MYSEJAHTERA – RFID TAG READER

by

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16004035

Dissertation submitted in partial fulfilment

of the requirements for the

Degree of Study (Hons)

(Information System)

JANUARY 2022

Universiti Teknologi PETRONAS

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CERTIFICATION OF APPROVAL

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A project dissertation submitted to the

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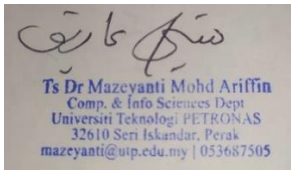
Approved by,



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(Ts. Dr. Mazeyanti Mohd Ariffin)

UNIVERSITI TEKNOLOGI PETRONAS

January 2022

CERTIFICATE 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 references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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(Muhammad Asyraf Bin Abdul Razak)

ABSTRACT

Since the government of Malaysia imposed the Movement Control Order (MCO) on March 18, 2020, in response to the COVID-19 pandemic, the Ministry of Health (MOH) in Malaysia has used an app called "Mysejahtera" to track infected or suspected cases instead of manual tracking to save cost and resources. One of the issues that MySejahtera app users encounter is a problem with users must also take out their mobile phone to scan QR codes every time they enter any store or building, particularly in mall areas which is inconvenience. The lack of an automated check-in and check-out system in existing MySejahtera apps is also harming the users' experience in utilising the MySejahtera, not to mention the users' time waiting in a long queue, particularly during peak hour and hot spot regions. The objective of this project is to utilise Internet of Things (IoT) technology/technique feature in MySejahtera that would make it easier for people to move around and to increase the efficiency and smoothness of movement by adding Radio Frequency Identification (RFID). In this project, the Design Thinking methodology will be utilised to help manage the project as well as the major development technique in this project. The Design Thinking technique was chosen for this project because it allows us to better understand the customers, challenge assumptions, reframe difficulties, and build and test creative solutions. Users will have no difficulty entering areas or buildings that have been built to be user-friendly if this project is implemented. The lack of automated check-in and check-out systems in existing MySejahtera apps will be addressed by integrating the IoT technology. This project is targeting all the Malaysians and foreigners residing in Malaysia especially the user of MySejahtera apps as the audience.

ACKNOWLEDGEMENT

First and foremost, I thank Allah S.W.T for providing me with the strength, patience, bravery, and drive necessary to complete this project. I would like to convey my heartfelt thanks to my supervisor, Ts. Dr. Mazeyanti Mohd Ariffin, for her excellent advice, instructions, encouragement, and unwavering support, all of which contributed to the completion of my research project.

Most importantly, I want to express my gratitude to my lovely wife, Nur Khairin Nadhirah Saifudin, for always being there for me through ups and downs. Also, my parents deserve special thanks for their love, patience, and trust throughout my bachelor's degree. I am grateful to my family for their unwavering support.

Finally, I would like to express my gratitude to every one of the responders who took the time to fill out the survey forms. During the challenging time of my degree studies, I am also grateful to all my friends for their thoughts, encouragement, and concerns. May Allah SWT continue to bless you all.

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INTRODUCTION

1.1 Background of Study

- What is MySejahtera?

Many countries throughout the world were affected by the COVID-19 pandemic in 2020, and the virus is still unresolved today. SARS-CoV-2, a novel coronavirus strain, has wreaked havoc on human lives and the global economy. Governments throughout the world have implemented a variety of apps to track and trace infected individuals in an effort to contain and control the spread of the COVID-19 virus. Malaysia is one of the countries where the COVID-19 pandemic is wreaking havoc.

On April 10, 2

020, the Malaysian government introduced MySejahtera, a mobile application meant to track and trace infections so that the Ministry of Health can confine and isolate afflicted people (Othman & Babulal, 2020). As a result, this preventive step mandates that everyone scan a QR code for data gathering every time they enter public spaces such as public transportation, malls, and even stores (Code Blue, 2020). Contact tracing is important in outbreak control because it can break the transmission chain quickly.

Visitors to a premise can be registered and managed using the MySejahtera Check-In function, which is structured and consistent in its operation. Using MySejahtera Check-In, you can aid the government in containing the COVID-19 outbreak and ensuring public health and safety. One of the features offered by MySejahtera Check-In is that it assists in the automatic registration of visitors; it also helps to reduce visitor congestion; it also helps to prevent the spread of infection by increasing compliance with new standards; and it also helps to ensure the security of user data. The MySejahtera Application was developed to assist in the control of COVID-19 outbreaks in Malaysia. It is available for both Android and iOS devices.

This paper presents the Radio Frequency Identification technology (RFID) in MySejahtera, which allows users to walk around and enter any areas or buildings without having to take out their phone and scan the QR code, which is time consuming. Upon using this MySejahtera RFID it will simultaneously help the government in tracking and tracing also preventing the spread of COVID-19 virus and the most important thing is it will assist in the control of COVID-19 outbreaks in Malaysia.

Figure 1: How MySejahtera Works

1.2 Problem Statement

There are two (2) main concerns faced by the users while using the existed MySejahtera application includes:

- Time consuming – not having an automated check-in and check-out system in existed MySejahtera apps is affecting the users' experience in using the MySejahtera also affecting the users' time waiting in a long queue especially in pick hour and hot spot areas.
- Inconvenience manual check-in and check-out system – having a problem with the internet connection is one of the problems faced by the users and not only that, but user also need to take out their mobile phone to scan QR code every single time before entering any store or building especially in mall area.

1.3 Objective

- To investigate the RFID in contact tracking applications, including the methodologies and benefits of using RFID.
- To create a new Internet of Things (IoT) feature in MySejahtera that would make it easier for people to move about.
- To test the functionality of the RFID – tag reader, which includes the check-in and check-out processes in each premises or building, is necessary.

1.4 Scope of Study

The scope of study for this project is to provide a solution to the problem described above. Furthermore, the Internet of Things (IoT) has the potential to assist folks during a pandemic, and this study specifically examines that possibility. A new Internet of Things capability for MySejahtera will be developed as a result of this study to make it easier for users to navigate their surroundings. Also of importance is the design and development of a new Internet of Things feature that will be trustworthy and will improve the MySejahtera tracking system, which is the centre of this research. Lastly, it is required to evaluate the functioning of the RFID, which includes the check-in processes in each individual office or building.

CHAPTER 2

LITERATURE REVIEW

2.1 COVID-19 Outbreak in Malaysia

According to New Straits Times, on January 25, 2020, COVID-19 was discovered in Malaysia, linked to 3 Chinese nationals who had intimate contact with an infected individual in Singapore. They arrived in Malaysia through Singapore on January 24, 2020. It was at Sungai Buloh Hospital in Selangor. There are 34 hospitals and screening facilities in Malaysia, including Kuala Lumpur Hospital (Kuala Lumpur), Sungai Buloh Hospital (Selangor), Tuanku Jaafar Hospital (Negeri Sembilan), Sultanah Aminah Hospital (Johor Bahru) and Tawau Hospital (Sabah).

In 2020, the first Malaysian was verified with COVID-19. He had just returned from Singapore when he had a fever and cough. Sungai Buloh Hospital, Selangor (Bernama, 2020). On the same day, a 4-year-old Chinese girl who had been quarantined in Langkawi's Sultanah Maliha Hospital since January 29th healed, was discharged, and permitted to return home (Bernama 2020). This was Malaysia's first COVID-19 recovery since the pandemic began.

The Movement Control Order (MCO) was established on the 18th of March and remained in effect until the 28th of April in Malaysia to control the spread of COVID-19 around the country. Six limitations were enforced by the government.

