MOBILE E-TIME TABLE SYSTEM ON ANDROID PLATFORM USING NEAR FIELD COMMUNICATION (NFC)

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Tajuk Projek : MOBILE E-TIME TABLE SYSTEM ON ANDROID PLATFORM USING NEAR FIELD COMMUNICATION (NFC)

Sesi Pengajian :

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Signature   :…………………………………………

Name of Supervisor   :…………………………………………

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"In the Name of Allah, the most Beneficent, the Most Merciful"

Special dedication for my lovely parents;

Sabarudin bin Abas and Norha binti Mohd Yusop

and My Sibling

To my Supervisor

My classmates

Thank you for all your care, support and believe in me.

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In the name of Allah, Most Gracious, Most Compassionate. Praise is to Allah. With His kindness, here I present final year project report.

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- My beloved family and all my friends.

ABSTRACT

This report research project into ─Android OS Platform Using Near Field Communication (NFC) For Mobile E-Time Table", performed as part of the faculty at University Teknikal Malaysia Melaka (UTeM).NFC is one of the latest wireless communication technologies. As a short-range wireless connectivity technology, NFC offers safe yet simple and intuitive communication between electronic devices. Users of NFC-enabled devices can simply point or touch their devices to other NFC-enabled elements in the environment to communicate with them, making application and data usage easy and convenient. With NFC technology, communication occurs when an NFC- compatible device is brought within a few centimeters of another NFC device or an NFC tag. The big advantage of the short transmission range is that it inhibits eavesdropping on NFC - enabled transactions. NFC technology opens up exciting new usage scenarios for mobile device.

ABSTRACT

Laporan ini dibuat untuk menyelidik mengenai ―Android OS Platform Menggunakan Komunikasi Jarak Dekat (NFC) Untuk Jadual Waktu", merupakan sebahagian sistem fakulti di Universiti Teknikal Malaysia Melaka (UTeM). NFC adalah salah satu teknologi komunikasi tanpa wayar terkini. Sebagai teknologi sambungan tanpa wayar berjarak dekat NFC menawarkan komunikasi selamat namun mudah antara peranti elektronik. Bagi tujuan berkomunikasi, membuat permohonan data dengan mudah, pengguna peranti NFC dibolehkan dengan menunjukkan atau menyentuh alatnya dengan alat lain yang dibolehkan oleh persekitaran NFC. Dengan teknologi NFC, komunikasi berlaku apabila peranti NFC dibawa dalam jarak beberapa sentimeter dengan NFC lain atau tag NFC. Kelebihan penghantaran pendek ialah ia menghalang berlakunya kecurian data NFC - transaksi yang aktif. Teknologi NFC membuka senario penggunaan baru yang menarik untuk peranti mudah alih.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOL

UTeM	Universiti Teknikal Malaysia Melaka
NFC	Near Field Communication
RF	Radio Frequency
RFID	Radio Frequency Identification
EPOS	Electronic Point of Sales
EM	Electromagnetic
PJM	Phase Jitter Modulation
GUI	Graphical User Interface
NDEF	NFC Data Exchange Format
SDK	Software Development Kit
APIs	Application Programming Interfaces
JLS	Java Language Specification
RMV	Rhein-Main-Verkehrsverbund

TEXT CONTENTS

CHAPTER I

INTRODUCTION

1.0 Introduction for Project

Near Field Communication is the process in which two technological devices share and exchange information or data over a wireless connection by being in close range of each other. Currently many cell phones have been designed with near field communication (NFC) chips for contactless transactions, data exchange, and simplified setup of more complex communications such as Wi-Fi. However, NFC transmissions must take place over very short ranges 10 centimeters is the maximum distance, with many applications requiring even shorter ranges it's possible to pick up transmissions from much further away. Therefore, in this project an NFC technique is proposed to solve the problems of student with application in time table. Basically, timetable is available as a paper pasted on the notice board. It was posted in one place and usually in print with a very small font size makes it difficult for the students to check the schedule. Thus, the system e - time schedule with a passive NFC device is used that can be downloaded to a mobile device. Android OS Platform Using Near Field Communication (NFC) For Mobile E-Time Table is a device program in NFC tag and put on the time table. The main objective for this project is to install and test the develop NFC system in the mobile phone and communication between unpowered NFC chip, called a tag. Since

unpowered NFC "tags" can also be read by NFC devices, it is also capable of replacing earlier one-way applications.

NFC standards cover communication protocols and data exchange formats, and are based on existing radio-frequency identification (RFID) standards including ISO/IEC 14443 and Felica. Further information on NFC technology will be discussed in Chapter 2 [11].

1.1 Objective of Project

The Final Year Project objectives are:-
   i) To understand database using in program the NFC tag and Android.
   ii) To develop application on Android which using NFC technology.
   iii) To enhancement the time-table system.

