



## **SMART TROLLEY WITH BARCODE SCANNER VIA APP**

by

**NURZAFIRAH HANIS BINTI MOHD ASMADI**  
(08DEU20F2010)

### **FINAL YEAR PROJECT REPORT**

Dissertation submitted to the Electrical Medical Engineering in

partical fulfilment of the requirements for the

Diploma

(Electrical Medical Engineering)

NOVEMBER 2022

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**CERTIFICATION OF APPROVAL**

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Approved by,

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Encik Khairol Napisham bin Abdul Razak

Project Supervisor

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SHAH ALAM, SELANGOR

## 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 references and acknowledgements, and that the original work contained herein have not been undertaken.

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NURZAFIRAH HANIS BINTI MOHD ASMADI

(08DEU20F2010)

## ABSTRACT

Trolley is a device used for carrying loads or things from one point to the other point easily. For different types of application, various types of trollies are available in the market. In other words, trolley can be called as shopping cart too. It is also depending upon the specific use the one will select the trolley, but it is limited to do specific work or things. To overcome this problem, a new trolley was designed which could be used for another purpose. There are various types of trolley available in the market like at the airport, shopping malls, industries, hospital, etc. To carry light or heavy loads. Specifically for the trolley that usually used in the supermarket, it is only have one purpose which is to carry a items or a things that we want before we check out them at the cashier. This trolley will be design with a sensor for scanning the barcode of the item. It will make our live easier. One more advantageous feature added to the design is it will be connected with the application which can be much easier for the user to see the item that they choose and put it into the trolley. They also can easily remove or delete the item from the trolley if they dont want them and it can also deduct and add the total price of the items.

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# CHAPTER 1 INTRODUCTION

## 1.1. Background of Study

- A shopping cart is a cart supplied by a shop, especially supermarkets, for use by customers inside the shop for transport of goods to the checkout counter during the shopping. Customers can then also use the cart to transport the goods they buy. The most places in Malaysia, the customer is allowed to exit the cart in determining the area in the car park, and store personnel will deliver the cart to a warehousing area.
- In addition, it can also facilitate the company or the supermarket to identify the goods or products in short supply. It will make it easier going for the company to order goods or the new product so that it remains constantly available. Therefore, it will facilitate dealings between the dealer and the supplier. This research is to report from the market survey on a smart trolley with barcode scanner implementation among users in Supermarket in Malaysia.
- Smart trolley with barcode scanner is innovative projects that have been practiced in developed nations like USA. This trolley is believed to facilitate customers to find goods or product faster, to know how much the price of goods or to control budget while shopping. If customer wants to buy something in a mall, customers should take certain items from display rack and line up for payment. Problems would arise when the size of the shopping center is relatively large and sometimes customers do not know where certain items are placed.
- In addition, customers also need to queue for a long time to wait in line at the cashier to pay. This will be the hardest hit during the season or if the sale of the shopping centers still use conventional methods to include the price of each item by hand to the cash register. On the other hand, customers often have to worry about a lot of things when go to the mall. For example, most customers would be worried that the carrying amount may not be enough to pay for purchasing items. Therefore, customers with smart trolley will be able to overcome these difficulties experienced by customers in the supermarkets. In addition, this technology is also beneficial to the companies and suppliers to check their stock management.

## 1.2. Problem Statement

- The main issue that usually happened in this world is we need to face a very long queues and wait for a long time during the checkout session at the cashiers especially when we are in the big supermarket. This is due the number of people who went to the supermarket every single day are extremely huge. We can clearly see in our country where the supermarket are relentlessly being crowded by a lot of people everyday and this number keep increase especially during payday or festive seasons like Hari Raya and Tahun Baru Cina. This make it been very troublesome to a lot of people especially to the elderly parents who have a health issues or the parents which need to bring their toddler everywhere with them.



### **1.3. Research Objective**

- To make a trolley with a barcode scanner
- Make an automatic sensor which scan the product that put into the trolley
- The product description ( name, weight, price, quantity, ingredients, etc) will be appear on the user smartphone
- The total or amount of the item will automatically count and deduct when the item removed
- Can be connect automatically to the cashier if user want to pay cash or can be pay online

### **1.4 Scope of Research**

- To make the user checkout session faster without any long queues
- Only valid if the supermarket registered with relevent party and be used especially in supermarket
- The descption of the item will be display on a screen via application
- Using a barcode sensor and application
- Make sure the payment system bring much easier for customers

### **1.5 Summary**

In this chapter we need to make an introduction of our project. This chapter includes the introduction of the project itself and a problem statement, research objective and scope research.