- It was forbidden for people to attend large gatherings such as religious, sporting, social, and cultural activities. Temporarily, all places of worship and businesses were shuttered. Essential products, on the other hand, may be purchased in markets, supermarkets, grocery stores, and convenience stores.
- After returning from overseas, people were expected to undertake health screening for the discovery of COVID-19 and self-isolate.
- Malaysia has barred foreign tourists and visitors from entering the country.
- Kindergartens, public and private schools, as well as daily schools, boarding schools, foreign schools, tahfiz centres, and other elementary, secondary, and pre-university institutions, were all shut down.

- Across the country, public and higher education institutions, as well as skill training institutes, were shuttered.
- Except for necessary services, government and private buildings were closed (water, electricity, energy, telecommunications, postal, transportation, irrigation, oil, gas, fuel, lubricants, broadcasting, finance, banking, health, pharmacy, fire, prison, port, airport, safety, defence, cleaning, retail, and food supply).

2.2 Factors Influencing the Intention to Use MySejahtera Application

The Unified Theory of Acceptance and Use of Technology (UTAUT2) theory was applied to predict Malaysian citizens' intentions to utilise the MySejahtera application. UTAUT2 is a theoretical model that is often utilised in the adoption of technology or systems (Naranjo-Zolotov & Oliveira, 2019). This idea is most used to predict the behavioural intent of users using a particular technology or system (Lin, 2019; Suki & Suki, 2017; Venkatesh et al., 2003).

Expectations of Results According to Venkatesh, Thong, and Xu (2012), expectations of performance are the level at which technology can be beneficial in completing a user's task. In addition, according to a previous study by Venkatesh et al. (2003) It can also be described as how users or consumers feel that technology can improve productivity and simplify work by achieving higher performance. In connection with the citizen's desire to use eParticipation in Portugal, Naranjo Zolotov and Oliveira (2019) found that performance expectations have a positive impact on citizens' willingness to use eParticipation. In addition, performance expectations are considered to be an important factor influencing technical intent.

According to Hoque and Sorwar (2017), the elderly's adoption of the e-Health service is influenced by their performance expectations. Walrave, et al., (2020) discovered that performance expectancy was the most essential element in predicting people's intention to use COVID-19 contact tracing applications in Belgium, with a positive link being created. The findings in identifying the association between performance expectancy and intention to use suggest that performance expectancy as a construct within UTAUT2 theory still needs to be tested further.

The ease with which anyone can use the system or technology is called the expected effort (Venkatesh et al., 2012). According to a Malaysian study on the impact of elements of UTAUT theory on consumers` intent to use smart travel to plan their trips, consumer expectations are the intent to use smart travel to plan their trips. Affects.

Alrawi et al., (2020), in a study investigating the adoption of mobile commerce or e-commerce in Malaysia, found that there was a significant correlation between expected effort and the intent to use mobile commerce. This shows that modern technology does not have to bring significant benefits to users. Further research reveals that expected efforts in Jordan have had a positive impact on the intent to use e-government services (Rabaa`i, 2017). All these results from previous studies emphasize the importance of effort expectations in predicting intent to use technology or services and find that effort expectations influence intent to use online technology. Chayomchai et al., Supports the discovery of (2020) COVID19 Use among Thais during the quarantine period. As a result, current research assumes that there is a positive correlation between expected work and the intent to use the MySejahtera app.

Venkatesh et al. (2003) defines facilitating conditions as the organisational and technical support that a user receives to make the adoption of modern technology easier and more user-friendly. These findings support the inclusion of enabling circumstances as one of the factors to be investigated as a part of the UTAUT2 framework, which is in line with previous findings. As a result, the facilitating condition was added in this study as one of the structures that would be examined to see if Malaysian citizens would be interested in utilising the MySejahtera contact tracing application.

2.3 Existing Application of RFID

a. Application of RFID Technology at the Entrance Gate of Container Terminals.

RFID is a technology that falls to the category of Automatic Identification (Auto-ID). In this group of technologies include the well-known bar code system, optical character readers, and a few biometric technologies, among other things (like retinal scans). Auto-ID systems have demonstrated their ability to minimise the amount of time and labour resources required while simultaneously increasing data accuracy. However beneficial they may be in practise, the fact that a human is required to manually scan goods is a limitation in and of itself. As previously said, it is precisely in this area that RFID will revolutionise auto-ID technology (Tsilingiris, P.S et al., 2007). In Figure 2 shows that it takes three components to make up an RFID system: a scanning antenna, a transceiver with a decoder to interpret the data, and a transponder, also known as an RFID tag, which has information that has been encoded into it. In most cases, an RFID tag is composed of a microchip that is connected to a radio antenna that is fixed on a substrate. The chip has the capability of storing up to 2 kilobytes of data and much more (Tsilingiris, P.S et al., 2007).

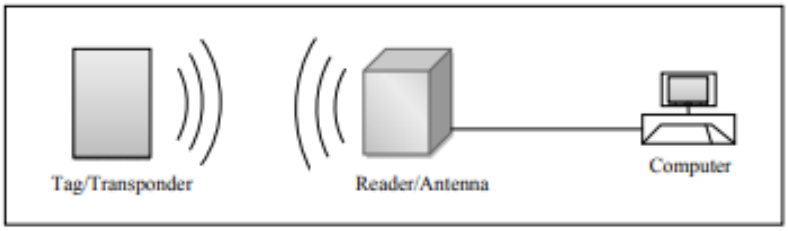

Figure 2: Working Process of RFID

A tag, for example, can hold information about a product or cargo, such as the date of manufacturing, the destination, and the date of expiration. Tags can be passive, active, or semi-active, depending on their function. Passive tags rely on the radio signal transmitted by the reader for power, whereas active tags have several sorts of power sources on the tag. Semi-active tags rely on a battery to power the microchip's circuitry, but they do not interact with the reader like fully active tags do. Because of the reader's radio frequency and power output, radio waves may be sent at distances ranging from one inch to 100 feet or more. After the reader decodes the data contained in the tag's embedded processing, the data is exchanged with the monitoring computer for further processing. The working process is shown in Figure 2.

b. RFID in retail store

These younger generations have a harder time comprehending why they can't locate a certain product in a store due to a stock-out or why they have to wait more than a few minutes in line. They also expect a degree of information, comparison, communication, and engagement that conventional firms are unable to give. All of the aforementioned issues may be addressed by using item-level RFID tagging in retail. RFID can help businesses streamline operations by giving more accurate and frequent stock availability data, decreasing the time it takes to check out a customer, and nearly completely removing the visual and operational impact of Electronic Article Surveillance (EAS). If the company has reached operational excellence, RFID may also be used to recommend enhancements to the shopping experience, such as magic mirrors or interactive fitting rooms. Furthermore, these breakthroughs open up new avenues for predicting client behaviour, allowing recommender systems to improve and sales rates to increase.

c. RFID Tag Motion Detection in High Tag Density Environments

This study addresses a major issue in brick-and-mortar stores: the inability to collect meaningful data on shopper behaviour in an unobtrusive manner, such as how a shopper physically manipulates an item and for how long, what items he or she picks up sequentially and concurrently, and distinct shopper behaviour patterns that lead to a successful sale. To promote RFID usability in "soft-goods" retailers specialised in garments, footwear, and other items, this article intends to bridge the gap between real-world high tag density deployments and human-tag interaction research threads. This enables the researcher to employ low-cost off-the-shelf tags without fear of detuning due to the objects' materials (although other adverse environmental effects remain). To that purpose, the following are some of the most important contributions, which are based on genuine data obtained in realistic controlled environments:

- Create a tag motion state identification algorithm and demonstrate its effectiveness in practical scenarios.
- Present findings on how the algorithm works with tag density scaling (in terms of motion accuracy and false positives) for up to 1000 tags in the range of a single reader in various reader modes and indoor situations.
- Demonstrate the impacts of actual consumer browsing, tag/antenna separations, and two distinct settings, all with differing amounts of RF harshness.