1.2 Problem Statement of Project

Usually, at the beginning of the semester, students are required to check their timetable provided by the faculty before attending class so that there had been no class overlap in one time. Basically timetable is available as a paper pasted on the notice board. It was posted in one place and usually in print with a very small font size makes it difficult for the students to check the schedule. Therefore, students going to the place where the schedule pasted, unfortunately sometimes the occurrence of such small fights between students pushes the impatient. It can also occur as a waste of time for senior have repeat module need to take a long time and complicated to check the timetable. Thus, the system e - time schedule with a passive NFC device is used that can be downloaded to a mobile device. With mobile devices students can check the timetable directly in their mobile phones without taking a long time to line up to see it.

1.3   Scope of Project

The project covers software design using Java programming and established NFC connection to interface mobile phone to a computer system that can be controlled wirelessly. The purpose NFC system would assist in e-time table.

There are two parts in this project which is the Android and NFC.

Figure 1: The Project Scope

1.3.1   Hardware

The first part doing this project is focus on the Android apparatus and hardware. Android has a large community of developers writing applications ("apps") that extend the functionality of devices, written primarily in a customized version of the Eclipse Keplers Software using Java programming language to program NFC Task Launcher.

1.3.2   Software

For the second part is NFC will be study. This project will use Eclipse Keplers Software using Java language also to operate NFC tag. The data will be transmitted to mobile from server by using NFC technologies.

1.4   Methodology of Project
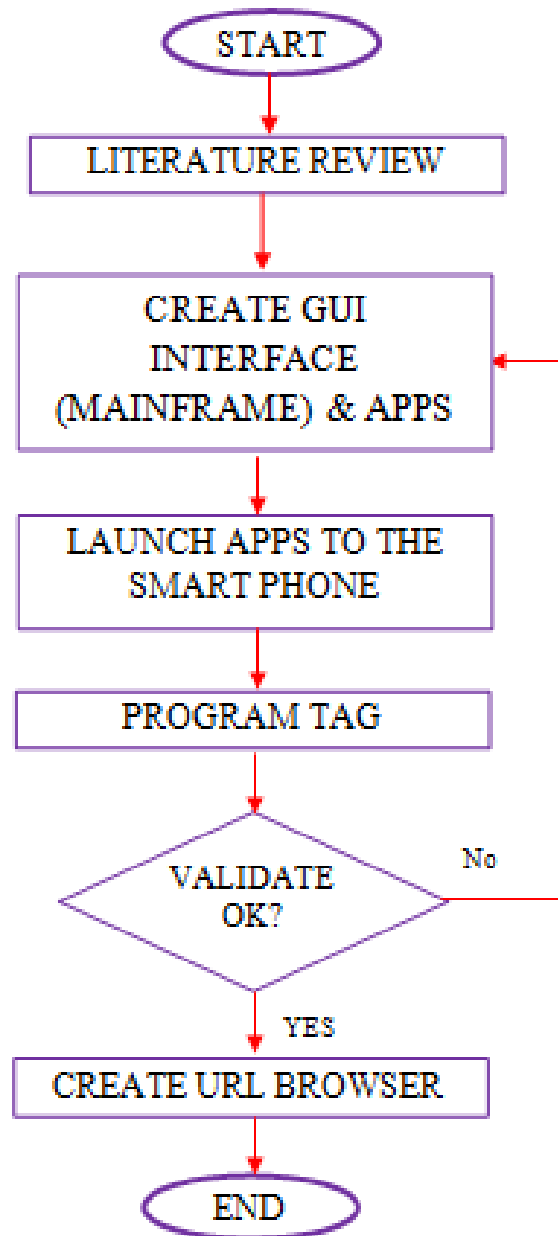
The methodology of this project is:-

Figure 2: The Methodology of Overall Project

1.5   Reporting Structure of Project

Chapter 1 (Introduction)

Chapter 1 briefly described about an introduction to ─Android OS Platform Using Near Field Communication (NFC) For Mobile E-Time Table" in general. This chapter provided information about NFC functionality and how it helps to overcome the problem of Time Table that available in the faculty. Objective, problem statement, scope and methodology of this project are included in this chapter.

Chapter 2 (Literature Review)

This chapter is discussed about the background research associated with the project such as the details about Near Field Communication (NFC) and NFC tag. Overall results of the literature will produce concept framework that shows the relationship between theory and research projects with the concept through an appropriate model or diagram.

Chapter 3 (Methodology)

For this chapter is discussed about the detailed about the project working and more detailed about database use.

Chapter 4 (Result and Discussion)

In this chapter will be show the initial result and final result and discussion.

Chapter 5 (Conclusion and Recommendation)

Last chapter discussed about conclusion and recommendation of this Final Year Project for this semester.