## CHAPTER 2 LITERATURE REVIEW

### 2.1 Introduction

In chapter two, the literature review was mentioned as a discussion of journals and facts which are carried out by researchers. The research's conclusion will therefore be to identify the problem statement and objective. The development of a project is mostly based on journal articles and evaluations of research that take into account theoretical and real-world data. It may also inspire the creation of a brand-new project or the enhancement of an already existing one.

Nowadays they have made a system model which supports easy shopping. This model is attached to the trolley for easy viewing. It consists the barcode scanner which is used to scan each product and total the bill itself. The product name and its price will get displayed on phone's screen.

### 2.2 Study by previous research

#### 2.2.1 Existing system

##### Barcode scanner

In the existing system, they have used the traditional method of barcode scanning. Using the Figure below barcode scanner we need to scan each product and so this method becomes very slow to be scanned. A barcode reader is associated in electronic device for reading with the barcodes. In this process we have no automatic billing system and the customer has to wait for the billing process in the long queues. Therefore, using the barcode process billing method is slow. This eventually results in the long queues. To avoid the process, we introduced types of technology based billing system. User can pay the amount through credit/debit cards or by cash. But it is the time consumption process for the billing purpose. So, the waiting time to pay the bill is increased.



**Figure 1 Barcode Scanner**

While the customer keeps the product in the smart trolley, the Radio frequency ID reader automatically senses the product by scanning the tag. And its corresponding electronic product code number is generated automatically. This electronic product code provides the information of the product its name and price.

- **Smart Shopping Cart**

In this paper they have made a system model which supports easy shopping. This model is attached to the trolley for easy viewing. It consists of RFID reader which is used to scan each product which has the RFID tag in it. The billing is done in smart trolley itself. The product name and its price will get displayed on LCD screen.

- **RFID Based shopping Trolley for Supermarket**

In this paper it consists of RFID and Arduino. Here the number of product and the product weight will be displayed, along with the price details. If it does not match with the database then buzzer will beep

- **Smart Cart with Automatic Billing**

In this the innovate system which supports smart billing trolley. In that they are representing the system with the additional functionality, which will calculate and update the customer bill. The product and the price will be displayed in the LCD screen. They can directly go the billing desk and pay the amount.

- **Smart cart using automatic billing, product information, product recommendation using RFID**

At the billing desk, the bill which is displayed on the screen will be transferred to the systems memory. This is possible by the module which is present inside the RFID, which transfers the bill wirelessly. The disadvantages of this system model is that once after displaying the total number of products and price, we have to enter a key. And after that no addition or deletion of product will happen.

- **Smart shopping cart with automatic billing system through RFID and transmitter and receiver**

In malls, there can be a big rush on holidays, weekends especially during on special offers and discount. Due to purchasing in the shopping mall, now-a-days customer prefer the online shopping to get the required items like Amazon, Flipkart and Snapdeal etc. so to solve this problem this paper proposed the virtual cart, using which one can overcome the complications of online and offline shopping by ensuring a better experience.

## CHAPTER 3 METHODOLOGY/ PROJECT WORK

### 3.1. Introduction

In methodology, the first step was to do the feasibility study which is intending to be a preliminary review of the facts to see if it is worthy of proceeding to the analysis phase. It is because the feasibility analysis is the primary tool for recommending whether to proceed to the next phase or to discontinue the project. The aims of the smart shopping cart are:

- i. User friendly
- ii. Easy to used
- iii. Make everything faster

### 3.2 Project design and overview

This project consist two main part which is hardware and software. Its includes the Arduino uno (microcontroller), Bluetooth module, LCD Display and the Barcode scanner itself.

