywhere
- Reduce temporary papers

## **CHAPTER 3**

### **METHODOLOGY**

This project will adopt incremental software development process and will be segmented into several increments. New features would be introduced after going through each increment.

#### **3.1 Required Tools**

The tools required for this project are as below:

- Android-based device with GPS capabilities, camera, and internet connectivity
- Android SDK and Eclipse IDE for the development of the client application
- A computer to be used as a PHP server to store and view client transmitted data

#### **3.2 Project Increments**

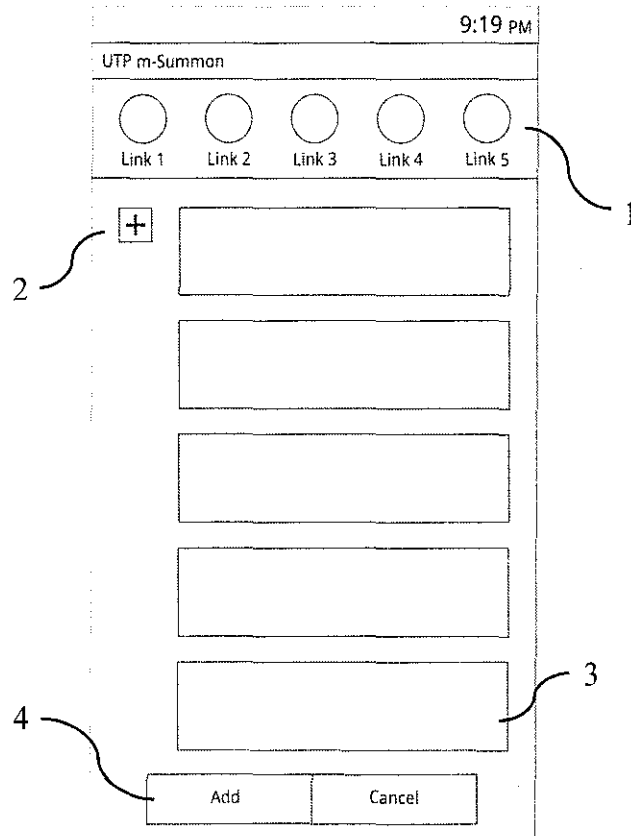
##### **3.2.1 Planning and Requirements Gathering**

The project will be started with a background study on how the summoning process is done. Survey will be done to security personnel to determine effectiveness and desirability of the process. A separate survey will also be conducted to students to identify the main problem involved regarding to the summonses.

After analysing the survey results, several features will be suggested to be implemented in the application and the complementary server.

### 3.2.2 Client Application Design and Development

The application's user interface will be designed in a simple manner to emphasize on user usability. The proposed user interface will be similar to the figure below.



**Figure 3: Proposed Client User Interface**

After the development of the user interface is considered usable, the development of the application's features will be continued. In Figure 3, area (1) represents the top navigation bar for accessing main features of the application. Area (2) represents a button for additional information to be included in the summons ticket, such as photographs of parking violations. Area (3) represents input fields where the information is mandatory to be inputted by the user. Area (4) represents action buttons, either to complete the summons ticket or to cancel it altogether.

The client will have several functions built-in to allow the summons process to take place. The client or the Android application will have the following functions:

- To capture and collect information
  - The client should collect vital summons information such as the identity (such as matrix number, student name, or car plate number) and the violation made.
  - The client may collect additional information including the location and photos of the violation. The location of the client will be captured by the Android device using built-in GPS functions. Photos can be attached using the device's camera or by using any other photos stored in the device.
  
- To retrieve information from the server
  - The client may retrieve additional information from the server such as global announcements and summons statistics.

The second draft of the user interface as shown in Figure 4 to Figure 6 is designed to follow Android design guidelines. The interface is kept clean and simple. All the buttons or input fields from the previous draft are retained.



Figure 4: Second draft of client user interface



Figure 5: Announcement draft interface



Figure 6: Statistics draft interface

### 3.2.3 Server Development

After the client application is capable of transmitting summons details, the development for the server will be started. Data transmission (summons details) to the server should only be accepted if it originated from an authorized device. The data will then be stored in a central database which is accessible by administrators. Certain data should be accessible by public, i.e., summons notice to the students.

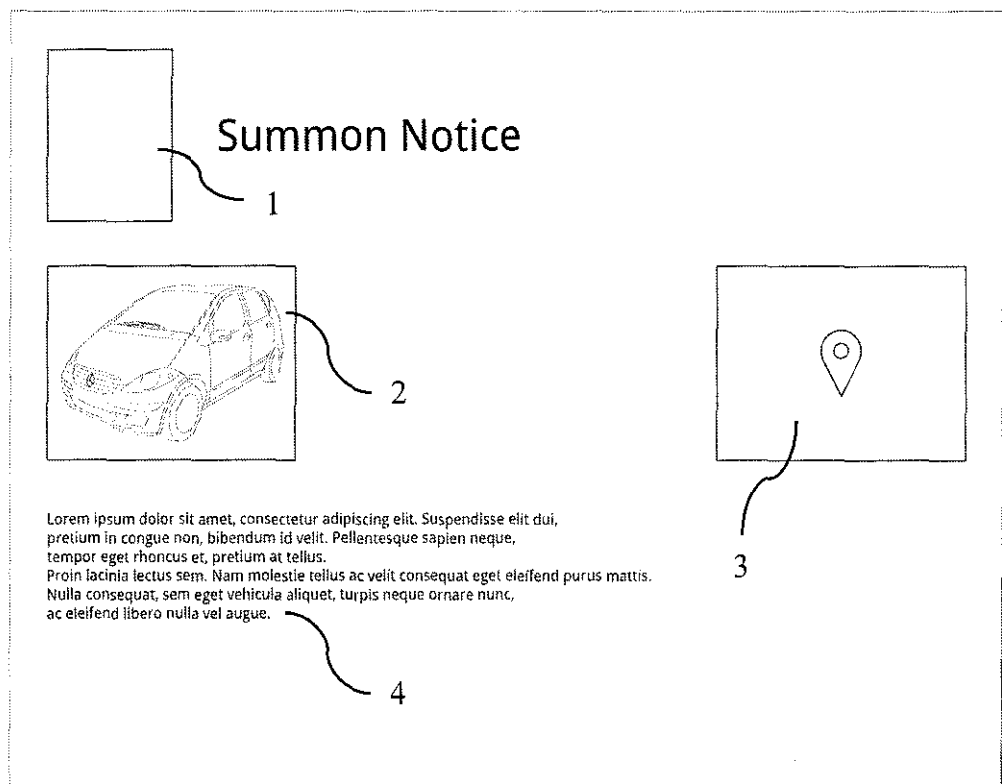


Figure 7: Proposed previewable summons details in a browser or email

Figure 7 represents a draft of a summons detail that is previewable by the students. Area (1) contains the logo of UTP; area (2) shows several photographs captured by the client application; area (3) shows a map where the summons violation takes place; and area (4) contains additional summons details.

The server will have its own set of functions to assist in the summons process. The server will include these functions:

- To retrieve, store and view information
  - The server will act as the central information centre where all the summons information from the clients is collected. This will allow other parties (students and administration) to view related information.
  
- To provide client with necessary information
  - The server will resolve the GPS coordinates provided by the client to a name or place. GPS coordinates are not suitable to shown as summons information.
  - The server will be able to broadcast announcement messages to clients for faster information delivery.

#### **3.2.4 Evaluation, Testing, and Enhancements**

The client and server will be evaluated for performance and reliability. Several testing will be conducted to allow quick bug fixes in the second and third increment. Enhancements are also be made along with the bug fixes in each new increments.



### 3.3 Flowcharts

The flowcharts below briefly explain the process that will be implemented by this project.