CHAPTER II

LITERATURE REVIEW

2.0   Introduction

In this chapter, reviews of the previous researched project that are related with this project will be discussed. The information will be become additional source for the project in becoming more successful. To have a brief understanding of the researches related to the project, a few literature reviews had been done. This chapter will describe the related literature reviews. This chapter also contained the theory of the NFC, android and programming languages that used in the project..

Literature review is to collect and obtain all information to achieve any valuable idea and overview of this project. Literature review is the phase where all the processes happen such as searching, collecting, and analyzing that has been done or published by another researcher. All of the process can be completed through relevant sources such as book, journal, technical report, proceeding conferences, web pages and others. Research findings from readings, observing and gather all the information related to the previous project will be include to gain the knowledge about the tools used. Literature review could be main references guidance in the process of making this project.

2.1 Overview

A mobile phone is an electronic device which is primarily used to make voice calls while the user is mobile. Mobile phone is very convenient to use and handy. Therefore in addition to the voice call capability, a vast amount of additional services are bundle to it, and many new future services are still on the way, such as NFC technology. On added communication capability to mobile phones is via several peer-to-peer services such as Infrared, Bluetooth and finally NFC. Infrared requires line of sight, NFC requires very close interaction, namely touching, and Bluetooth requires communication within small distance.

In this system by using NFC technology, the suitable database must be considered, where this project use Java application which is this microcontroller act as the main brain and control all the activities of this system.

This chapter will cover about the study and the idea based on the exactly same as previous project as well as the theory used to accomplish the goals of this project. The technology, hardware and software in this development of this e-timetable system will be explaining each part in details. In this project development, all of the criteria and consideration to design the system will be focused to give a clear view on this project.

Table1: Comparison between Standards [1].

	NFC	RFID	IrDa	Bluetooth
Set-up time	<0.1ms	<0.1ms	~0.5s	~6 sec
Range	Up to 10cm	Up to 3cm	Up to 5cm	Up to 30cm
Usability	Human centric easy, intuitive, fast	Item centric easy	Data centric easy	Data centric medium
Selectivity	High, given, security	Partly given	Line of sight	Who are you?

Use cases	Pay, get access, share, initiate service, easy set up	Item tracking	Control and exchange data	Network for exchange. Headset
Consumer experience	Touch, wave, simply	Get information	easy	Configuration needed

2.2   Near Field Communication (NFC) Technology

2.2.1   Introduction of NFC

Near Field Communication or NFC is an emerging technology for electronic devices which allows them to communicate with each other by simply touching or bringing them very close to each other. This act of communication is called ‗to tap and go' or ‗tap-in'. Currently data transfer speed options are 106, 212, and 424kbps. NFC communication uses the 13.56MHz spectrum as in RFID. Using NFC, communication could take place between two active devices such as cell phones or even between a NFC device and a passive (or unpowered) ‗tag'. Currently, NFC has applications mostly in the field of contactless electronic payment. Examples include Electronic Point of Sales (EPOS) terminals at shopping centers and ticketing systems in public transport such as buses and trains. NFC has also shown promise in being used for data transfer or ‗data beaming' in applications such as smart posters or simplifying the setup of more complex communication methods such as Wi-Fi or Wi-Max.

2.2.2 NFC History

NFC is a descendant or an evolved form of Radio Frequency Identification (RFID). Before studying NFC, certain features and specifications of RFID must be studied. RFID involves tracking or identifying objects by a ‗reader' through information stored on electronic ‗tags' using special RFID software called middleware. For communication, RFID technology uses frequencies in the radio range of the Electromagnetic (EM) spectrum; which are in the range of 3 kHz – 300 GHz. RFID can trace its roots back to World War II where a Russian inventor developed a covert audio spying device for the Soviet army in 1945. However, it wasn't until 1970's that the first true RFID device was invented which was a radio transponder with memory. From 1973 and onwards, real competition developed for research in the field of RFID. The term RFID was first used in a patent that was awarded to Charles Walton in 1983 for a ―Portable radio frequency emitting identifier". From then on, many applications have been found for RFID. The work on NFC was started by Phillips and Sony in 2002 and they complemented it by developing the first NFC forum along with Nokia. Since then, the NFC forum has more than 150 members and research is being conducted by many companies and academic organizations in this field. NFC can also be called the 2nd generation or ‗2G' RFID. A lot of NFC-enabled phones now exist in the market and many applications have been or are being developed.

2.2.3 Background of NFC

Although NFC based applications run in a similar manner to Bluetooth on mobile devices, the working principal behind Near Field Communication is based on RFID. Therefore it is essential to study the basics of RFID before discussing the technical details of Near Field Communication. As mentioned earlier, RFID system contains 3 essential parts which are the reader, tag, and middleware. We will briefly describe how these components work in sync.