2.4 Comparative Study between RFID and Bar Code

Table 1: Comparison between RFID & Bar Code

Differences	RFID	Bar Code
Reading rate	• One or more tag instantaneously • Passive UHF • RFID: (40ft. -fixed reader), (20ft.-handheld reader)	• One tag at a time • Several inches to several feet
	Active UHF RFID: 100+ft	
The ability to read or write	Able to read, write and amend	Read only
Line of sight	Not needed	Needed
Durability	High	Low – Cannot be read if stained
Security	High – Difficult to imitation	Low - Easier to imitation
Technology	RF (Radio Frequency)	Optical (laser)
Automation	Most fixed readers are automated and do not require human involvement	Most barcode scanners require human operation and labour intensive

The use of RFID tags as a common method of identifying could be phased out in favour of RFID tags since they are more economical, lightweight, and commercially viable than barcodes. Several applications of RFID are highlighted in the associated paper, which

spans several different industries and uses the term "universal." In this project, the implementation provides valuable insight into how to properly utilise RFID technology. Table below show the comparative study on existed RFID project.

Table 2: Comparative Study on Existing RFID Project

Company	Developer	Main Goal	Result
KPJ	Malaysia	Provide complete peace of mind to all mothers delivering at the maternity ward.	Mom can be doubly sure that their own baby will be always brought to them.
Decathlon	France	Increase product availability in the stores.	The overall product visibility is improved, and labour costs have been reduced.
MySejahtera RFID Tag Reader	Malaysia	Increase productivity and ease people to move around.	Users can easily manoeuvre through the stores or building that is made for ease of usage.

CHAPTER 3

METHODOLOGY

3.1 Research Methodology

The Design Thinking methodology will be used to assist manage the project and as the primary development technique in this research. Design Thinking methodology is chosen in this project as it is creating a method for the development of this project, whether it is a product or a service, based on the intersection of user demands, available technology, and the needs of the organisations who request the project (D. Sandino, et al., 2013).

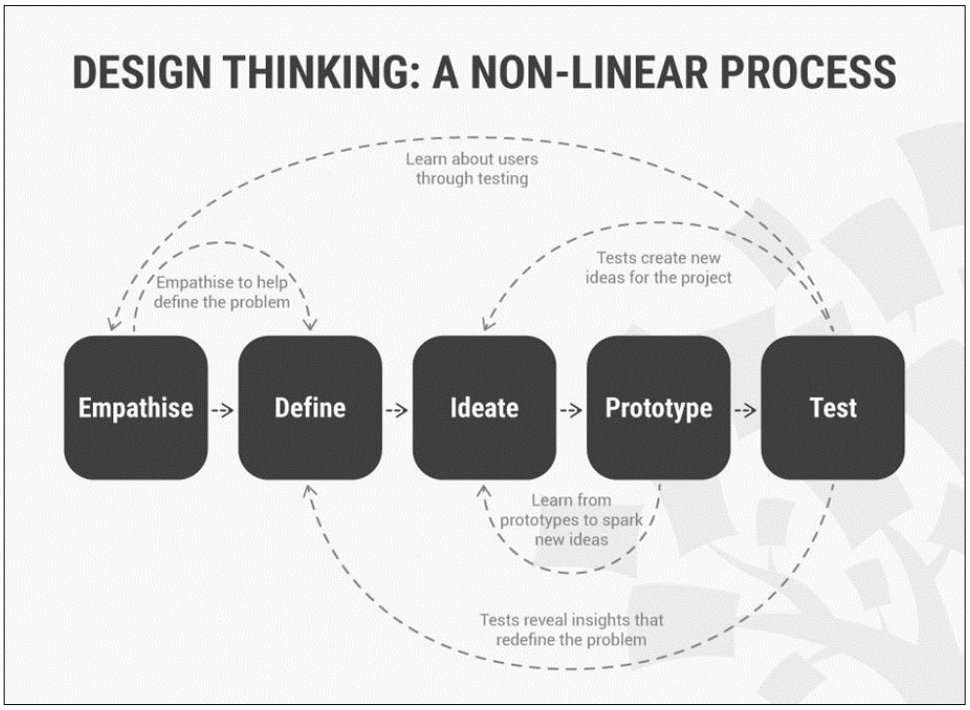

Figure 3: Design Thinking Methodology

Design thinking is a non-linear, iterative technique to better understanding consumers, challenging assumptions, re-formulating issues, and designing and testing new solutions. The five most effective steps for handling vague or unknown situations are empathy, definitions, ideas, prototypes, and testing. Design thinking is a world-leading institution for improving the world and enabling business (global giants like Google,

Apple, and Airbnb apply it with surprising success). It has the same level of popularity as a popular topic among. Design thinking allows the team to experiment with fresh concepts. Design thinking makes the development process go more smoothly by giving you a better knowledge of the ultimate outcome.

1. Empathise.

   The first phase in the Design Thinking approach is to empathise with the problem we are trying to solve. This conveys consulting experts to learn more about the subject of concern, as well as observing, engaging, and empathising with people who used MySejahtera apps. In this phase also we conduct a survey to better understand their experiences and understand what technical difficulties they face when trying use MySejahtera apps as well as immersing ourselves in the physical environment to gain a more personal understanding of the issues at hand. The survey contains with few questions asking about respondents' nationality, age, frequency on using MySejahtera and the problem faced by the users.

2. Define.

   During this phase, all the information from the survey were gathered throughout the Empathise phase. This is where we will analyse and synthesise the data in order to define the fundamental challenges that have observed thus far. In a human-centred manner, we should try to define the problem as a problem statement.

3. Ideate.

   A system design of the project will start to be developed during this phase. In the Empathise stage, we learned more about our users and their requirements, and in the Define phase, we analysed and synthesised our findings to come up with a human-centred problem statement. With this firm foundation, we may begin to "think outside the box" in order to find fresh solutions to the issue statement we have developed, as well as alternate perspectives on the situation. This phase will be performed repeatedly in order to leave room for system improvement until the prototype reaches the required level of executability and scope.

4. Prototype.

   We will now create a number of low-cost, scaled-down models of the prototype, or any specific function found inside the product during this phase in order to study the problem solutions generated in the previous stage. This will enable extensive product testing during the iteration phase for a variety of purposes, including validating RFID system standards and requirements, addressing any newly discovered requirements, and uncovering any identified problems.

5. Test

   We may begin testing the full product when the initial prototype is completed, using the best solutions found during the prototyping process. In an iterative approach, the insights gathered during the testing phase are frequently used to redefine one or more problems and educate the understanding of users, use conditions, how people think, behave, and feel, and to empathise. Changes and enhancements are made even at this stage to rule out potential issue solutions and get a complete understanding of the product and its users.