### 3.2 Block Diagram

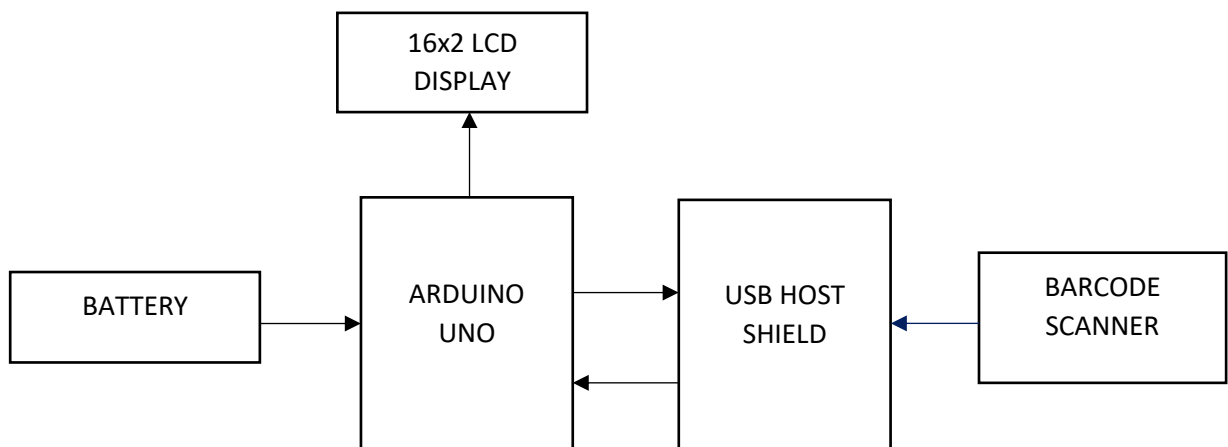
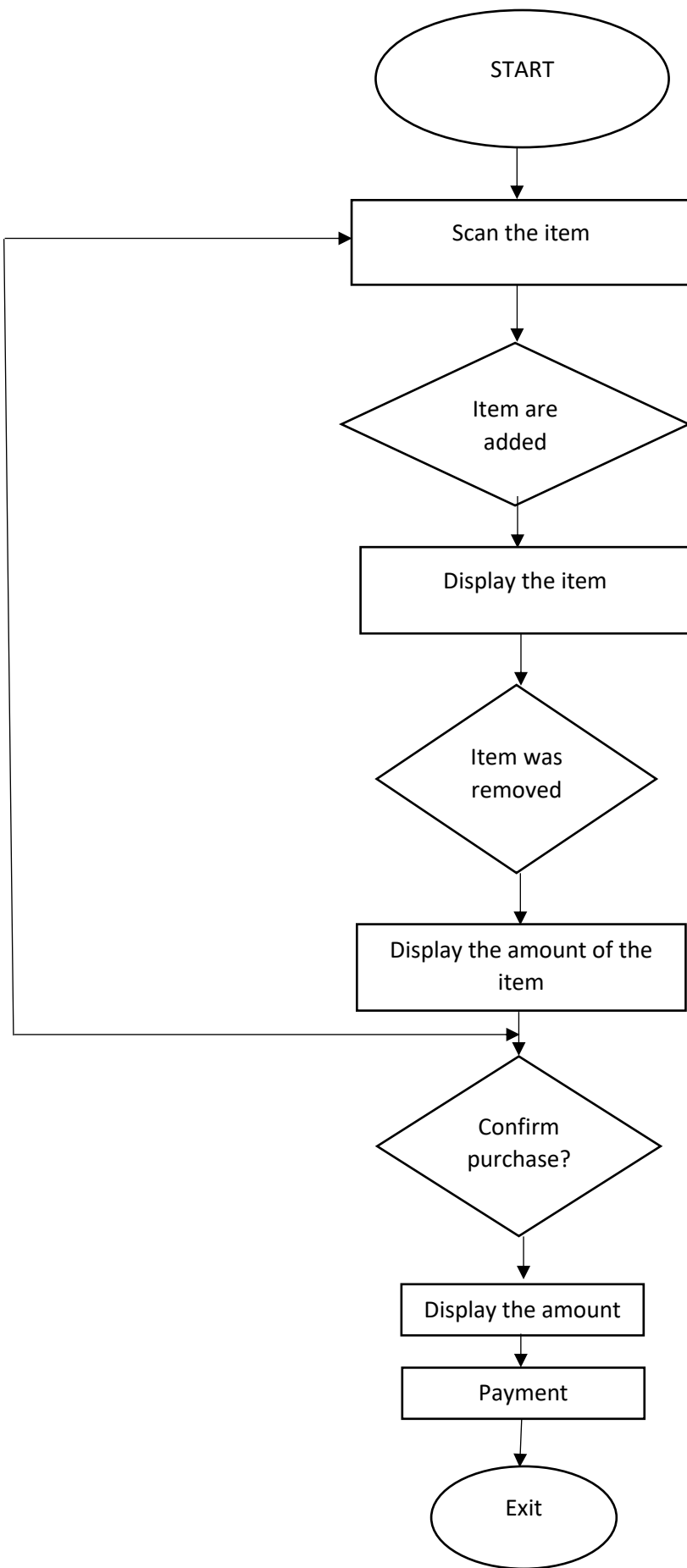


Figure 2 Block Diagram

### 3.3 Flowchart

#### Flowchat of the Application

Figure shows that the research flowchart process.