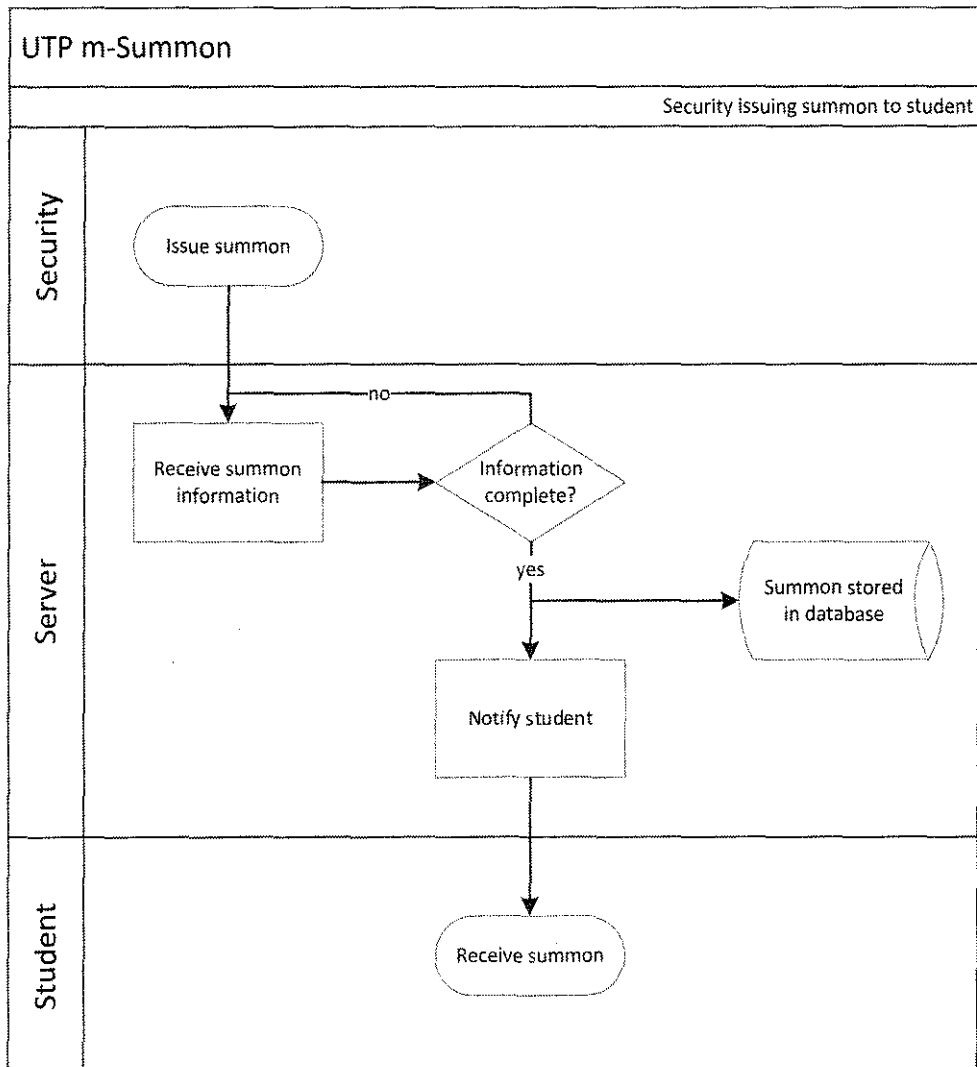
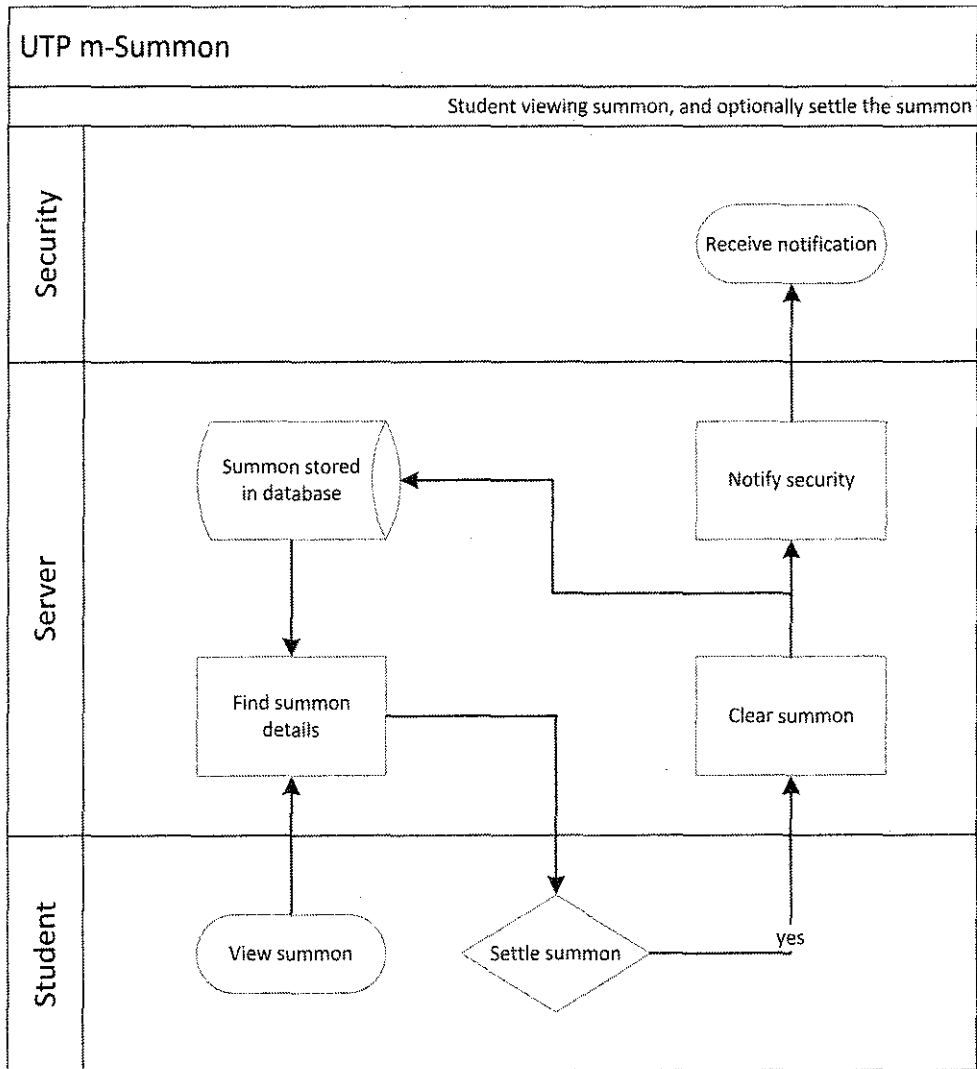


Figure 8: Summons Issue Process

Figure 8 shows the process of issuing summons to the student. The summons details are sent to the server. After all information required successfully received, the information is stored into the database. The student is notified immediately after the summons details are completely uploaded.



**Figure 9: Viewing Summons Process**

Figure 9 shows the process of viewing the summons details. Students can use the server to query any pending summons or to view the summons using the notification given by the server. The server looks up for related summons and serves it to the student. The student has the option to settle the summons using the website. After the student has settled the summons, the security administration will be notified.