3.2 Development Tools

There are certain tools that are required in order to build this project and that help in maintaining complete control over all product components as well as keeping track of all other areas of the development process. The following are the tools that are required**:**

- Power supply - A power supply is an electrical device that delivers electrical power to the prototype in order for it to operate.
- Arduino microcontroller - Serving as an integration platform for both software and hardware components. It takes in data from sensors and produces an output, such as a data description of the user.
- RFID tag - The tag is equipped with a smart barcode that holds information about the registered user and is required by the RFID reader.
- RFID reader - Tracking and reading product information from an RFID tag is required. Radio waves will be used to transmit the information from the tag to the reader.

- Firebase - The Firebase Realtime Database is a NoSQL database that is hosted in the cloud and allows us to store and sync data amongst the users in real time.

3.3 Gantt Chart

Table 3: FYP1 Gantt Chart

Project Elemenations	Week											
Phase 1: Project Initiation	1	2	3	4	5	6	7	8	9	10	11	12
Project Proposal												
Background of project												
Submission of 01A Form to coordinator												
Confirmation of Supervisor and FYP Title												
Meeting with SV												
Phase 2: Analysis												
Research for Literature Review												
Requirement Gathering												
Understanding the flow of the project												
Comparative Studies among existing RFID project												
Phase 3: Design												
Choose the classification of method												
Creation of Gantt Chart												
Phase 4: Presentation												
Proposal Defence Documentation												
Proposal Defence Presentation												
Phase 5: Development												
Initiate Prototype Development												
Submission of Interim Draft Report												
Phase 6: Completion of FYP1												
Submission of Progress Assesment 2												
Submission of Interim Report												

Table 4: FYP2 Gantt Chart

Project Elemenations	Week											
Phase 1: Development	1	2	3	4	5	6	7	8	9	10	11	12
Plan suitable test procuders												
Developer Testing												
System Testing												
Acceptance Testing												
Phase 2: Completion of FYP2												
Product Implementation												

CHAPTER 4

RESULT AND DISCUSSION

4.1 Survey Result

An online survey was undertaken to acquire further information on the research issue statement and project goal. Google Forms was used to build the poll, which was then shared on various social media platforms such as WhatsApp, Facebook, and Instagram. In order to stimulate responses, the survey was provided to a diverse group of people ranging in age from 18 to over 50. The survey was completed by 53 persons in total. An appendix contains the sample questionnaire.

1. Nationality.

The survey began with six control questions in which respondents were asked to provide basic information about themselves as well as their experience with the current MySejahtera application. First, the nationality of the respondents was inquired about in this survey. The bulk of the 53 replies (86.2%) were from Malaysian nationals, while (13.8%) came from foreign countries (e.g., South Sudan and Pakistan).

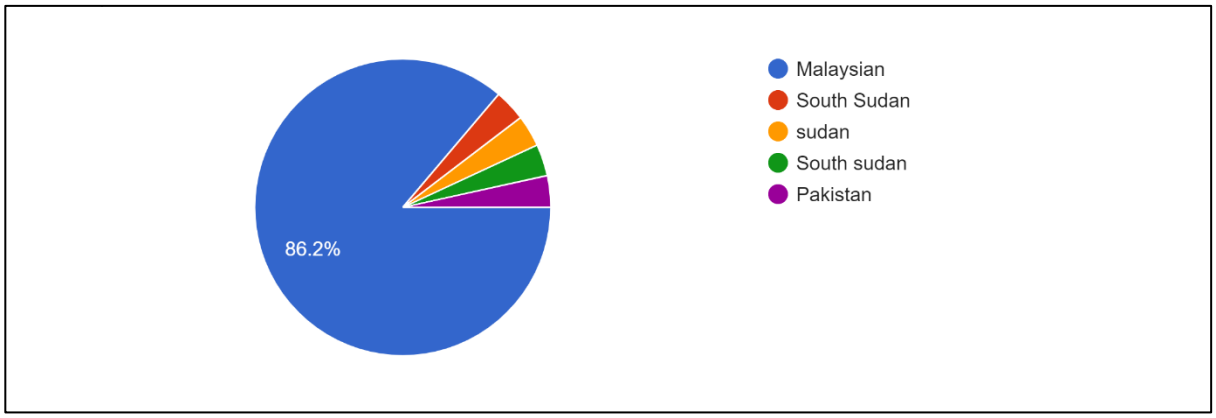

Figure 4: Survey on Nationality

2. Age Range.

The age group 18-25 had the most responses (65.5%), followed by the age group 26-35 (27.3%), and the age group 36-45 (6.9%). The age categories 46 and above received no replies, which might imply that the survey was unable to contact a greater number of persons in those age groups.

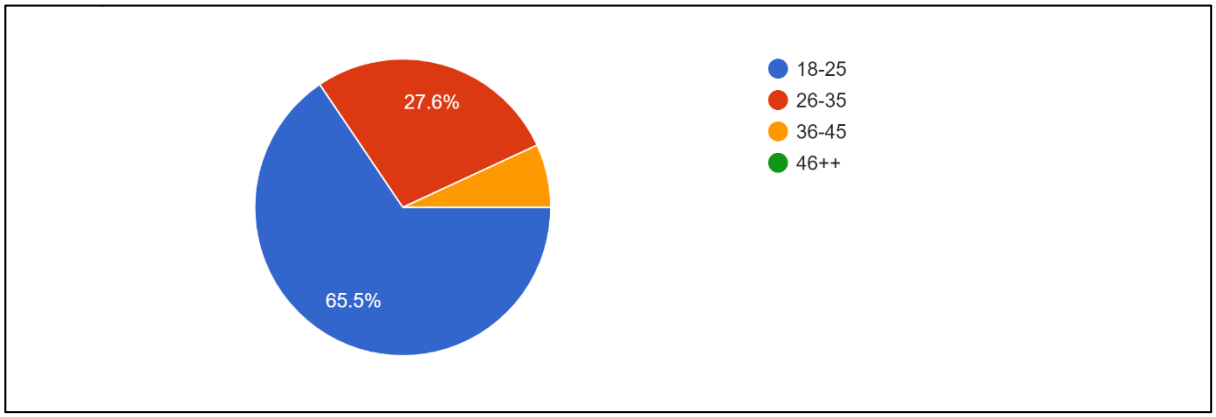

Figure 5: Survey on Age

3. How often do you use MySejahtera apps?

The respondents were asked how frequently they used MySejahtera applications, with the majority choosing 'Always' as the most common option (79.3%). 'Often' gets (17.2%) of the vote. Only (3.5%) said they 'Sometimes' use the Mysejahtera apps. 'Rarely' and 'Never' receive no answer.

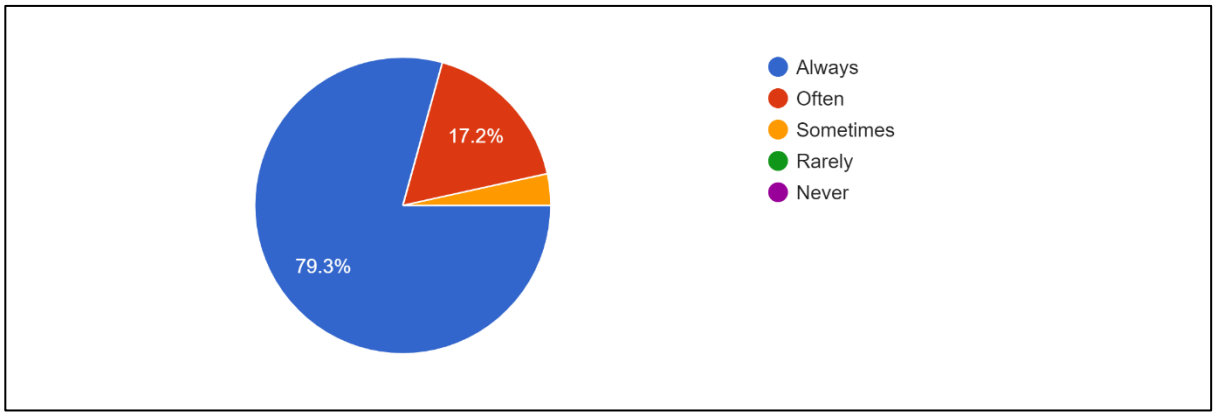

Figure 6: Survey on MySejahtera Application

4. **“Not having an automated check-in and check-out system in existed MySejahtera apps is affecting the users’ experience in using the MySejahtera also affecting the users’ time waiting in a long queue especially in pick hour and hot spot areas”. Do you agree with the problem statement?**

The majority of respondents agreed with the survey's problem statement, with (74.9%) were agreeing and (20.7%) disagreeing. (3.4%) answered maybe.