**Figure 3 Flowchart of this project**

### 3.4 Project description

When the customer want to keeps the product in the smart trolley, they need to scanning the barcode to know about the item. And its corresponding electronic product code number is generated automatically. To store the item price and total billing data, microcontroller memory is used LCD display and the application on the smartphones.

Fot the circuit of this Smart Trolley With Barcode Scanner via Application, we are using an Arduino uno as the main component for tis product. We are putting a codes to make sure the barcde scanner can be read and the Bluetooth module can be connect well with smartphone. At the same time, the LCD display added to have another display about the item that scanned.

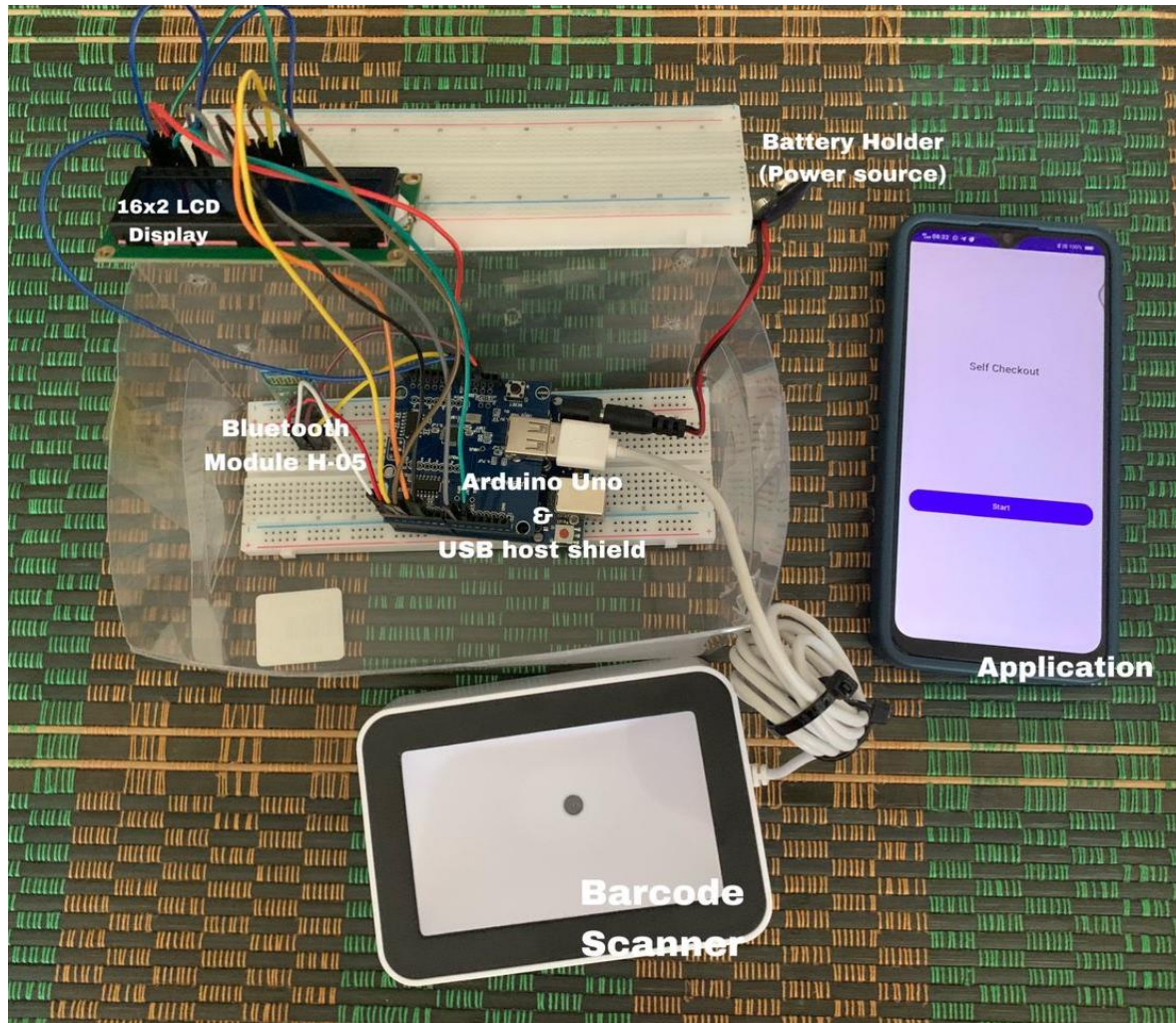
The flowchart about Smart Trolley With Barcode Scanner via Application is using a Bluetooth module that can be connect with smartphone so that the barcode number of the itam will be appears on use smartphones. In the flowchart that drawn in this precious pages, we can see the item also can be remove if we don't want the item anymore. Its is also have a payment method that can be easier for the user to make a payment without queuing in the cashier.