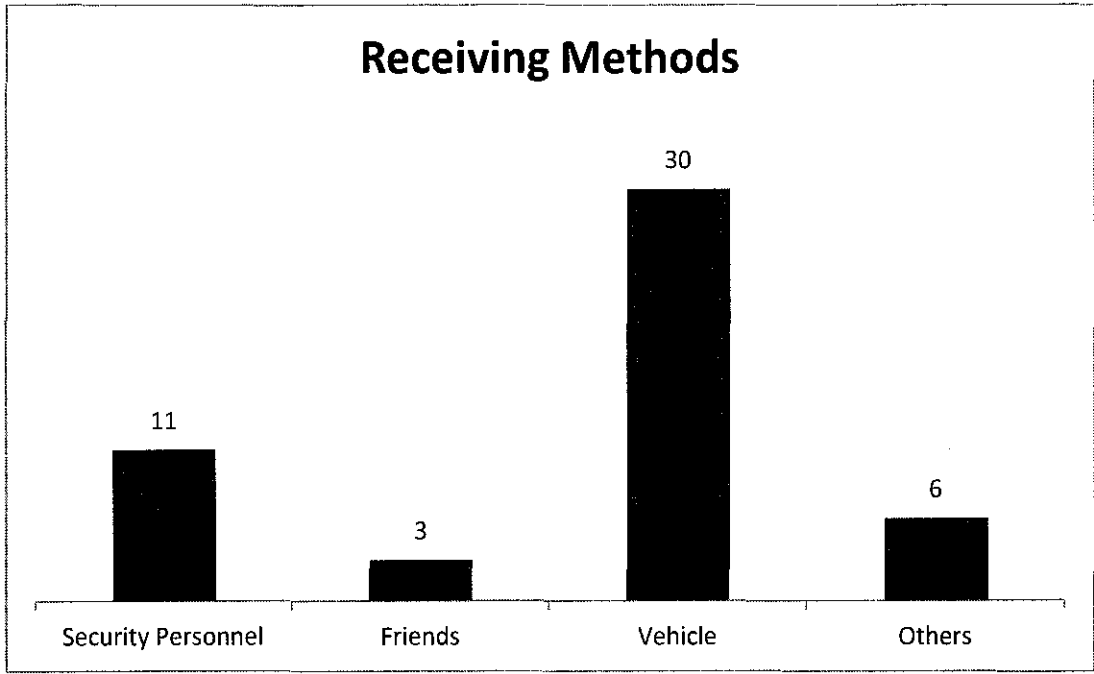
## **CHAPTER 4**

### **RESULTS AND DISCUSSION**

#### **4.1 Survey Results**

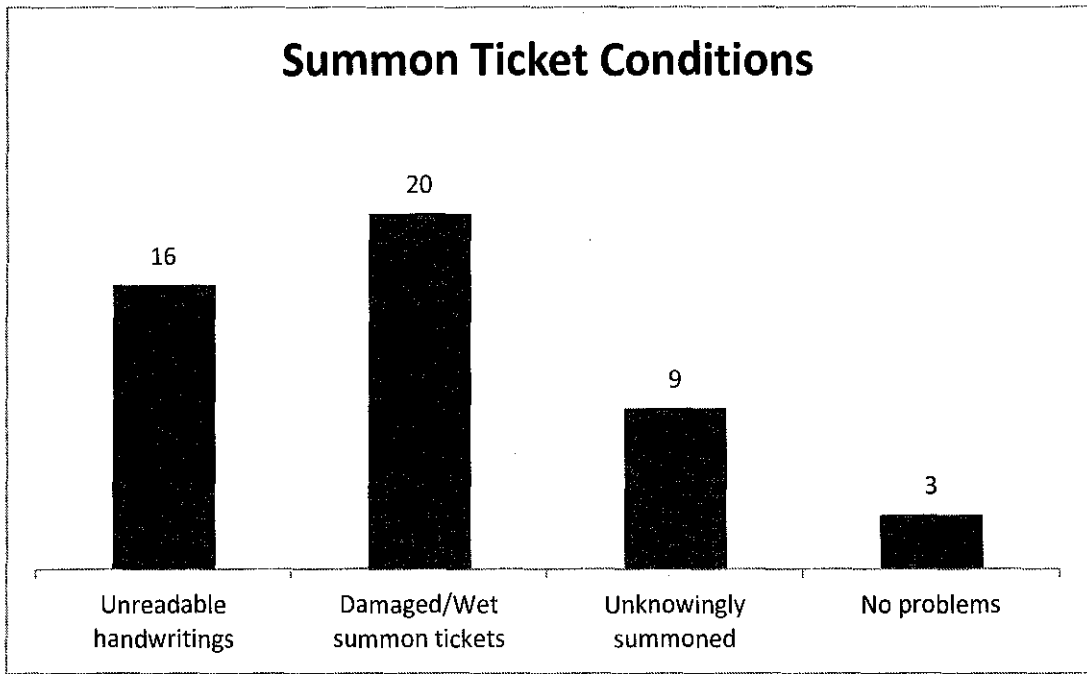
A survey has been conducted in Universiti Teknologi PETRONAS, which resulted in 42 respondents consisting of students that have previously been summonsed. The survey is done to analyse students' satisfaction with the current summons process and system in UTP. The results of the survey are shown in the figures below. The survey collects the following information:

- The method students received the summon tickets
- The condition and the contents of the summons ticket
- The duration student taken to settle the summons
- The desired notification if summonsed
- Comment on the current summons system in UTP



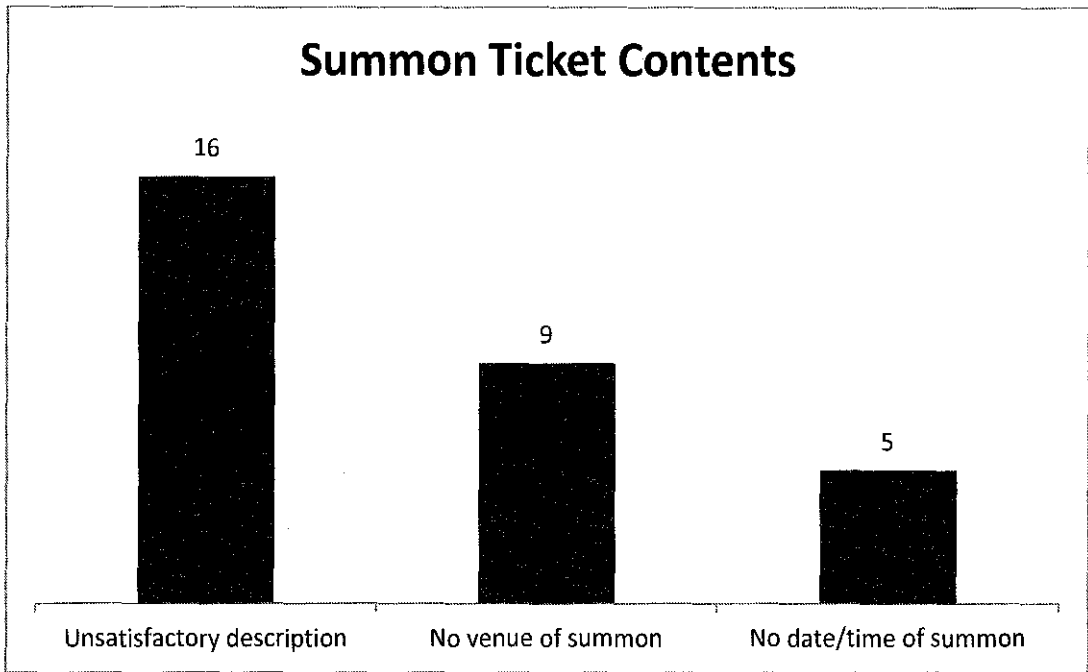
**Figure 10: Methods of receiving summons tickets**

Figure 10 shows most of the respondents received their summons tickets by retrieving it from their vehicles. There are some received the tickets directly from the security personnel and friends.



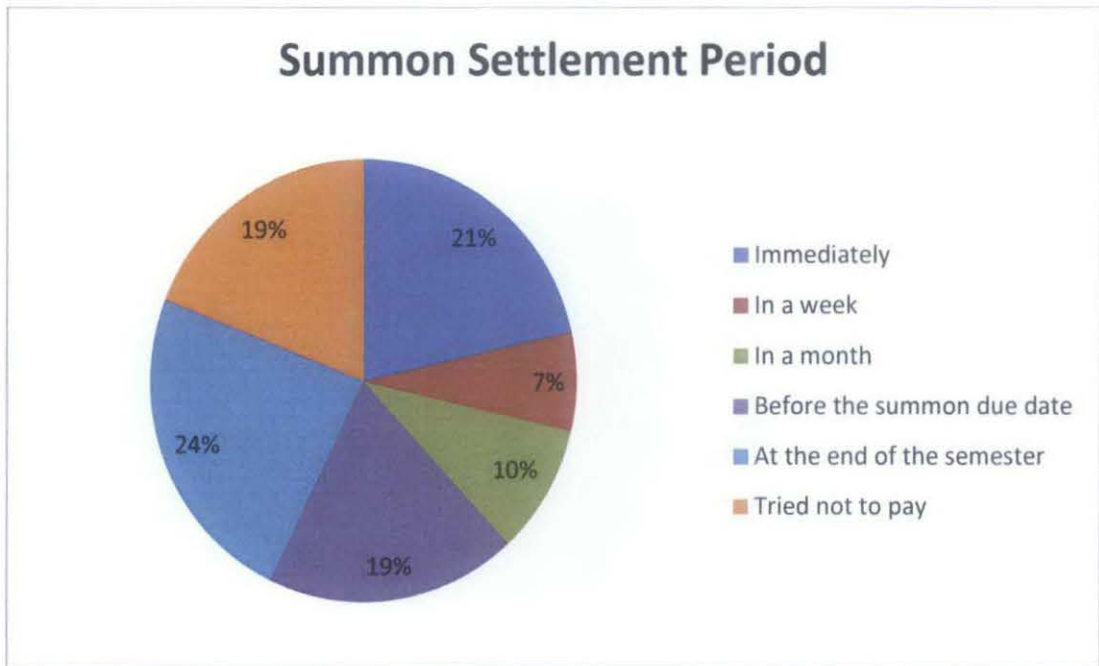
**Figure 11: Summons ticket conditions when received**

Figure 11 describes the condition of the summons tickets when received by the students. Most of the respondents found the tickets were damaged or wet. A few realised at the end of the semester that they were summonsed. The current practice of affixing summons tickets to the offending vehicles seems to lead to damaged tickets and/or went missing. A number of respondents also were unable to read the handwritings on the ticket.