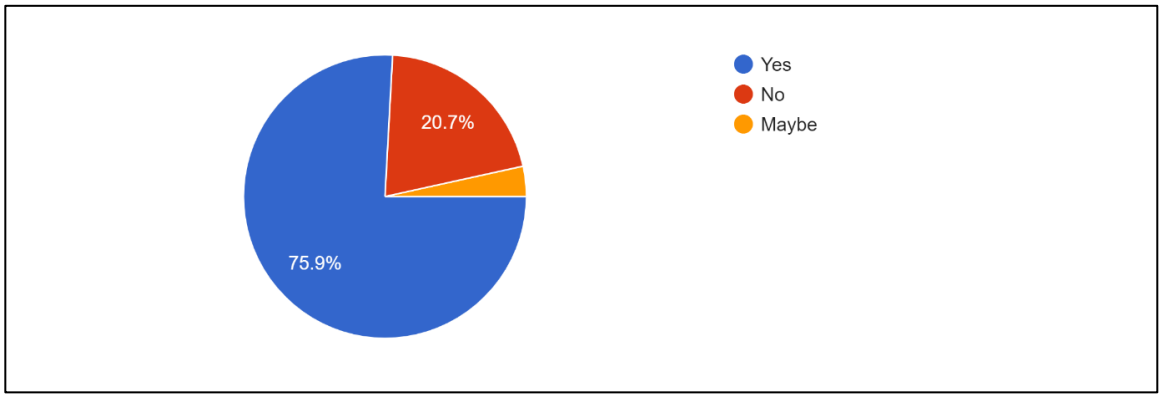

Figure 7: Survey on Problem Statement

5. **Are you interested to have a RFID feature in MySejahtera that would assist you in reducing the time taken in a long queue and having a smooth experience to move around?**

The majority of responses (93.1%) wanted an RFID feature in MySejahtera, and (6.9%) thought RFID may assist with this issue. Furthermore, there was no one response that indicated that the respondent was uninterested.

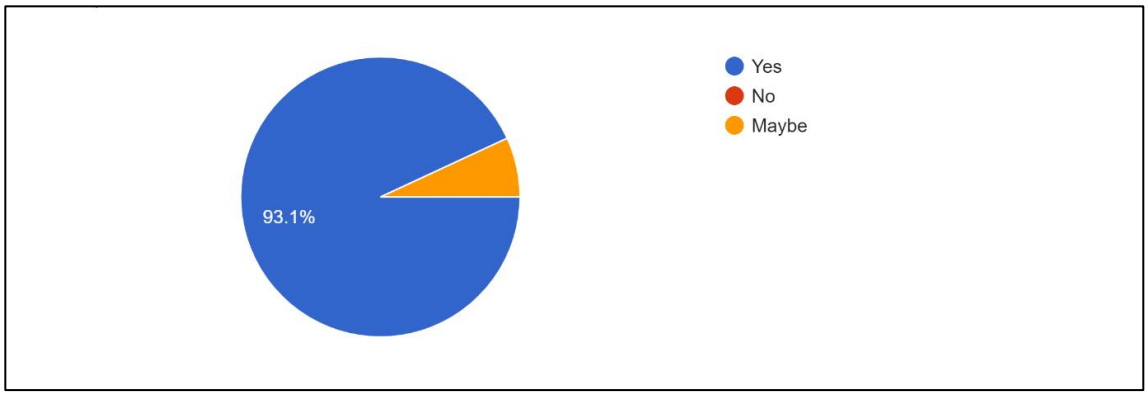

Figure 8: Survey on RFID Feature in MySejahtera

6. Would you prefer RFID instead of QR/Bar code?

RFID accounted for a large majority of the total responses (96.6%), instead of QR/Bar code with (3.4%).

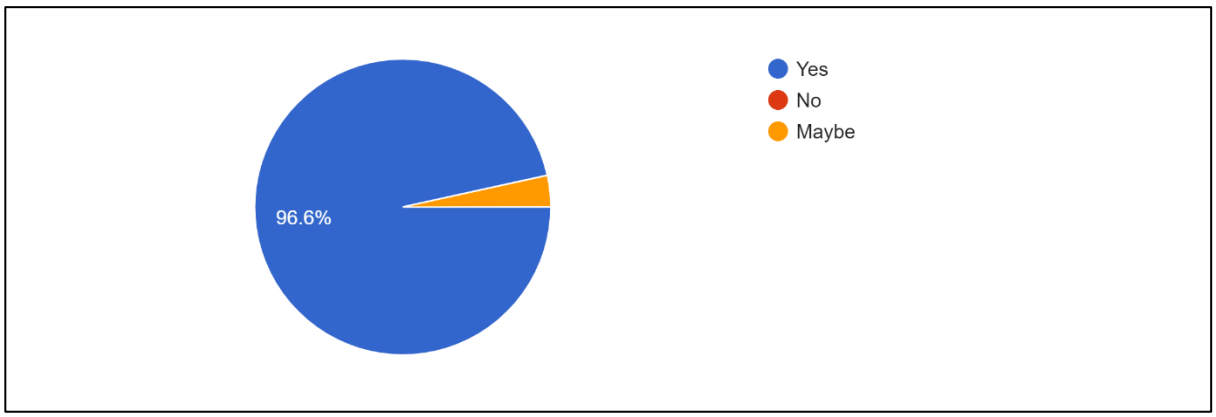

Figure 9: Survey on Preferred Feature

4.2 Product Design and Implementation

4.2.1 System Architecture

The overall Mysejahtera RFID system connections are designed to be connected as shown in the System Architecture in Figure 10. All components required for this project are as tabulated in Table 5.