Overall, Smart trolleys with barcode scanner allow solving checkout problems for the customers. After scanning via barcode scanner, shoppers can select to complete the payment without queuing at the checkout counter. It is an easy method for everyone because nowadays everyone are use to using smartphone every single day.

### 3.5 Project Hardware

Arduino uno is the main component the used in this project. As mentioned, Arduino uno is use as a microcontroller that controls the project. Other than that, barcode scanner also is main product tgat highlight this product.. LCD display also use in this product as another screen for user to see the items that they scanned using the barcode. Bluettoth module also the component that use in this product to connect the barcode with the application.

### 3.5.1 Mechanical Design/Product Layout



**Figure 4 Mechanical Design/Product Layout**

### 3.5.2 Description of the main component

The following components are selected, after studied and analyzed the literatures and references as mention in previous chapter (Chapter 2).

#### 3.5.2.1 Arduino UNO

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc and initially released in 2010. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.



**Figure 5 Arduino UNO**

### **3.5.2.2 LCD Display**

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols.



**Figure 6 LED Display**

### **3.5.2.3 Barcode Scanner Module**

A barcode scanner scans digitally convert printed barcodes. It then decodes the data and sends the data to a computer. It consists of a lens, a source of light, and a light sensor that can translate optical impulses into electrical signals.





**Figure 7 Barcode Scanner Module**

#### **3.5.2.4 Bluetooth Module**

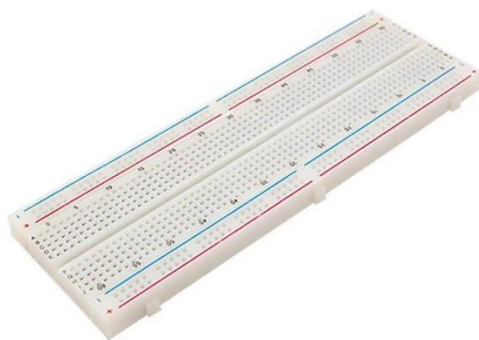
The Bluetooth module HC05 is a MASTER/SLAVE Module. By default the factory setting is SLAVE. The role of module can be configured only by at commands. The SLAVE module cannot initiate a connection to another Bluetooth device but can accept connections. MASTER module can initiate a connection to other device. The user can use it simply for a serial port replacement to establish connection between MCU and GPS, PC to our embedded projects.



**Figure 8 Bluetooth Module HC05**

#### **3.5.2.5 Breadboard**

A breadboard, solderless breadboard, or proto-board is a construction base used to build semi-permanent prototypes of electronic circuits. Unlike a perfboard or stripboard, breadboards do not require soldering or destruction of tracks and are hence reusable.



**Figure 9 Breadboard**

### **3.5.2.5 Connector (Wire)**

A jumper is a tiny metal connector that is used to close or open part of an electrical circuit. It may be used as an alternative to a dual in-line package (DIP) switch. A jumper has two or more connecting points, which regulate an electrical circuit board.



**Figure 10 Jumper Connector Wire**

### 3.6 Project software

A software project is the entire software development process, from gathering requirements to testing and maintenance, carried out in accordance with the execution in a given time frame to produce the desired software product. In order to make this project feasible for usage in daily life, I run it using the Arduino IDE programme.