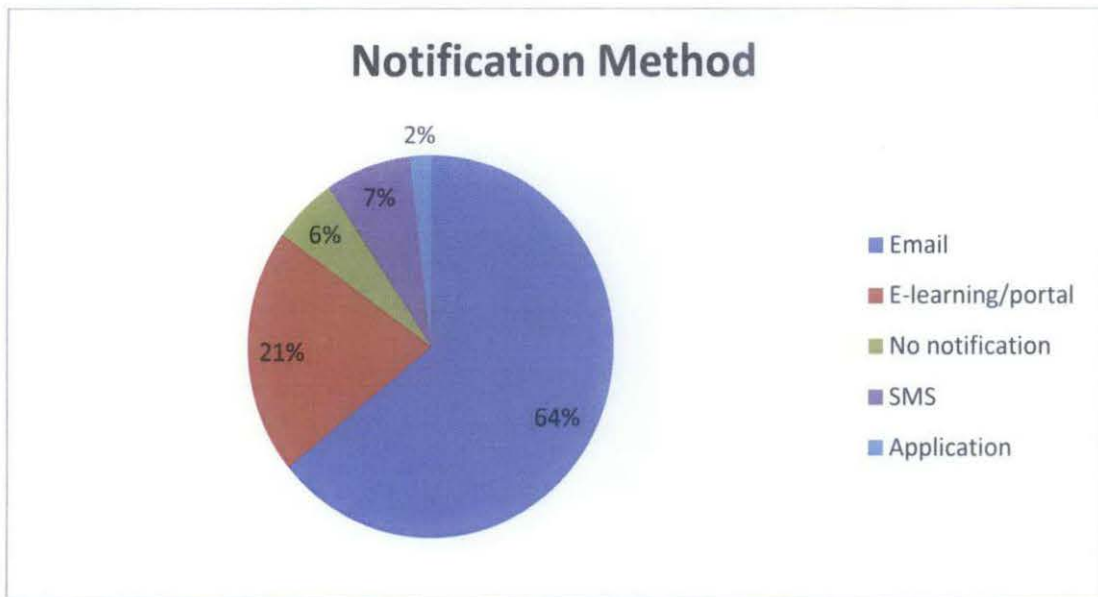
**Figure 12: Summons ticket contents**

Most of the respondents that has been summonsed agreed that most of the tickets issued do not have satisfactory descriptions. There are some occasions where the venue, date, or time was missing from the ticket.



**Figure 13: Duration student settle summons upon receiving ticket**

The majority of respondents settle their summonses at the end of the semester. A big number of the respondents chose to pay the summonses immediately or pay just before the summonses due date. There were also some tried not to pay the summonses. The least choice of settling summonses is in a week or a month.



**Figure 14: Desired notification method when summonsed**

Almost all of the respondents wished to be notified through email should a new summons ticket is issued to them. Notifications through portal-based method, e.g. UTP E-Learning, are also desirable to the respondents. The least desired notification methods include short messaging service (SMS), and a dedicated application for summonses. A small number of respondents do not wish to receive notifications on these summonses.

Several respondents have given some comments on the current summons system in UTP. The following are some of the comments given:

- The summons paid should be cheaper
- The summons process should be simplified
- Insufficient methods to check/track/print own summonses
- Slow/incorrect updates at the financial department

From the results of this survey, it can be concluded that most of the students in UTP are not satisfied with the methods that are currently being used to handle summons and parking violations. Based on the comments on the current summons system, the students are looking forward to a new system that simplifies and automates the summons process, which is in line with this project's objectives.



## 4.2 Security Personnel Informal Interview

An informal interview has been done with a security person to further understand the summons process.



Figure 15: The Summons Process

The summons starts after a security person issues tickets to the students. The tickets are in three copies which are for the student, the security department and the finance department. The first copy is given to the student or affixed on the students' vehicle. The second copy is kept at the security department for records. The final copy is given to the finance department to be keyed into the current system.

In a given day, the finance ticket copies are gathered to a certain amount before it is passed to a staff responsible to input the information into the system. This current practice of manual input of information introduces delay. This delay affects students whose are eager to settle their summonses immediately.

The security person also explained summonses can only be checked either at the security department or at the finance department including the copy of the tickets. This means the student can only check their summonses at these two places if their ticket is not lost.

From the results of the interview, it is apparent that a delay in transmitting information is introduced. Problems may occur if students wish to settle their summonses immediately but in the meantime, the summons details is yet to be entered in the system. In addition to that, students also agree that visiting several departments in order to settle summonses is a big hassle.

### 4.3 Client Prototype

The client prototype is designed closely to the drafts in the previous chapters. As previously mentioned, this client is meant to be used by the security personnel. The client will have a light theme throughout the application. The main menu in Figure 16 includes several shortcuts to each activity. The icons (1) are designed to have a larger size for easy access. The icons also resemble their intended functions.

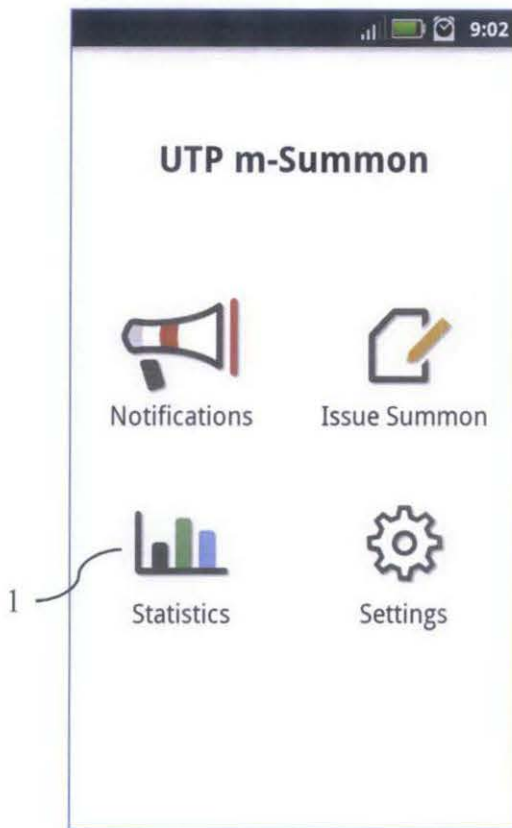


Figure 16: Main Menu UI



Figure 17: Issue Summon UI

The input fields in Figure 17 include three fields for identification, category and the summons description. The title and the submit button (3) will stay fixed on the top of interface. The photo buttons (4) are split into two that allows capturing photo on the spot or by picking photos in the device's photo gallery. The selected photos (5) are shown below the photo buttons and can be removed by pressing them. The location button (6) is used to remove or add the current location. The detected location will be shown in the location field (7).

A location detection test has been done outdoors by using an Android device. The time needed by the Android device to get a lock to GPS satellites were around 2 to 3 minutes. In a user point of view, it would seem slow. The client application codes were updated to also include network location to have a faster GPS lock albeit with lower accuracy. However, the client will still continue to obtain GPS coordinates until a certain accuracy threshold is achieved.

The client may give incorrect location for the first few minutes. The location field can be pressed if the detected location is incorrect. Pressing on the field will present the user with a list of locations nearby as shown in Figure 18. Choosing any location in the list will override the automatic detected location. The refresh button (1) can be used if the location needed is not shown in the list. The progress indicator will show up if the list is being refreshed. The details (2) included are the place name and the distance from the client. Before the summons is issued, the client application will notify the user with a popup message (3) if the required fields are left empty.



Figure 18: Location Picker UI



Figure 19: Error popup message



The settings interface in Figure 20 stores common information such as account settings (1) and server settings (2). The account settings are used to identify which security person is using the device. The server URL is used by the application to correctly contact the central server. Meanwhile the update interval setting determines how many times the application should retrieve the updates.

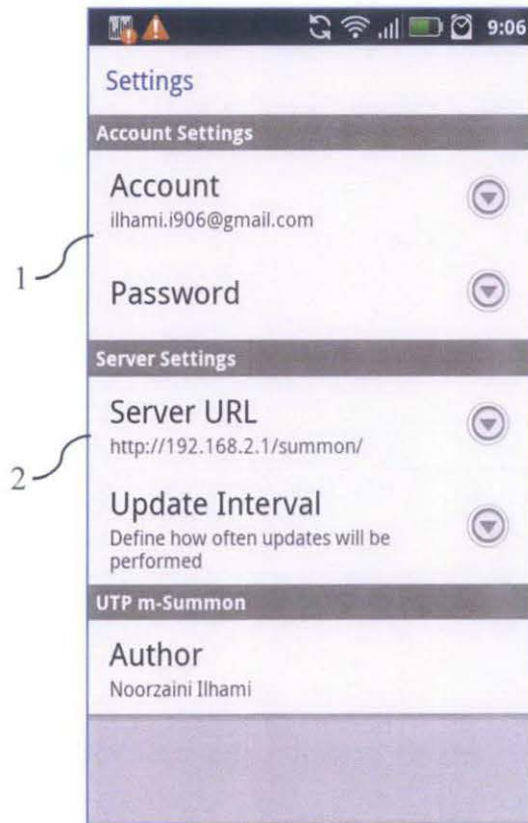


Figure 20: Settings UI

Figure 21 shows the progress of submitting the summons. The user can check the submission progress through Android's notification bar. This notification also shows the progress of photo being uploaded to the server. If the summons is not issued due to network connectivity problems, the summons will be temporarily stored in the phone storage. After the network connectivity is restored, the pending summonses will be issued. The moment the summonses are successfully issued, notifications will be sent via e-mail to the student by the server.

