QR-code based E-wallet System using Android platform

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Abstract

Currently, in order to make payment or purchase an item, the INTI community needs to pay with physical cash. Since they use physical cash, it means they are required to carry their wallet/purses around, and there is a chance that they may lose it, thus, money is lost/stolen. Furthermore, they need to make frequent trips to Automated Teller Machines (ATM). The E-wallet can provide a safer platform to make payments and purchase items, thus eliminating the need to carry cash around. E-wallet system is a kind of electronic card which is utilized for exchanges made online through a PC or a cell phone. Its utility is same as a credit card. An E-wallet should be connected with the person's bank account to make payments. This paper aims to study about E-wallet system and how it can be implemented into INTI community. The objectives of this project was to study about the current methods of making payments in INTI while investigating how E-wallet system can be used to enhance payment experience and safety for INTI community. After that, to design and implement a mobile application which is QR-code based and lastly, to conduct testing for the proposed system to ensure the accuracy. For this project, the author primarily used Android Studio as the software to develop the system and Firebase Real-Time database to store and retrieve users' information. The project has demonstrated the basic needs of an E-wallet System and showed that it is possible to be implemented in INTI.

Keywords

E-wallet System, QR-code

Introduction

Making payments and purchasing items has always been a part of people's daily life, whether if it's paying online or paying in cash. In general, it can be said that the payment systems are mechanisms that allows the transfer of money between a seller and a customer. Today, no economic activities are possible without transferring of funds, in other words, the payments systems are one of the most important infrastructures. The Malaysian payment systems have evolved from currency notes and coins in 1897 to a rapid increase of cashless payment systems in

modern era because of the advanced technology that helps to improve efficiency in the payment systems. In recent years, there has been an increasing interest in E-wallet systems (Tan, Y., 2018). Through the introduction of E-wallet system, people can purchase safely items without the need to pay with cash.

The current payment method in INTI is paying with cash. Because of this, the students and the staffs are obligated to carry their wallets which over time, can be difficult to manage. In addition, the INTI community also need to rely on the ATM machines, which over time, can impose long queues thus increasing waiting times. By implementing e-wallet system, it can reduce the waiting times, paying process and can give the INTI community a better experience in making payments and purchasing items. Although the concept of E-wallet isn't very new, however, it is slowly making its way to Malaysia, as stated by an article published by Blockchain.my (Bcmy.io, 2018). In another article (Shah, 2018), it is mentioned that more E-wallets are expected to be launched in Malaysia in 2018. Majority of the transactions in the country are still made by cash, as 20% are done by online. In the same article, Chan Kok Long, an online payment provider iPay88 Sdn Bhd ED, says that E-wallet will replace the majority of the transaction made in cash. It will cover a variety of areas such as night markets. Even though E-wallet is already implemented in many countries, but as previously mentioned, it is slowly making its way to South-East Asia. This is got to do with preferences. As technology is more appealing to youths, and as more senior citizens prefers paying in cash as it easier, it will take a while for the E-wallet to hit big.

Methodology

Development of the System

The development tools used to create the functionalities of the proposed system. The development tools that were used are: Android Studio (3.3, Google and JetBrains) and Firebase Database (28, Firebase, Inc.). Moreover, Java, XML and JSON are the languages used. Android studio is the official IDE (Integrated Development Environment) or tool for developing application only for Android. It has a solid editorial tool for creating creative UI and emulators for various versions to test and mimic sensors without having genuine Android gadgets. It likewise has an extremely valuable Gradle plugin which you can make application files (apks) with different configurations. Also it makes exporting and uploading apk on playstore simple with a single click. In the ongoing updates, Android studio has brought instant run which makes testing

The database that has been used in this project is Firebase. It does not need to be downloaded as it can easily be found online, the only thing that is needed, is a gmail account. Firebase enables the user to create those applications that need authentication, database, storage, analytics etc. Firebase is not something specifically identified with Android, however it is a back-end service provided by Google in which the user can coordinate in Android, iOS, websites and other applications. It gives all back-end services like authentication by means of Google, Facebook, OTP, email and so on. Other services also include Real-time database to store details, storage to store multimedia, cloud service to send notifications and analytics to screen usages and crashes. In this project, the author only used Authentication (16.1.0, Firebase, Inc.) and Real-time Database (16.0.6, Firebase, Inc.).

The Firebase Realtime Database (16.0.6, Firebase, Inc.) is a cloud-hosted NoSQL database that allows the user to store and sync between the users in realtime. The Realtime Database is one major JSON object that the developers can manage in realtime. With only a single API, the Firebase database gives your application both the present value of the data and any updates to that data. Realtime syncing makes it straightforward for the users to get to their information from any gadget, be it web or mobile. Realtime Database moreover enables users to team up with each other. At the point when the users are disconnected, the Realtime Database SDKs utilize local cache on the device to serve and store changes. At the point when the device comes online, the local data is automatically synchronized. The Realtime Database can likewise incorporate with Firebase Authentication to give a simple and intuitive Authentication process.

Firebase Authentication (16.1.0, Firebase, Inc.) gives backend services, simple to-utilize SDKs, and instant UI libraries to authenticate users to the mobile app. Typically, it would take a very long time to set up an authentication system. Even from that point forward, it would likewise need to keep a devoted team to keep up that system. However, by utilizing Firebase, the whole system can be set up in less than 10 lines of code that will deal with everything. By using Firebase Authentication makes building secure authentication easier, while additionally improving the sign-in and on boarding experience for end users.

Application Homepage

Figure 1. Homepage interface

After registering for an account, the user can immediately login the account. Once the user has successfully logged in, the user will be directed to the homepage where five functions or features the E-wallet System provides like update balance, check balance, transfer money, scan and pay and lastly, view transaction history.