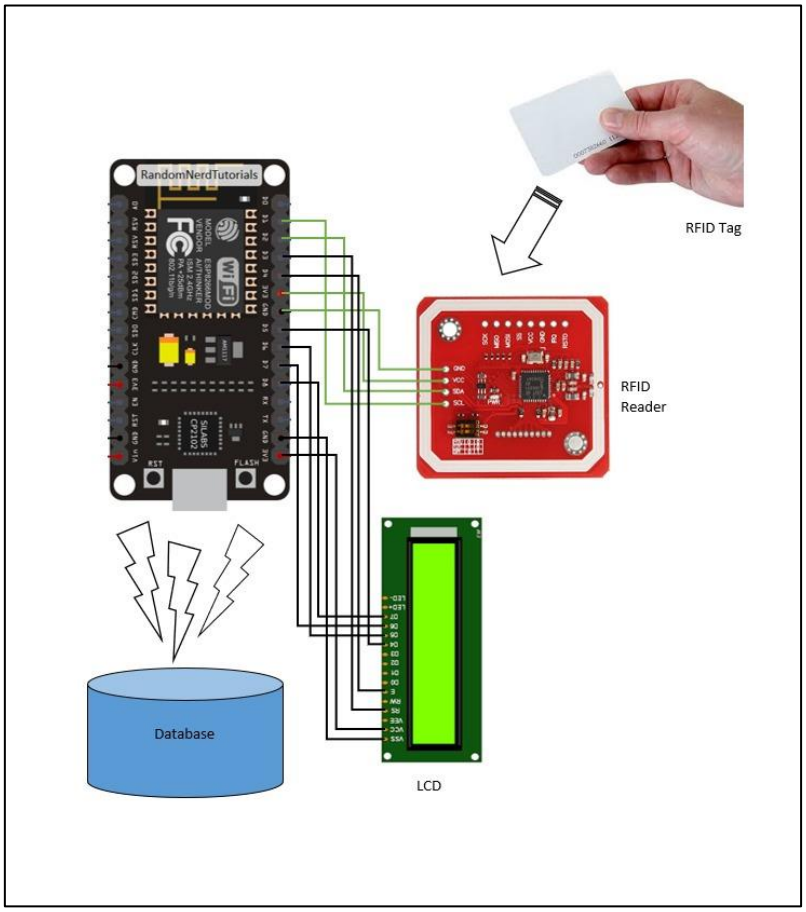

Figure 10: System Architecture

Table 5: Tools and Component Selection

Tool	Description/Justification
1. NodeMCU ESP8266	Main microcontroller to run the RFID module.
2. PN532 NFC/RFID V3 Module	RFID wireless sensor module
3. LCD 16x12	Display data from sensor connection
4. NFC card	As an input device that store user information
5. Firebase Realtime Database	Cloud-hosted NoSQL database that able to store and sync data between users in real-time

As said earlier, this study is to test the functionality and benefits of the RFID in this new modern era. MySejahtera RFID is designed to overcome the lack of current automated check-in process as well as to assist people in experiencing the smoothness and an efficiency of having an improvised automated check-in process.

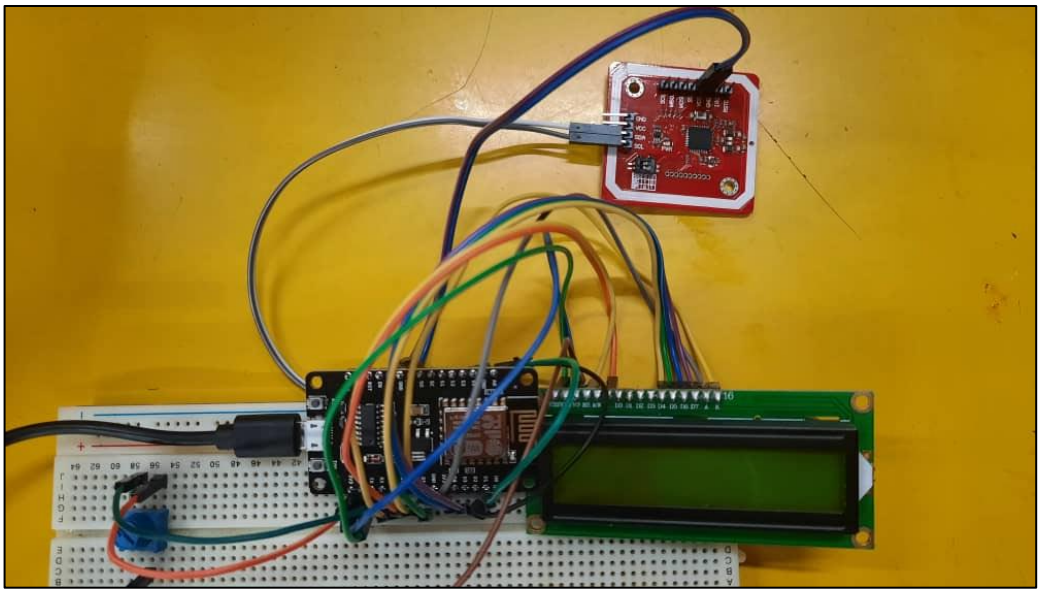

Figure 11: Circuit Design

In this section, we were testing the functionality of the RFID. The check-in process was tested in the first place where the NFC/RFID Reader will detect scanned RFID from the registered RFID tag. Next, the board will capture the data from the scanned RFID Tag and display the name and checked-in status of the user on LCD screen Moreover, the data that has been registered in RFID will be displayed at the serial monitor and stored in the real-time database as shown in Figures below.

```
22:38:18.904 ->
22:38:18.904 -> Scan your NFC tag:
22:38:18.904 ->
22:38:23.923 -> _____________________________________
22:38:23.970 -> Name: Nur Khairin Nadhirah
22:38:24.016 -> IC : XXXX-XX-XXXX
22:38:24.016 -> Adrress: UTP
22:38:24.063 -> Vaccine: Fully vaccinated
22:38:24.063 -> Status: Checked in
22:38:24.063 -> _____________________________________
```

Figure 12: Check-in Display in Serial Monitor

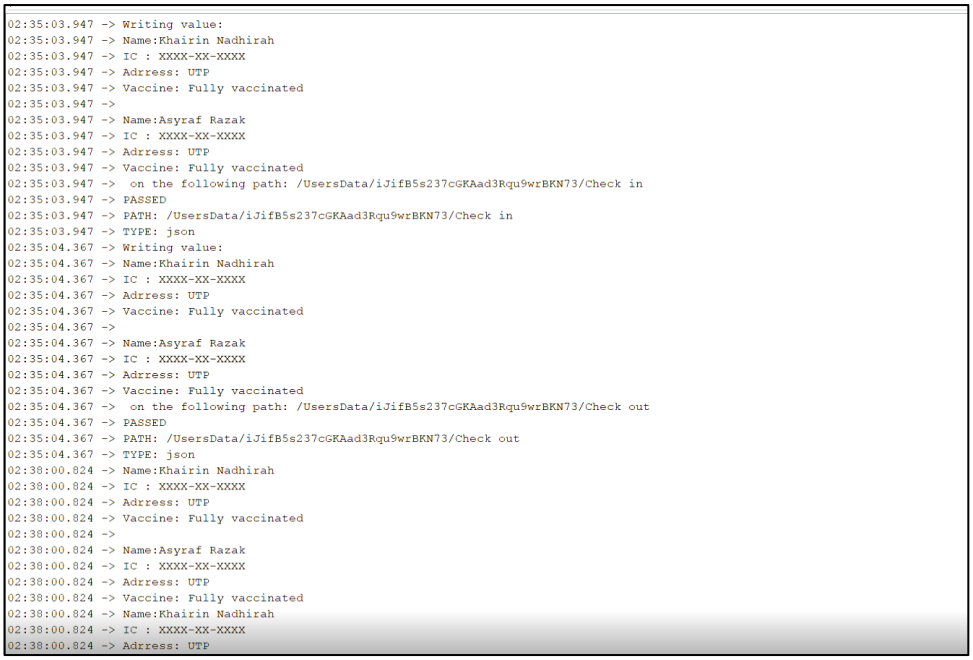

Figure 13: Serial Monitor to Firebase

The data will be stored in real-time database and here will display all the user's data containing the name, Identification Card number, address, vaccine status and the check-in status.