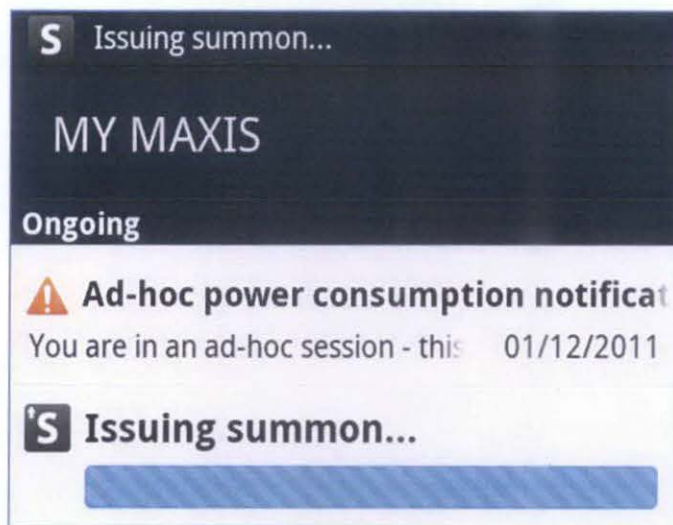


Figure 21: Android notification bar



Figure 22: Upload on going notification

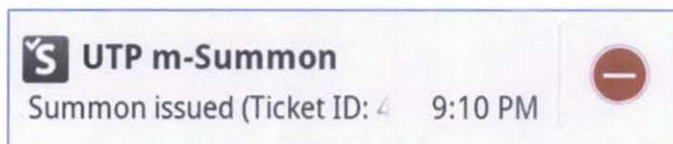


Figure 23: Summons issued notification

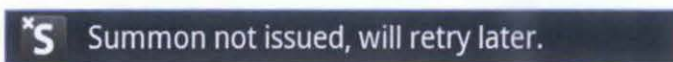


Figure 24: Summons not issued notification

Figure 25 shows the notification email sent by the server. The email contains some messages and several details related to the summons issued. The link to view the summons ticket is included in the email.

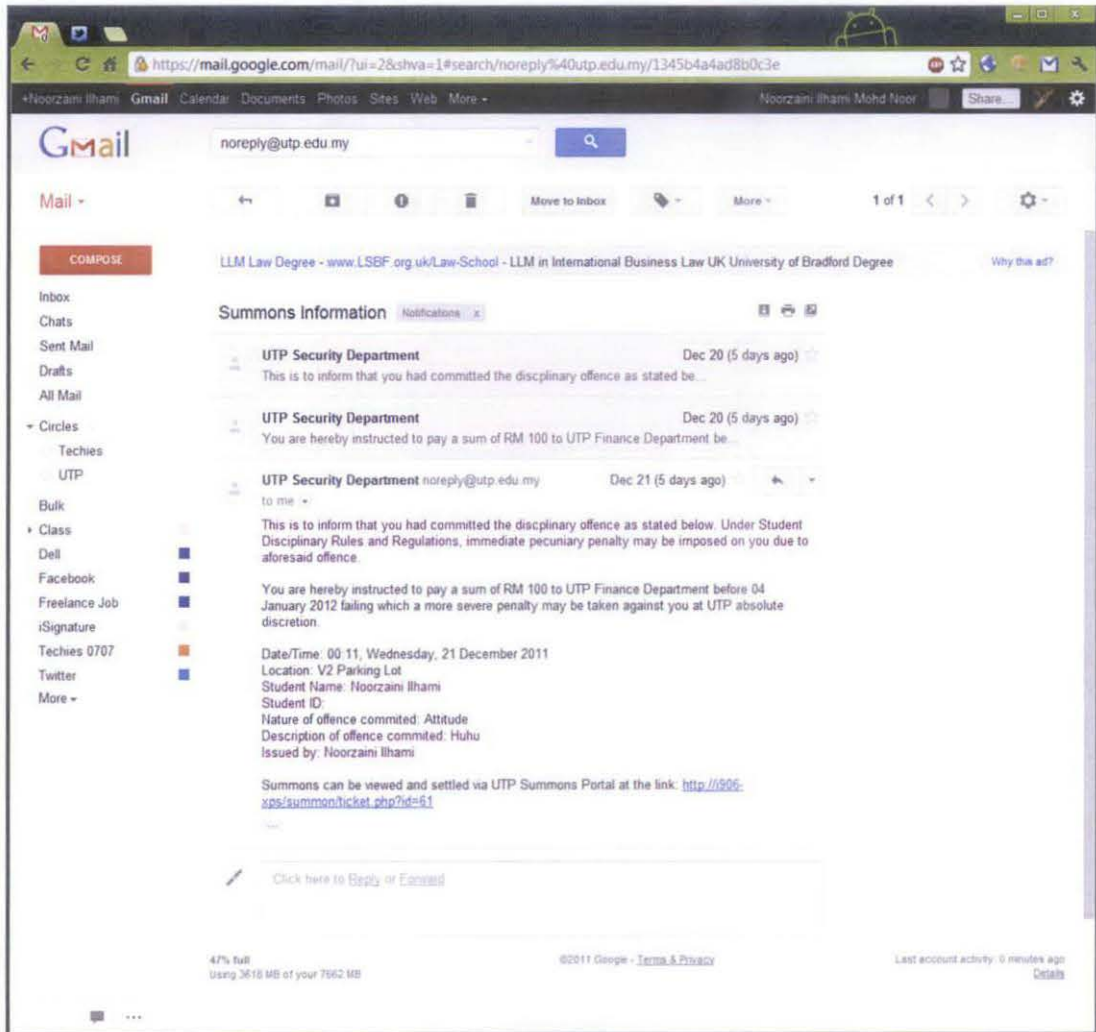


Figure 25: Sample Notification Email

There are sometimes photos needs to be taken immediately. Opening the summoning page may take up to 30 seconds before it is ready to receive input. In this case, the user may take a photo first and later choose the share option in the camera application. This will bring up the share dialog as shown in Figure 26 which lists the applications that are able to receive picture.

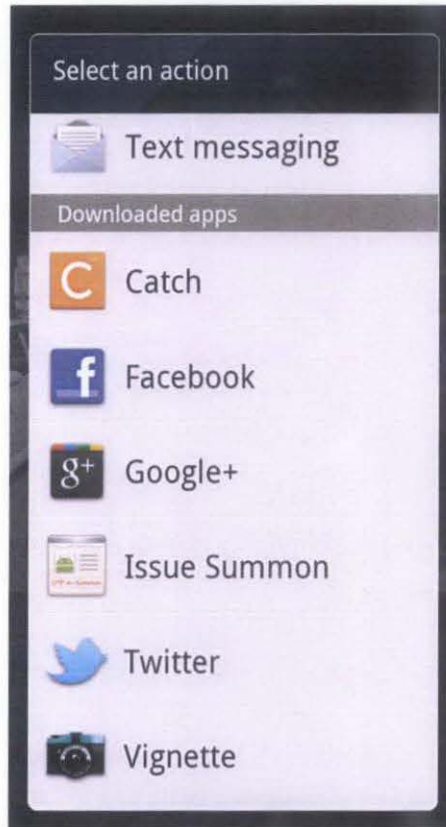


Figure 26: Share picture action dialog



UTP m-Summon client application also provides an interface for showing notifications and statistics. Both notifications and statistics share the same interface but are split into two views. The notifications view as in Figure 27 contains several simple elements. The view indicator (1) shows the current active view. The view can be changed by touching the title or by swiping the view to the left or the right. The refresh button (2) and the issue summon button is fixed on the top for easy access. The refresh button is used to fetch new notifications and update the statistics manually. Normally, this information will be updated automatically by a specific interval set in the settings. The icon (3), message and date (4) of the notification depends on the type of notification issued by the server.

The statistics view in Figure 28 show simple statistics which includes the number of summonses issued on the particular day, week and month (5). The popular location section (6) shows the count of summon issued in the particular location.