Check Balance

Figure 2. Check Balance interface

One of the functionalities is to check balance. The user will select the "Check Balance" feature on the Homepage and it will be redirected to the interface as shown above. The user will then need to select the "Show Balance" button and their balance will be shown.
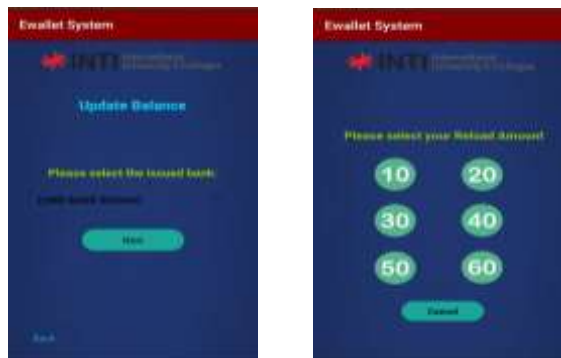
Update Balance

Figure 3. Update Balance interface

When the user wants to update the balance in the account or add money into the account, the user can select the "Update Balance" feature. The user will then need to select the issued bank that is associated with their E-wallet account followed by selecting the amount to be added to their account.

Scan and Pay

Figure 4. Scan and Pay interface

To make payments or purchases, the user can select on the "Scan and Pay" feature. In reality, the user will need to scan the QR-code displayed at the cashier and this QR-code will trigger the merchant's payment page. Finally, the user will then need to key in the amount. The amount will be sent to the merchant's account and the amount will also be deducted from the E-wallet.
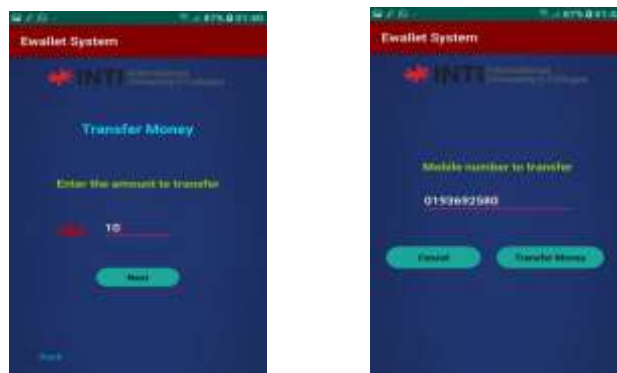
Transfer Money

Figure 5. Transfer interface

To transfer money, the user needs to select the "Transfer Money" option at the homepage. The user will be presented an interface where an amount needs to be keyed in first. The user will then be taken to another interface where the mobile number of the person the user is sending the amount to, needs to key in.

Results and Discussion

The system managed to perform the basic functionalities of a QR-code based E-wallet system which is to check balance, scan and pay, transfer money, transaction history and update balance. To obtain some feedback from testers, the author conducted a user evaluation on the feel and the usability of the system. This is done after the author has gone through the possible test cases. The

findings on the evaluation at least hint that it is possible to implement an E-wallet System in INTI. A further novel finding is that, the interfaces may be need to be improved so that the users can feel satisfied whilst using the application i.e. the feel and the look of the interfaces.
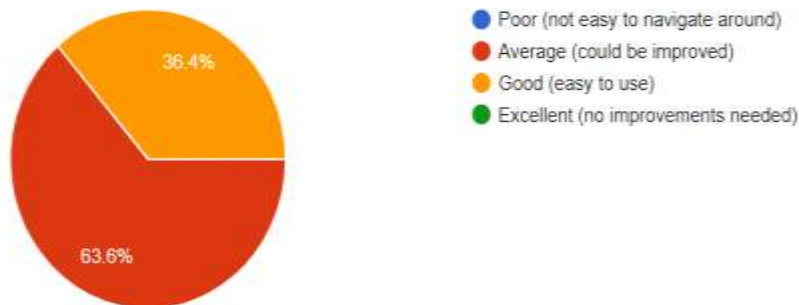

Figure 6. User Evaluation

Conclusions

The system was developed so that INTI Community can experience a faster and convenient way of purchasing and making payments. The proposed system has successfully managed to achieve its objectives which are: studying the current payment method that is being used in INTI. The author has found that the cash is being used to make payments. Secondly, investigate how E-wallet System can enhance payment experience. By using the system, the INTI Community does not need to make frequent trips to ATM machines and rely heavily on wallets. Thirdly, to design and implement a mobile application that is QR-code based. The author has successfully developed a Scan and Pay feature that allows the users to scan the QR-code and make payments. Lastly, to conduct testing to ensure accuracy. The author has created a series of test cases which all have been tested and ensuring the right results.

References

Bcmy.io. (2018, February 1). *Growing Use Of Digital Wallets [Summary By Country]*. Retrieved from: http://bcmy.io/blog/growing-use-of-digital-wallets-summary-of-studies-by-country/

Tan, Y. (2018, March 17). *E-wallet race heats up - Business News | The Star Online*. Retrieved from: https://www.thestar.com.my/business/business-news/2018/03/17/ewallet-race-heats-up/

Engineersgarage.com. (2018). *What is Android : Introduction, Features & Applications*. Retrieved from: https://www.engineersgarage.com/articles/what-is-android-introduction

Agarwal, T. (2018). *Architecture and Advantages of Android Operating System*. Retrieved from: https://www.edgefxkits.com/blog/android-operating-system-advantages/

Shah, S. (2018, February 2). *The making of Malaysia's cashless society*. Retrieved from: https://themalaysianreserve.com/2018/02/02/making-malaysias-cashless-society/