#### 1) ARDUINO IDE



Figure 11 ARDUINO IDE Software

A cross-platform programme called Arduino was created using C and C++ functions. I used this software to create and upload programmes to boards that are compatible with Arduino as well as other vendor development boards that employ outside cores.

The progress of project is divided into 4 levels as shown in the following:

- i. 1<sup>st</sup> level (FYP 1)
  - Research and development for the project.
  - Gathering of informative source about the topic from multiple sources, such as books, journals, internet and also magazines.
  - Analysis about the project and at the same time search for solutions for this project.
  - Held meetings with supervisor to get the guidelines so the project could be implemented according to the planning.
- ii. 2<sup>nd</sup> level (FYP 1)
  - Finalization of the proposal.
  - Held discussions with supervisor about the materials preparations (Preparation of material list) to obtain the needed material.
  - Understanding about the hardware development.

### 3.7 Summary

In this chapter, we are doing a research methodology to find a way and make sure the project work well. We need to list out and understand the description of the component that may be used in this project. Also make a block

diagram and flow chart and the project circuit. In this chapter also show the type of software we use to make sure our report are complete.

## **CHAPTER 4 RESULT**

### **4.1 Introduction**

In my project, I already shown and explain the supervisor about how this product work during the presentation day. In this chapter, it is about the technical information of the project and the result will be discussed.

### **4.2 Result and Analysis**

The project is not finished according to the intended concept design over the course of the allotted project time frame. This is a result of the Bluetooth connection with smartphone issue. The Bluetooth and smartphone connection turns out to be unable to connect to read the barcode and display it on the smartphone's LCD screen. A malfunctioning bluetooth module may be to blame for the barcode scanner's inability to read the barcode correctly, which could lead to an LCD display and display on the smartphone.

### **4.3 Discussion**

Based on the result, it will have to improve more appropriate innovative and sustainable of this Smart Trolley With Barcode Scanner via Application. It may cause the equipment that not working. Although the project are not working as well as I wanted, the connection of the project are done very well. A code has been tested and all the connecion part are work as well. The application of this projrct also work very well. This provides assurance that the project can be implemented. Unfortunately, the LCD are not display because of the components issue.

### **4.4 Summary**

In this chapter, I discovered that related testing has been carried out in stages to obtain the appropriate results to simplify operation and software. Additionally, testing has been done on all crucial project components. To enable the software to be installed into the Arduino Uno microcontroller circuit, tests are run on the circuit. The project operation test is the last and most crucial test. Testing is done on how this project operates in order to produce good outcomes.

## CHAPTER 5 CONCLUSION

### 5.1 Introduction

The main objective of this Smart Trolley With Barcode Scanner via Application is to design a circuit of the project wireless using a Bluetooth module HC-05 and Arduino uno for the barcode reader in display LCD. This system can be a useful smart trolley in a supermarket. The implementation cost of this product is relatively low because the components used are relatively cheap and available in the market. The main product, Arduino uno is also the microcontroller that is used as an example.

### 5.2 Conclusion

The prototype model was successful in achieving its goals. The created model is simple to use, inexpensive, and doesn't require any specialised training. This project report examines and makes use of barcode technology, which is used to identify products. In order to help consumers save time, energy, and money while shopping in malls, we have also learnt about the architecture of the system that can be employed in such systems. There are a few issues/problems that can be fixed to strengthen the suggested system. This problem needs to be fixed notably with regard to billing in order to promote contactless payment to browse offers, bargains, and the ability to make payments inside the cart by using a different payment method, which may be utilised to advance the cart and improve the user experience.

### 5.3 Suggestion for future works

The proposed measures are meant to add what is missing. Some recommendations for this project's efforts. The lithium battery is one of them. Since they are made to last longer, they are an excellent option for high-tech, smart devices, and other electronics where changing the battery is inconvenient. Extremely low temperatures are no match for lithium. Lithium is perfect for outdoor applications since it can function properly at extremely cold temperatures.

The performance and accuracy of this system can be increased by adding a camera that records the item being scanned while also performing image detection. This allows the system to discriminate between the item being scanned and the item in the cart. Additionally, this system can be upgraded to identify heavier things or goods in a mall using a 50kg weight cell.

# CHAPTER 6 PROJECT MANAGEMENT AND COSTING

## 6.1 Introduction

The gantt chart explaining the progress of the project and the selection of hardware and software used for this project. The gantt chart also used as a guideline of this two semester of project management.

