

# The Development of myRapid Payment System Using near Field Communication (NFC) Technology

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**Abstract:** *In this paper, we present the development of Near Field Communication (NFC) for future mobile payment systems. NFC is expected to become a very trendy technology for mobile services, more specifically for mobile payments. The objective of our paper is to develop the prototype of myRapid payment system using NFC technology. In order to ensure the rigor of our research, we used a Mobile Application Development methods to develop the system. Our findings show that transport operators can also benefit from reduced operating and maintenance costs by cutting down on the use of paper tickets, ticket machines, ticket sellers, and even ticket collectors by using this system. It is shows that mobile with wireless technology helped to improve many activities like services and electronic commerce.*

**Keywords:** Near Field Communication, Mobile Application Development, electronic commerce

## 1. INTRODUCTION

Nowadays, people are living in a more technical world than ever, a world that to a greater extent consists of surroundings and objects created by mankind in this new technical world the use of information technology (IT) is significant. Recent advancement in mobile with wireless technology helped to improve many activities like services, and commerce. Today's people want everything in a snap or fast when the world is becoming more technical now. People are on the move, both work and otherwise. Mobile application works closely with the client. It can become not wireless or wireless environment like NFC.

NFC technology enables short-range wireless communication between two devices that each transmits and receives information. Public transportation has demonstrated considerable agility in implementing new technology in its payment, or ticketing, systems. Certainly, the rapid and pervasive implementation of contactless technology in public transit processes can be attributed in large part to the

sector well-defined systems. The aim of this development is to develop a system that can be helpful to minimize the user from overcrowding on Rapid Machine to reload myRapid Card or buy a token especially during peak hour which people after this can through ticket barrier only using their smartphone.

### 1.1. Problem Statement

Time wasting and overcrowding at the Rapid Stations such as LRT or Monorail are the worst during the peak hour in the morning and after office hour.

i. The harassing atmosphere at LRT Ticket Vending Machine and the problems sometimes occurred with the machine;

Since not everybody have own Rapid Card, most of the public transport user will have to be in order in line to purchase the token and also to reload the Rapid Card. Not to mention, there also time when the machine is out of service and the user need to living up and wait a little longer to settle their transactions especially when the module is limited (Wan Seadey, Mesin Tiket Tak Boleh Diharap,

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February 10, 2011). To overcome this problem, this mobile application will have a feature which allows users to view their credit balance or top up using ecommerce through this mobile application.

ii. Imperfection information regarding trains especially;

Other than that, users also got a problem with train frequencies added with the new train extensions recently. "Little did they know of the massive human congestion at LRT platforms that ensued following this extension. Ask any regular Kelana Jaya LRT users and he will tell you that since then, travelling to work and coming home have become a laborious and stressful process, almost unbearable, on some days" (Amirullhsan, Despite new upgrades LRT not up to the mark, August 13, 2016). This application will have a feature which users can view all the expected information like train frequencies and this can help plan their journey well before getting to another place especially for foreigners, this application can help them very well.

iii. People lack of knowledge to get their right to use special accessible facilities and others idiosyncrasy in the stations; some of them may uninformed accessible facilities at station especially for pregnant women, elderly and person with disabilities.

## 1.2. Objectives

The technology of NFC itself which could connect with other devices when they are touched together or just within a few centimeters away is the major function of all to mitigate every problem involving short-range wireless connectivity that uses magnetic field induction to enable exchanging data between devices. Therefore, the objective of the project is to develop the prototype of myRapid payment system using NFC technology in order to encounter the above problems.

## 2. MOBILE APPLICATION DEVELOPMENT PHASES

During any mobile application development project, it is essential to collect the requirements before designing the mobile application, to have a design before implementation to follow a structured software development lifecycle. A circumstance varies, different lifecycles have been developed and

described from time to time to accommodate different needs of different projects. In the development of this project, Mobile Application Development was chosen as the methodology because it is an agile methodology that provides behavioural support for the development. Mobile Application Development methodology promotes adaptive planning, evolutionary development and delivery, time boxed iterative approach and encourages rapid and flexible response of change. It is a conceptual framework that promotes foreseen interactions throughout the development cycle. Mobile Application Development can benefit in many ways such as saves a lot of rework, each cycle is short, enough scope to fix a problem, one shortfall in any cycle can be solved in the next cycle.