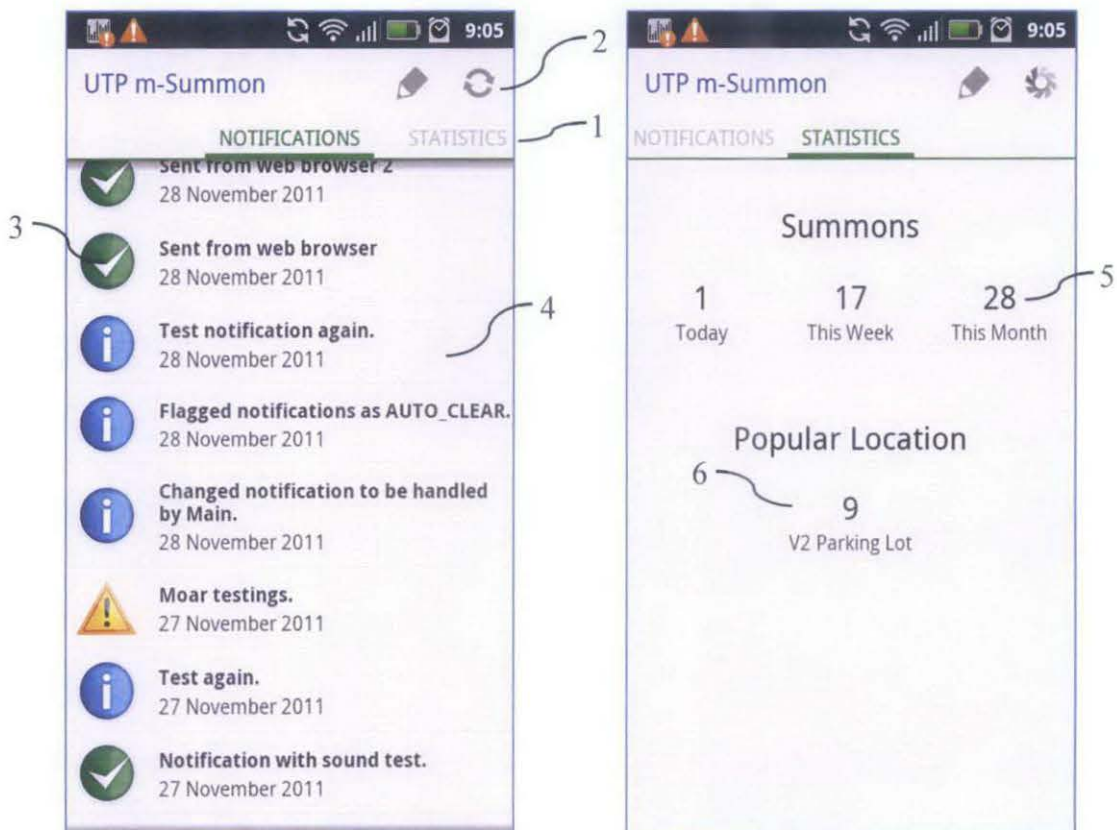


Figure 27: Notifications List UI

Figure 28: Statistics UI



## 4.4 Server Prototype

The server is designed to resemble UTP's student portal while keeping the light and simple theme. Figure 29 shows the front page of the summons system. The front page contains the numbers of summonses issued on the day, week and month. The search input field is included for the students to search pending summonses. The search results are shown as in Figure 30.



Figure 29: Server Front page



Figure 30: Search Results

Figure 31 shows the interface for the administrative personnel to issue notifications to security personnel. The form takes two inputs which are the message (1) itself and the type of notification (2). The types of notification include information, warning, and green tick. The client (Android devices) will receive the message as set in the update interval settings.

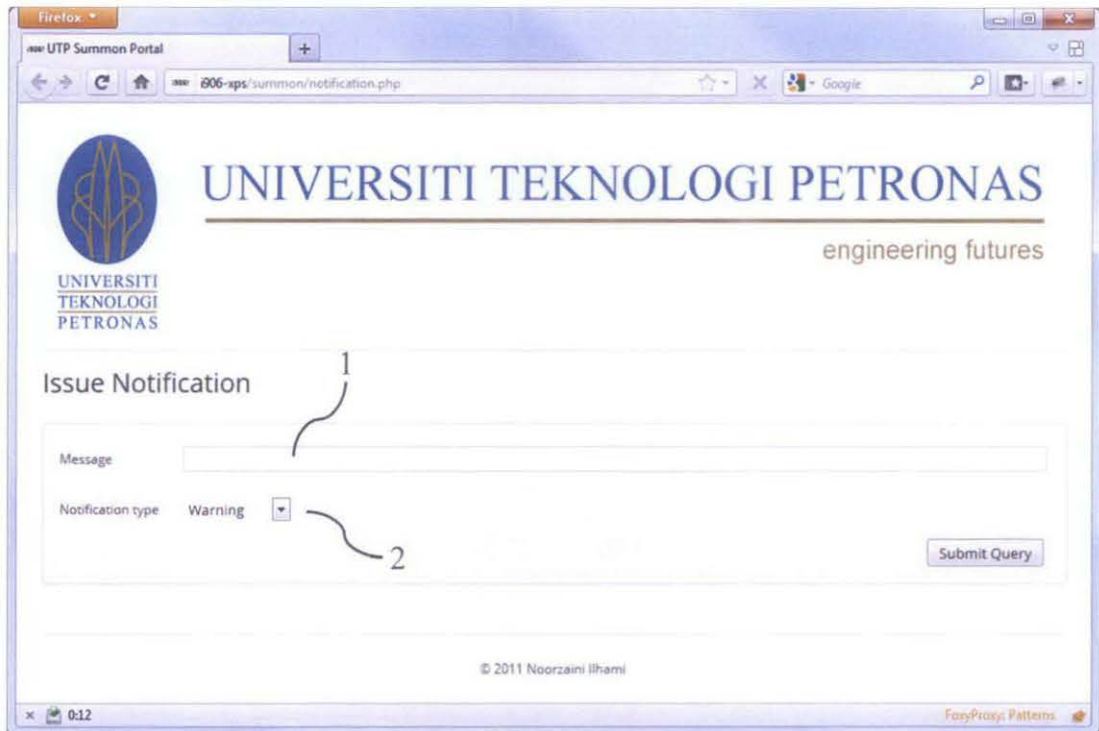


Figure 31: Issue Notification UI

The main feature in the server prototype is the page to view the summon notice as in Figure 32. This page can be reached by searching in the search page or by the e-mail containing a link that is sent out by the server to the students. The summon notice page contains the details that was filled in by the security personnel. These details include the date the summons was issued (1), the summons details itself (2) which are the summons issuer, summons category, location and description. All of the photos which were captured by the client are shown in a gallery (3). The location of the summons is visualized in the Google Maps component (4). The student has the option to pay the summons by using payment button (5).