Figure 14: Check-in Recorded in Database

The same process will be applied if user want to check out. The user needs to scan the RFID Tag and RFID Reader will detect registered RFID. Then, board will capture the data from the scanned RFID and the LCD screen will display name and checked out status of

the user. Moreover, the data that has been registered in RFID will be displayed at the serial monitor and stored in the real-time database.

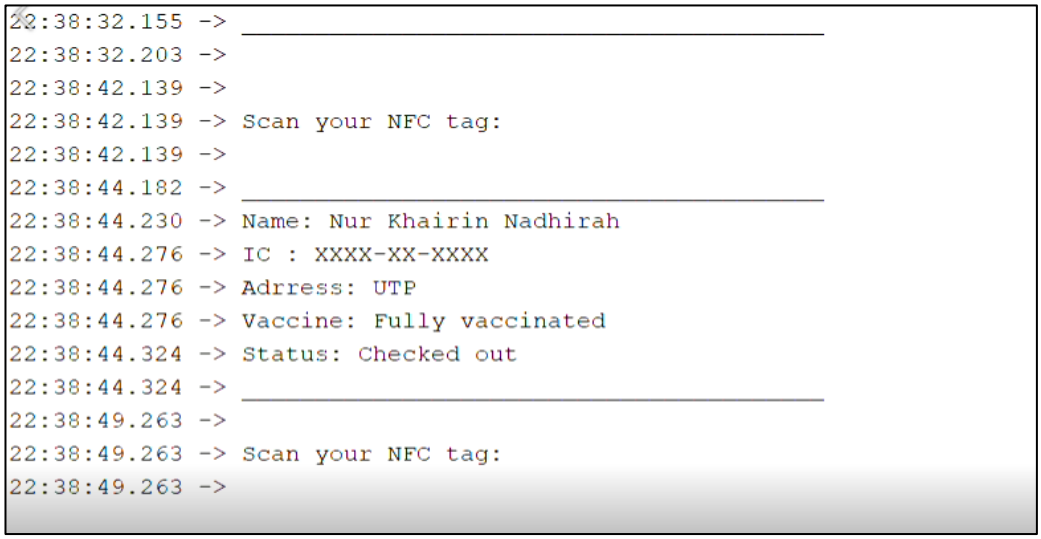

Figure 15: Check-out Display in Serial Monitor

Figure 16: Check-out Recorded in Database

4.2.2 Flowchart

The flowchart diagram of the check-in and check-out process is depicted in the figures below. Figure 17 depicts how the user will pass through the RFID scanner and the system will retrieve the user's information from the registered RFID and record the check-in status in the database.

Figure 18 depicts the check-out procedure, in which the user passes through the RFID scanner and, if the user's data is stored in the database, the system updates the check-out status in the database.