### 2.1. Analyze

Analyze phase covers the activities of understanding requirements and determining the goal of the project. The clients highlight their project objectives and ideas and discuss the functionalities that they require. The analyzing phase ends when the developer agrees on the key issues and obtains information to continue. Developer also analyze the existing similar system on the current market to compare. The primary deliverables from all the activities and processes involved in the scope and plain is the project proposal

### 2.2. Design

Structure that highlights platform, features, specification and feasibility. This to ensures that the project aligns according to client requirements. In the design development phase, the interface design formally defines the application and rechecks to ensure all bases are covered. Developer must consider all the parameters necessary for building a successful application including design concepts, functionality, timeline, and budget. Developer will create static prototyping of most mobile screens for the client to have a clear idea about the appearance and functionality and suggest changes. This phase also involve the process of designing the analysis models of RapidWave app which include use case diagram, use case specification and sequence diagram. The developer also has found some other added requirement from users. All designs are

approved by the client before entering the application development phase. The primary deliverables from this phase is the technical design workflows

### 2.3. Development

Application development phase begins with designing the User Interface (UI) and then coding it in minimum time using Android Studio platform. In this phase, the developer will decide what kind of application program that want to use. For the programming process, each of the interfaces was coded based on the five main functions. During the coding process, each function was coded as a separate component. Then, these separate components were integrated together. The integrated components or functions were first tested on an emulator in order to find any possible errors or mistakes that may occurred. The design and implementation of a mobile application is important.

There were many limitations and constraints that need to be considered such as size of memory, screen size, manufacturer or type of model and also the Android Version. The critical part of the application development is when the developer needs to deal with codes in order to make this application working correctly. For the development, the developer decided to used Android platform only. The prototypes of the application are subject to client approval on a regular basis. As quality assurance is a critical factor, developer will develop and deploy several function from the apps to usability and marketing.

### 2.4. Testing

In development phase, developer will follows testing process to check RapidWave functionality. Developer will keep in touch with the client during development phase to facilitate monitoring of the project and then take note and summary client feedback and strives to achieve quality beyond client requirements.

### 2.5. Launch and Maintenance

Launch RapidWave application to client and maintain based on the agreement agreed by client.

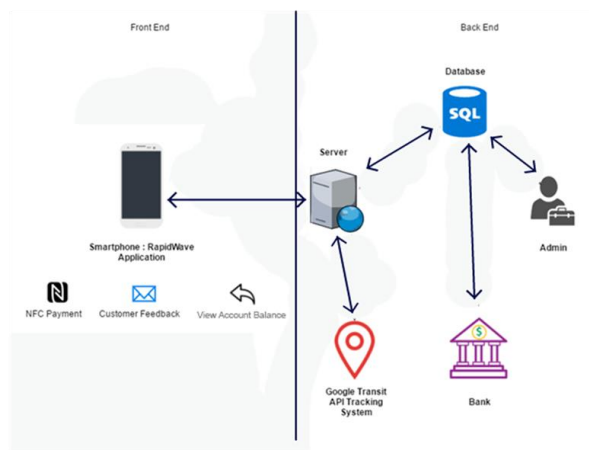


Figure 1.0: System Architecture Diagram of MYRAPID Payment System Application Using NFC

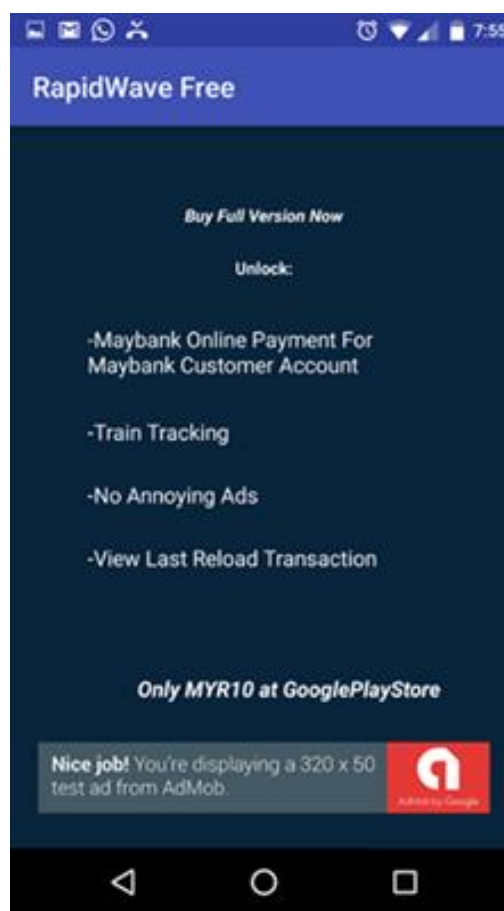


Figure 2.0: MyRapid Full Version Reminder on splash screen before entering to Login Activity freemium version