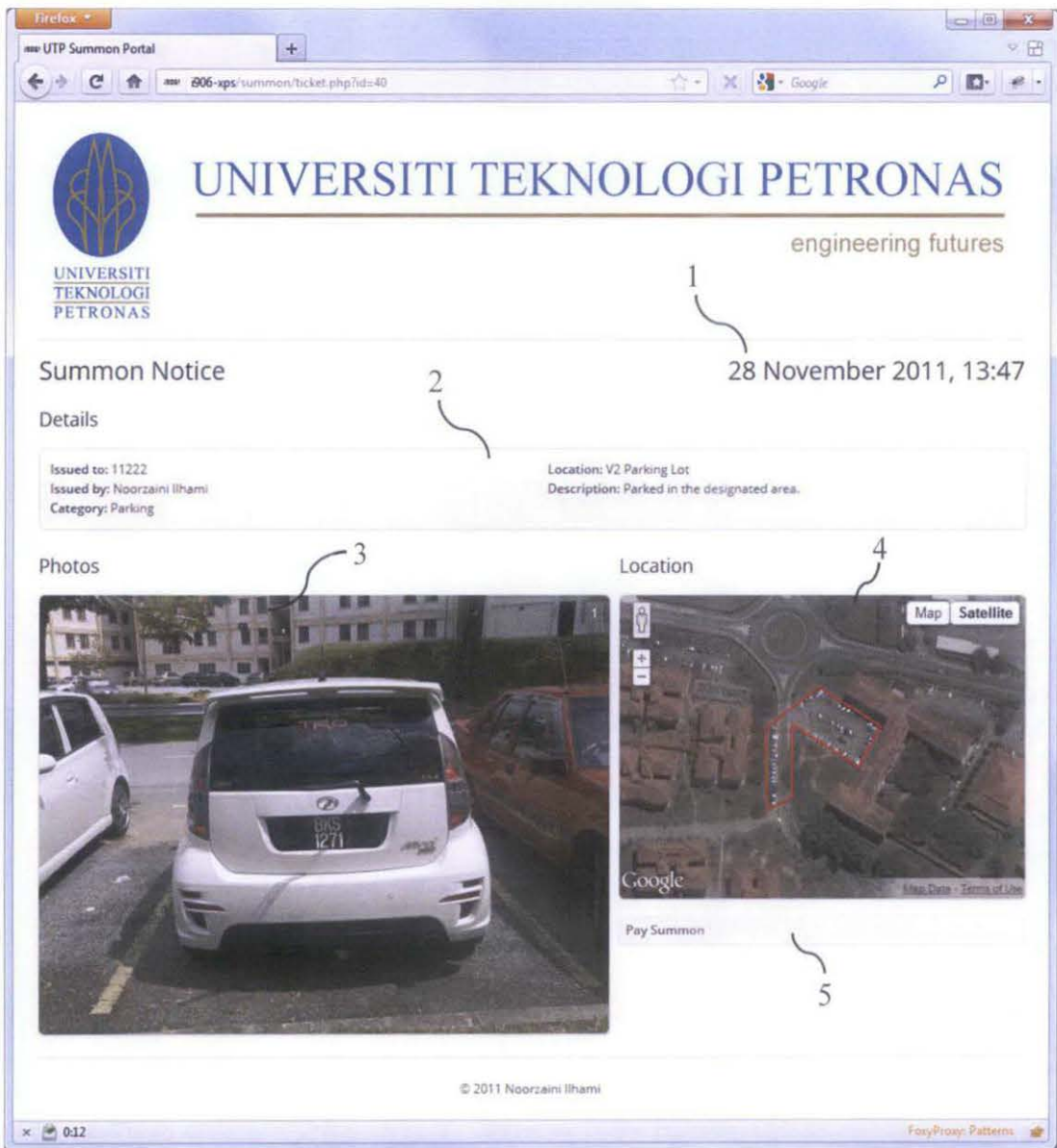


Figure 32: Summon Notice

Figure 33 is a dummy page intended to show the payment gateway if online payment system is implemented in the summons system. Most of the online banking system in Malaysia uses the MEPS FPX for online transactions. Students may use their online banking account to settle the summons and the payment will be transferred to UTP's account.



Figure 33: Sample online payment page



Figure 34 is a representation of the database relationship used by the server to organize the summon information. The database contains several tables which are summons, users, notifications, photos, location and coordinates.

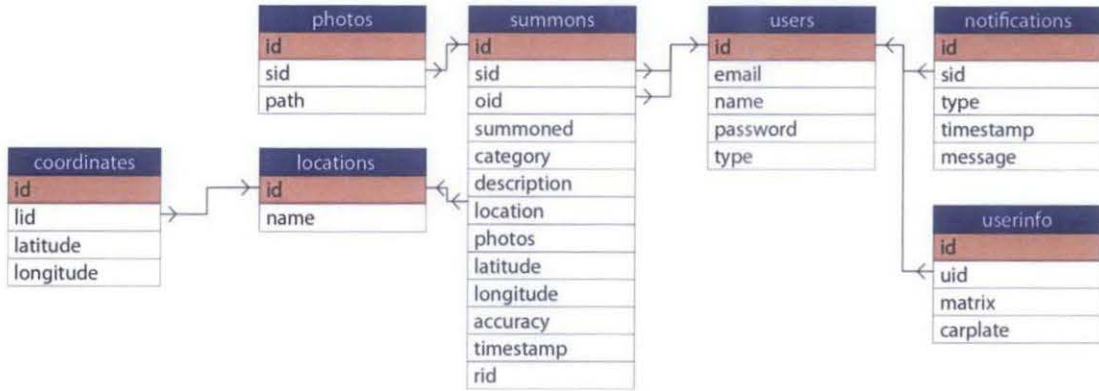


Figure 34: Database relationship

The table below briefly explains the functions of each table in the figure above.

Table Name	Description
<b>users</b>	Stores users basic account details
<b>userinfo</b>	Stores users extended account details
<b>summons</b>	Stores summons information
<b>photos</b>	Stores photos location on the server
<b>locations</b>	Stores location names
<b>coordinates</b>	Stores location area coordinates
<b>notifications</b>	Stores notification information

Figure 35: Database description

## CHAPTER 5

### CONCLUSION AND RECOMMENDATION

The summons process in Universiti Teknologi PETRONAS can be simplified by using newer technological input methods i.e., Android-based Mobile Summon System. By using this system, summons notifications can be delivered immediately to students with better details and higher reliability.

This system can be further extended to help both on the offender's (student) side and security personnel side. A barcode scanner can be implemented to scan vehicle stickers with QR codes in it. This QR code can contain the vehicle number or any related information to the owner of the vehicle. Instead of manually inputting the vehicle number, these barcodes are scanned and information is automatically inputted in the client application. The figure below shows an example car sticker with a barcode containing the following JSON code:

```
{ "uid":27, "matrix":11236, "carplate":"BKS1271",  
  "key": "84d5066309f380dfb61182c58c19ac8c" }
```



Figure 36: Advanced Car Sticker

Online payment e.g. CIMBClicks, is also suitable to be implemented in this system. With this method of payment, students can choose to pay after receiving the summon notification instead of going back and forth from the financial department and the security department.

## REFERENCES

- [1] (2011, February) Android Developers. [Online].  
<http://developer.android.com/guide/basics/what-is-android.html>
- [2] Xianhua Shu, Zhenjun Du, and Rong Chen, "Research on Mobile Location Service Design Based on Android," in *Wireless Communications, Networking and Mobile Computing 2009*, 2009, pp. 1-4.
- [3] (2011, April) Android Developers. [Online].  
<http://developer.android.com/guide/topics/fundamentals.html>
- [4] (2011, April) Android Developers. [Online].  
<http://developer.android.com/guide/developing/tools/index.html>
- [5] (2011, April) Apple Developers. [Online].  
<http://developer.apple.com/programs/start/standard/>
- [6] (2011, April) Apple Developers. [Online].  
<http://developer.apple.com/programs/ios/distribute.html#compare>
- [7] (2011, April) Android Market. [Online].  
<https://market.android.com/support/bin/answer.py?hl=en&answer=113468>
- [8] J Whipple, W. Arensman, and M.S. Boler, "A Public Safety Application of GPS-enabled Smartphones and the Android Operating System," in *Systems, Man and Cybernetics 2009*, 2009, pp. 2059-2061.
- [9] Rashmi Bajaj, Samantha Lalinda Ranaweera, and Dharma P. Agrawal, *GPS: Location-Tracking Technology*. France Telecom R&D, San Francisco, CA, 2002.
- [10] (2011, February) Wikipedia. [Online]. <http://en.wikipedia.org/wiki/Php>
- [11] (2011, March) Wikipedia. [Online]. [http://en.wikipedia.org/wiki/Traffic\\_ticket](http://en.wikipedia.org/wiki/Traffic_ticket)
- [12] WikiAnswers. [Online].  
[http://wiki.answers.com/Q/What\\_are\\_the\\_disadvantages\\_of\\_manual\\_systems](http://wiki.answers.com/Q/What_are_the_disadvantages_of_manual_systems)
- [13] (2011, March) HP. [Online]. <http://h10134.www1.hp.com/services/mobileapps/>
- [14] (2011, December) StatCounter. [Online]. [http://gs.statcounter.com/#mobile\\_os-monthly-201011-201111](http://gs.statcounter.com/#mobile_os-monthly-201011-201111)

[15] Dannenfeld Diane. (2007, December) HowStuffWorks. [Online].

<http://communication.howstuffworks.com/convergence/how-paperless-offices-work.htm>



## APPENDICES

### 6.1 Appendix I: Planned Gantt Chart for Semester 1

ID	Activities / Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Planning and Requirement Gathering														
2	Client Application Planning and Design														
3	Server Planning and Design														

### 6.2 Appendix II: Planned Gantt Chart for Semester 2

ID	Activities / Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Client Development														
2	Server Development														
3	Client-Server Integration Development														
4	Testing and Enhancements														

### 6.3 Appendix III: Student's Survey Form

1. How do you usually receive summon ticket(s)? *Tick where applicable.*

- The security personnel hand it to me
- The summon ticket was magically there; found it on the car/motorcycle
- A friend hand it to me
- Others (please specify)

2. Describe the summon ticket conditions & contents as soon you received it. *Tick where applicable.*

- Unreadable handwritings
- Damaged/wet summon tickets
- Unknowingly summoned (perhaps the ticket was blown away)
- No/insufficient description about the summon
- No venue of summon
- No date/time of summon
- Others (please specify)

3. When do you usually settle your summons? *Choose one.*

- Immediately
- In a week
- In a month
- Before the summon due date
- At the end of the semester
- Tried my best not to pay

4. Should you need notification on summons, choose the medium you wish to receive. *Tick where applicable.*

- Email
- E-learning/portal
- I'll know at the end of the semester
- Others (please specify)

5. Comments on the current summon system in UTP.

## 6.4 Appendix IV: SEDEX Poster



# UTP m-Summon

## Android-based Mobile Summon System

By: Noorzaini Ilhami bin Mohd Noor • 11236 • Information & Communication Technology • Supervisor: Dr. Mohd Fadzil bin Hassan