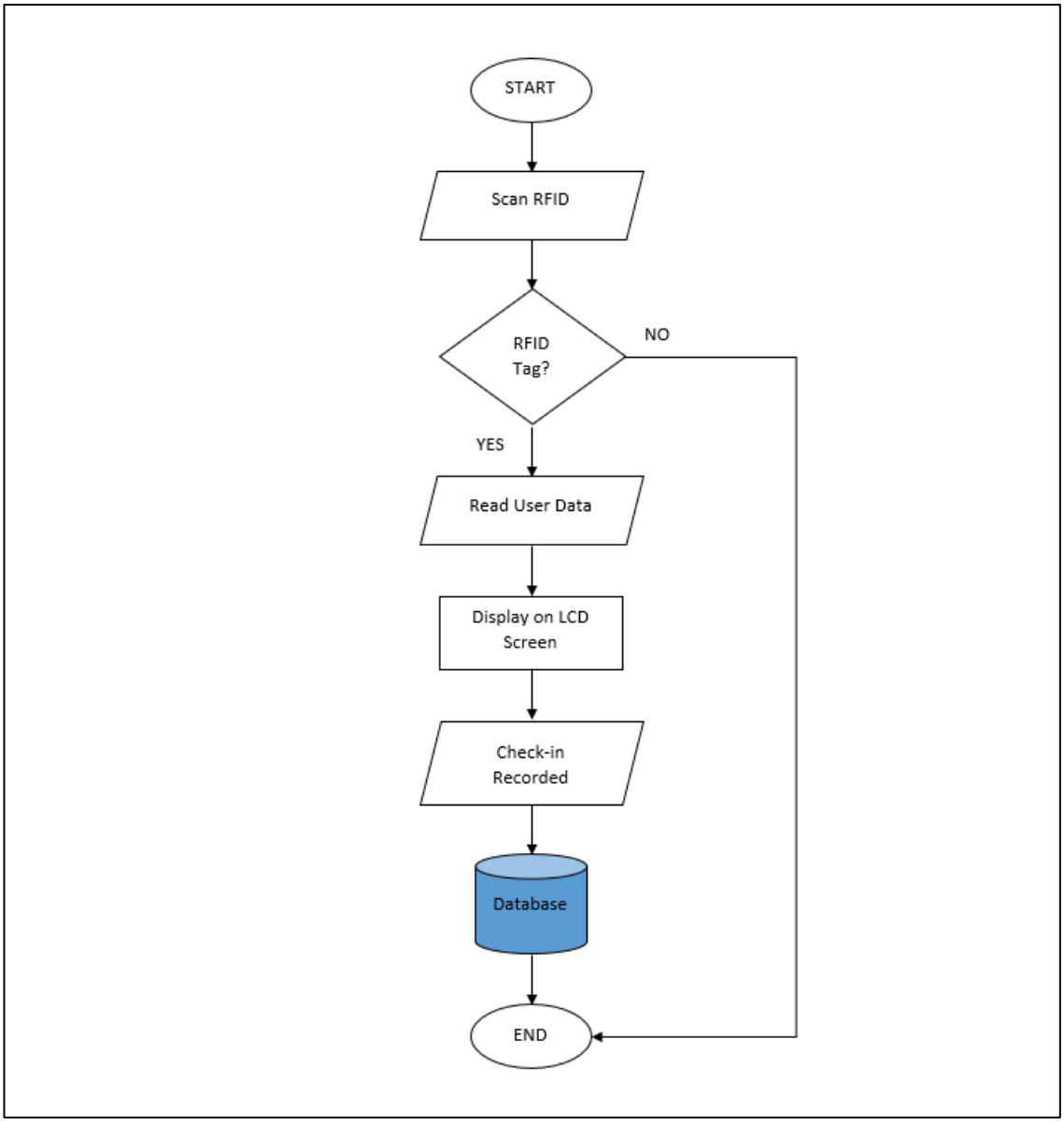

Figure 17: Check-in Flowchart

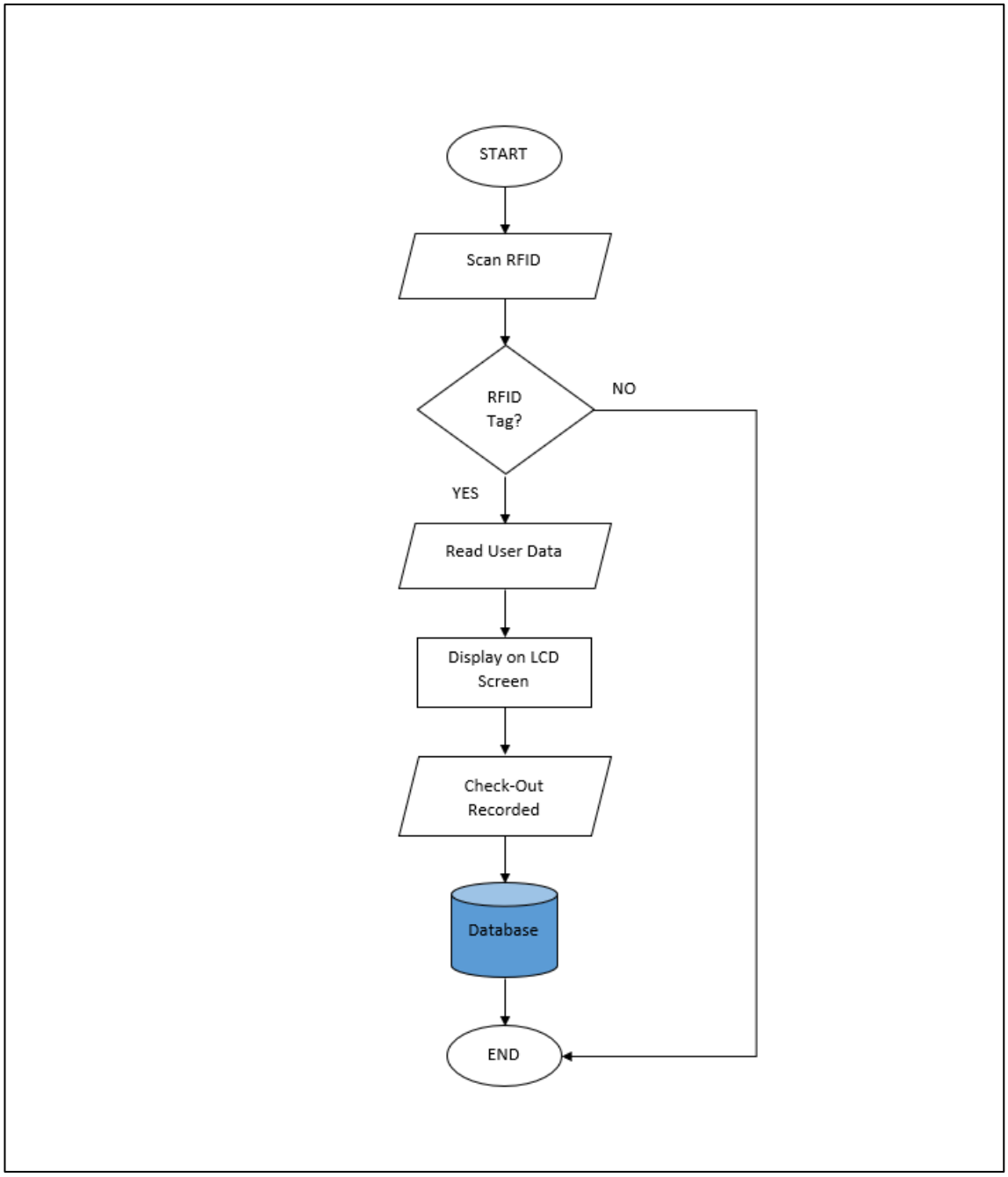

Figure 18: Check-out Flowchart

4.2.3 Activity Diagram

In the Unified Modelling Language (UML), the Activity diagram is one of the Behavioural diagrams that may be used to express a process or algorithm as a series of phases. It is broken down into three sections: user, database, and RFID system as shown in Figure 19.

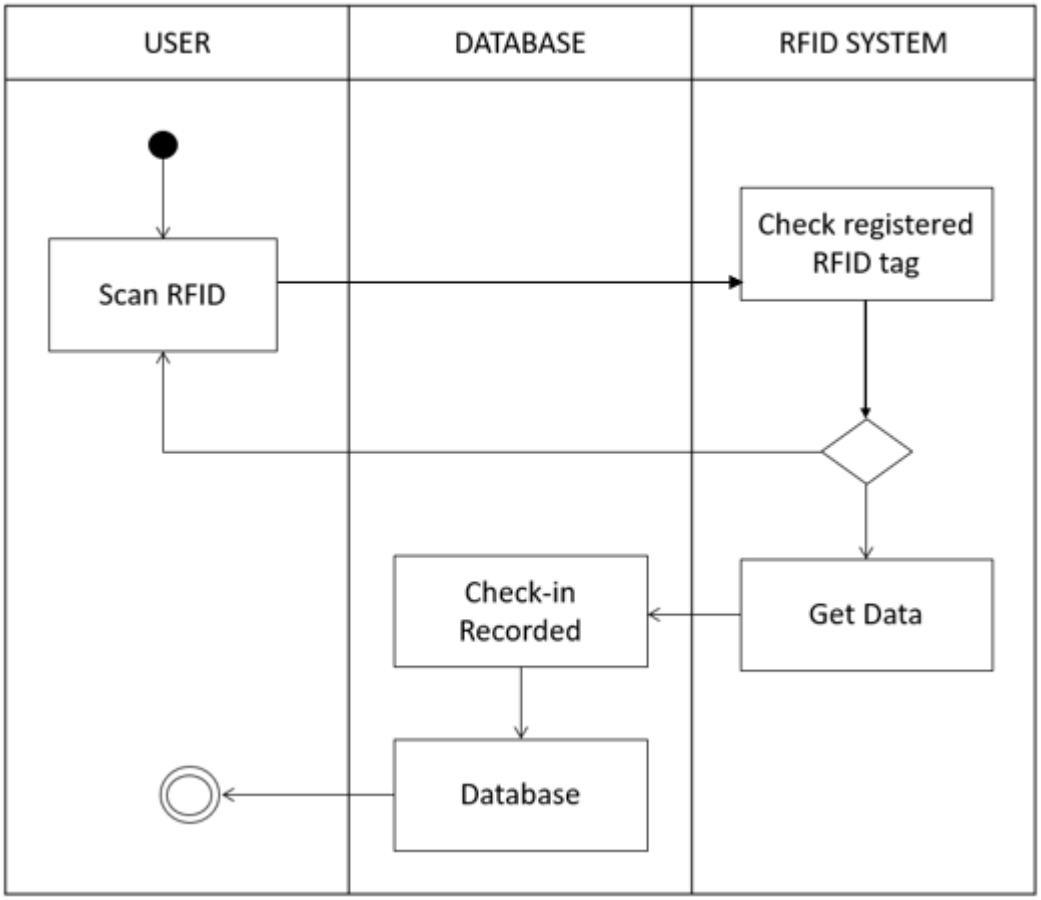

Figure 19: Activity Diagram

CHAPTER 5

CONCLUSION AND RECOMMENDATION

To sum up, as a desired objective of the project, it is intended to develop a new feature that will benefit not just the MOH community, but also Malaysian citizens in general. Users will have no problems accessing through places or buildings that have been designed to be user-friendly. The problem statement where the lack of automated check-in and check-out systems in existing MySejahtera apps negatively impacts user experience and time spent in long queues, especially during pick hour and hot spot regions will be solved by implementing the IoT feature, RFID reader and RFID Tag. The most reliable method for developing this project has also been discovered, which is the design thinking method, which allows us to better understand the users, challenge assumptions, reframe difficulties, and build and test creative solutions to the problems they face.

Additional research based on this project will be conducted in the future, as well as testing and consistently improving the system's performance to make it more durable, secure, and functionally rich. Moreover, the data that is delivered to the database could be improvised by implementing the time stamp and location of that premises. In addition, since the testing result meet the objective in smoothing the process of people to move about and the functionality check-in and check-out process using RFID, this concept could be implemented in the MySejahtera apps in the future. This is for further improving the user experience while using the apps particularly during the check-in process. There is still a lot of research to be done in the future to create new technologies to improve the effectiveness and viability of such systems. This prototype is the first step on the road to commercialization.

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