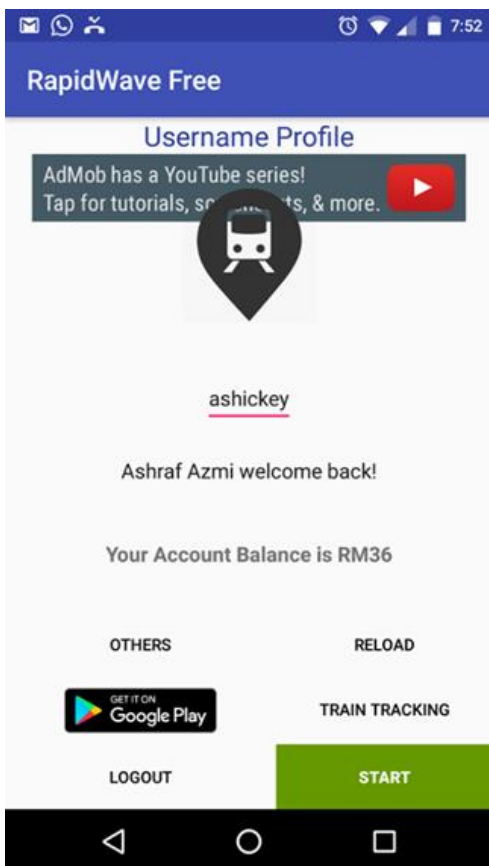


Figure 3.0: User Area Activity freemium version

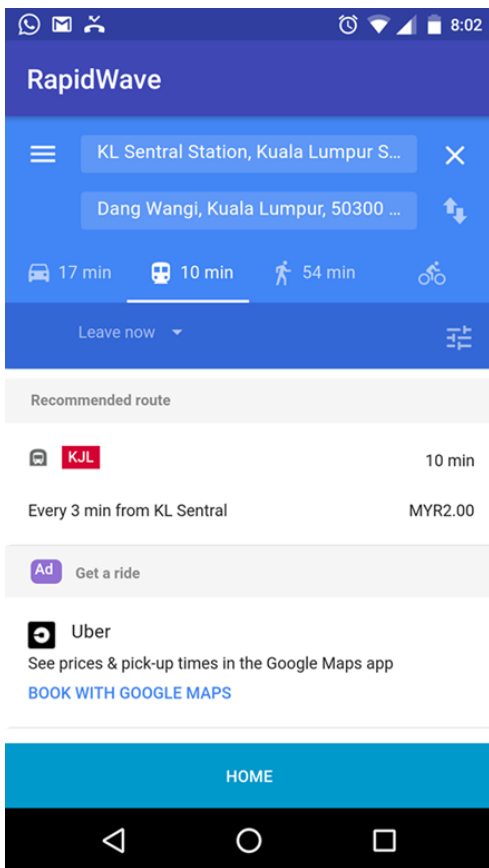


Figure 4.0: Train Tracking Activity

### 3. RESULT AND DISCUSSION

The potential users to use this system is starting from 18 years old to 36 years and above based on six smartphone user personas shows where they were now can manage with current smartphone applications technologies and other principals ("Vserv unveils the first Smartphone User Persona Report (SUPR) in Malaysia," January 16,2016). This system can assist the users to get detail information like telephone numbers, fax, train frequencies, trains routes and addresses for any LRT, Monorail or ERL stations in Klang Valley or nearby.

This system provide and online reload where users can easily reload their Rapid KL credit value by using online e-banking for instant reload. They now does not have to que up in front of reload machine for credit reload again. The NFC embedded in the most smartphone in Malaysia would utilize in this project. The payment will occur when users tapping their smartphone with NFC embedded inside in second ticket barrier station. The online transaction will proceed after that. The security in this system would be protected with 4-digit PIN numbers and will automatically close the app after 3 minutes. The users need to enable this PIN numbers before tapping their phone to NFC reader on ticket barrier.

### 4. CONCLUSION

Mobile phones are network connected and have easy to use sound and text interfaces. They provide anytime anywhere access to information, and applications are easy to download over the air and manage on the phone. When these features are combined with NFC, travelers can experience a host of new, intuitive, and rewarding experiences on their mobile phones. From the traveler's perspective, NFC enabled phones have great benefits over paper tickets. Tickets stored virtually in phones are inherently more durable, less likely to be lost, and are perceived to be more environmentally friendly than paper versions. They are even more convenient than plastic cards, with no fumbling in a wallet for the right card. NFC enabled phones can hold multiple payment applications, allowing the traveler to select which method to use credit, debit, travel passes, or prepaid tickets. Updates are easy and can be done over the air, avoiding a trip to the bank or other point of

sale. Travelers can tap information tags embedded in smart posters to download train schedules or information on nearby attractions, enhancing the passenger's travel experience as well. A simple tap also provides fast access to Internet services and rich information. NFC can also be incorporated into readers to enable services such as renting bicycles or opening storage lockers.

Transport operators can also benefit from reduced operating and maintenance costs by cutting down on the use of paper tickets, ticket machines, ticket sellers, and even ticket collectors. Paper tickets require production, storage, and distribution. Kiosks need maintenance, and personnel costs for all of these processes can be high. Customer service

issues with lost paper tickets are also costly, and environmentally unfriendly paper tickets can be detrimental to a transport operator's image. A mobile device allows the operator to provide additional services such as language settings, advertising and promotional opportunities, tourism information, loyalty schemes, and direct marketing. Risk management can also be improved through the use of NFC-enabled phones for over the air blocking and updates to prevent fraud, know your customer protections, and general management information. The speed of over the air updates is a major benefit compared to delays that can occur when blocking contactless cards.

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