### Introduction

#### Background Study

- UTP enforces strict traffic and parking laws for students and staffs
- Summon tickets are issued for every traffic or parking violation

#### Problem Statement

- Summon tickets often damaged or lost before being received
- Insufficient summon details leads to dissatisfaction
- Lengthy summon settling process, a burden for students

#### Objectives

- To automate the process of issuing summon by UTP security personnel
- To improve summon details by including additional data (photos, detailed location) from Android™ devices
- To ease students to view, pay, or settle pending summons via online methods

#### Scope of Study

- Target users: security personnel and students
- Area: Universiti Teknologi PETRONAS

#### Project Significance

- Potentially reduce error in summon information
- Potentially reduce paper consumption
- Speeds up the summon process for all parties

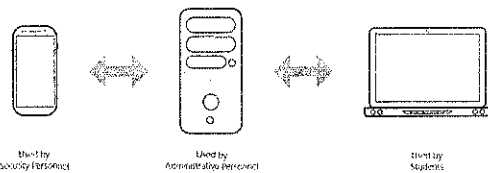
### Methodology



Incremental Model

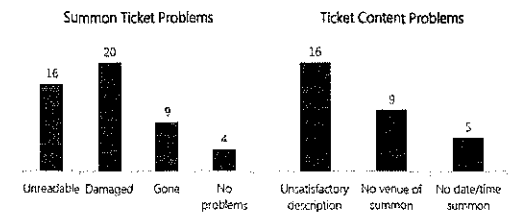


### System Architecture



### Results & Discussions

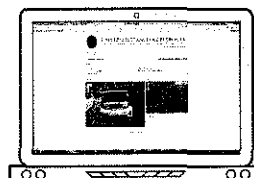
#### Survey



#### Screenshots



Screenshot of UTP m-Summon mobile application for security personnel



Screenshot of UTP m-Summon portal for students

### Conclusion

By implementing this project:

- Major improvement for current summon system in UTP can be achieved
- Students may settle summons through UTP m-Summon portal

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## 6.5 Appendix V: Project Development Log

01:14 PM 25/03/2011

- Downloaded Eclipse IDE (3.6.2 x64), Android SDK (r10).

11:17 PM - 11:29 PM

- Installed Eclipse IDE.
- Installed Android SDK.

10:07 AM 22/04/2011

- Installed ADT Plugin.

08:00 AM 23/07/2011

- Attended Mobile Apps Tutorial.

02:00 PM 16/10/2011

- Drafted UI for UTP m-Summon.

11:15 AM 17/10/2011

- Configured mobile phone to preview screen to laptop.

02:29 PM - 07:12 PM 19/10/2011

- Start designing UI in Eclipse.
- Completed design for main menu.
- Created states for buttons.
- Created main menu UI for landscape mode.
- Updated Android SDK to r14.

01:45 AM - 02:25 AM 20/10/2011

- Created ViewPager.
- Configured ActionBar.

12:48 PM - 01:54 PM 20/10/2011

- Configured ActionBar.

10:00 PM - 01:48 AM 21/10/2011

- Combined ActionBar and ViewPager.
- Created placeholder for notifications layout.
- Created placeholder for statistics layout.
- Created placeholder for issue summon layout.
- Modified style for ViewPagerIndicator.

02:03 PM - 05:37 PM 23/10/2011

- Created layout for settings.
- Designed application icon.
- Defined application permissions.

12:26 PM - 01:15 PM 24/10/2011

- Problems with the mobile phone. Phone already dead!?

12:09 PM - 03:41 PM 25/10/2011

- Continue development with emulator.
- Reconfigured ActionBar.
- Reconfigured all layouts.
- Designed summon layout.
- Designed nicer button for camera and gallery.

11:04 PM - 01:39 AM 26/10/2011

- Continue creating layout for issuing summon.

11:57 AM - 04:58 PM 26/10/2011

- Researched on tutorial for determining location.
- Attached function for calling camera and gallery app.
- Created function to retrieve GPS coordinates.
- The mobile phone still does not want to start. :(
- Created function to determine better location.
- Edit settings layout to prepare for server functions.
- Researched on posting data to server.
- Created class for server functions.
- Created basic server functions.
- Successfully pinged server using emulator.

11:46 AM - 02:12 PM 27/10/2011

- Researched on AsyncTask.
- Redesigned class for server functions to allow async operations.
- Researched on handling exceptions.
- Implemented callbacks.
- Researched on viewing selected image in summon layout.

04:08 PM - 06:33 PM 29/10/2011

- Mobile phone came back to life. Yeay!
- Researched on how to add selected photos to layout.
- Researched on styling the photos layout.

09:50 PM - 12:23 AM 30/10/2011

- Created layout to preview selected photos.

09:46 AM - 02:05 PM 30/10/2011

- Researched on point-in-polygon.
- Researched on Google Maps API.
- Created several map polygons.
- Created function to pass location from client to server.
- Created server dummy response.
- Created layout for selection locations.
- Repaired location progress spinner.

06:47 PM - 07:51 PM 30/10/2011

- Created server function to find nearest location.
- Created server function to read map polygons.

08:46 PM - 09:38 PM 30/10/2011

- Created a dialog to prompt user if GPS is disabled.

02:58 PM - 04:23 PM 31/10/2011

- Repaired location button.
- Created function to remove location.
- Created function to add location.

06:46 PM - 07:53 PM 31/10/2011

- Created function to submit summons.
- Researched on uploading files from Android.

10:28 PM - 01:20 AM 01/11/2011

- Problems with getting results from camera capture.

11:23 AM - 01:54 PM 01/11/2011

- Created a list to store selected photos.
- Updated remove photo function.
- Tested GPS using mobile phone.
- It seems the GPS takes some time to get a lock.
- Searched for faster GPS solutions.
- Updated location function to include network location.
- Got faster but less accurate locations.

03:31 PM - 04:29 PM 01/11/2011

- Research on uploading images

10:30 PM - 11:41 PM 01/11/2011

- Researched on uploading images
- Successfully uploaded an image from emulator.

11:06 PM - 01:00 PM 02/11/2011

- Researched on background services.
- Added "share" feature to initiate summon from photo gallery.
- Researched on passing large amounts of data to other activity.
- Researched on Parcelable.

06:17 PM - 07:54 PM 02/11/2011

- Researched on Serializable.

08:13 PM - 09:54 PM 02/11/2011

- Researched on creating notification progress bar.
- Created an upload icon.

12:06 AM - 02:53 AM 03/11/2011

- Created background service.
- Upload successful but died in the middle.
- Multiple photos successfully uploaded, with progress bar.

11:06 AM - 02:01 PM 03/11/2011

- Setup database
- Transferred map locations to database
- Created dummy server functions
- Created server login function
- Created submit summon server function
- Created submit photo server function
- Successfully submitted summon with photos to server.

06:39 PM - 07:57 PM 03/11/2011

- Revised location server functions.

08:52 PM - 10:33 PM 03/11/2011

- Created layout for location picker.

12:57 AM - 01:40 AM 04/11/2011

- Successfully populated list for location.
- Successfully passed data to summon activity

03:30 PM - 04:27 PM 04/11/2011

- Created some error controls

12:00 PM - 01:08 PM 24/11/2011

- Fixed notification
- Created notification icons

5:23 PM - 7:55 PM 24/11/2011

- Created state handling
- Created better notification
- Added error handling

10:57 PM - 12:48 AM 25/11/2011

- Create template for summon notification (student)
- Added google maps API

01:04 AM - 03:01 AM 25/11/2011

- Created function to read summon details
- Created server function to parse summon details
- Created function to resize uploaded image

09:50 AM - 12:32 PM 25/11/2011

- Fixed image functions
- Created fake payment system

10:03 PM - 1:32 AM 27/11/2011

- Fixed state handling
- Created storage for pending summons if failed to submit
- Created function to auto submit pending summons

11:32 AM - 1:38 PM 27/11/2011

- Researched on local service
- Researched on messenger service
- Researched on alarm service
- Added update interval into settings
- Created update service for notifications

4:48 PM - 5:44 PM 27/11/2011

- Created database for notifications
- Created server function to read notification and statistics

7:53 PM - 10:48 PM 27/11/2011

- Created client function to retrieve notifications
- Created function to store old notifications
- Created function to notify with sound
- Created statistics layout
- Created function to retrieve statistics

2:22 AM - 2:57 AM 28/11/2011

- Moved notification handler to main activity
- Created function to stop updating if fails after 10 retries
- Created function to unbind service if destroyed

11:58 AM - 12:12 PM 28/11/2011

- Fixed bug in settings
- Fixed notification
- Issue notification interface

5:42 PM - 8:17 PM 20/12/2011

9:28 PM - 11:50 PM 20/12/2011

- Created email notification
- Created search interface

Total development time: 86.58 hours