## 6.2 Gantt Chart

### PROJECT 1

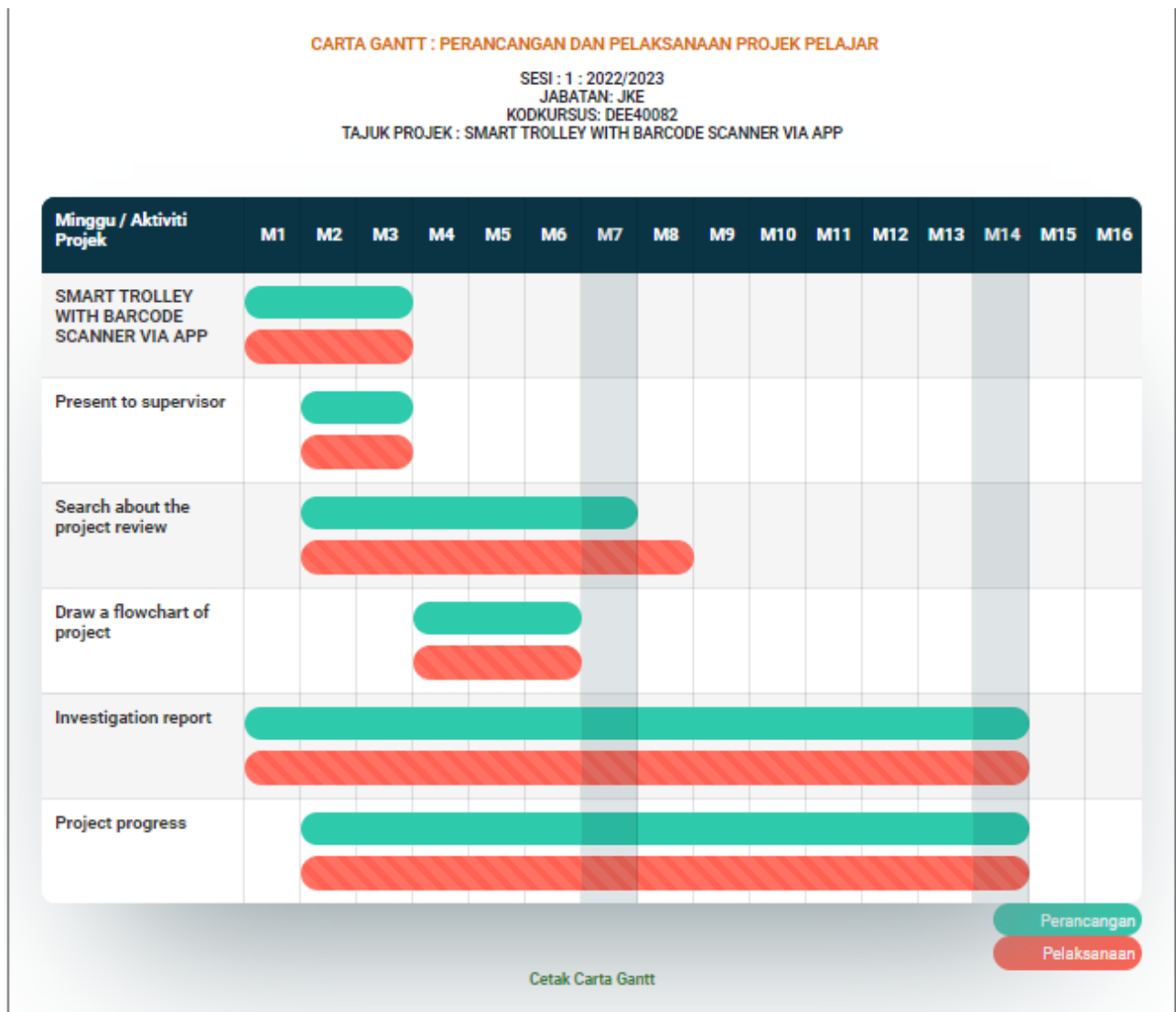


Figure 12 Gantt Chart Project 1

# PROJECT 2

0000 / 2 / 0000/0000  
 JABBARAH JABR  
 KOCORABAH 00000100  
 TASK: PROBLEK - SMART TROLLEY WITH BARCODE SCANNER VIA APPLICATION

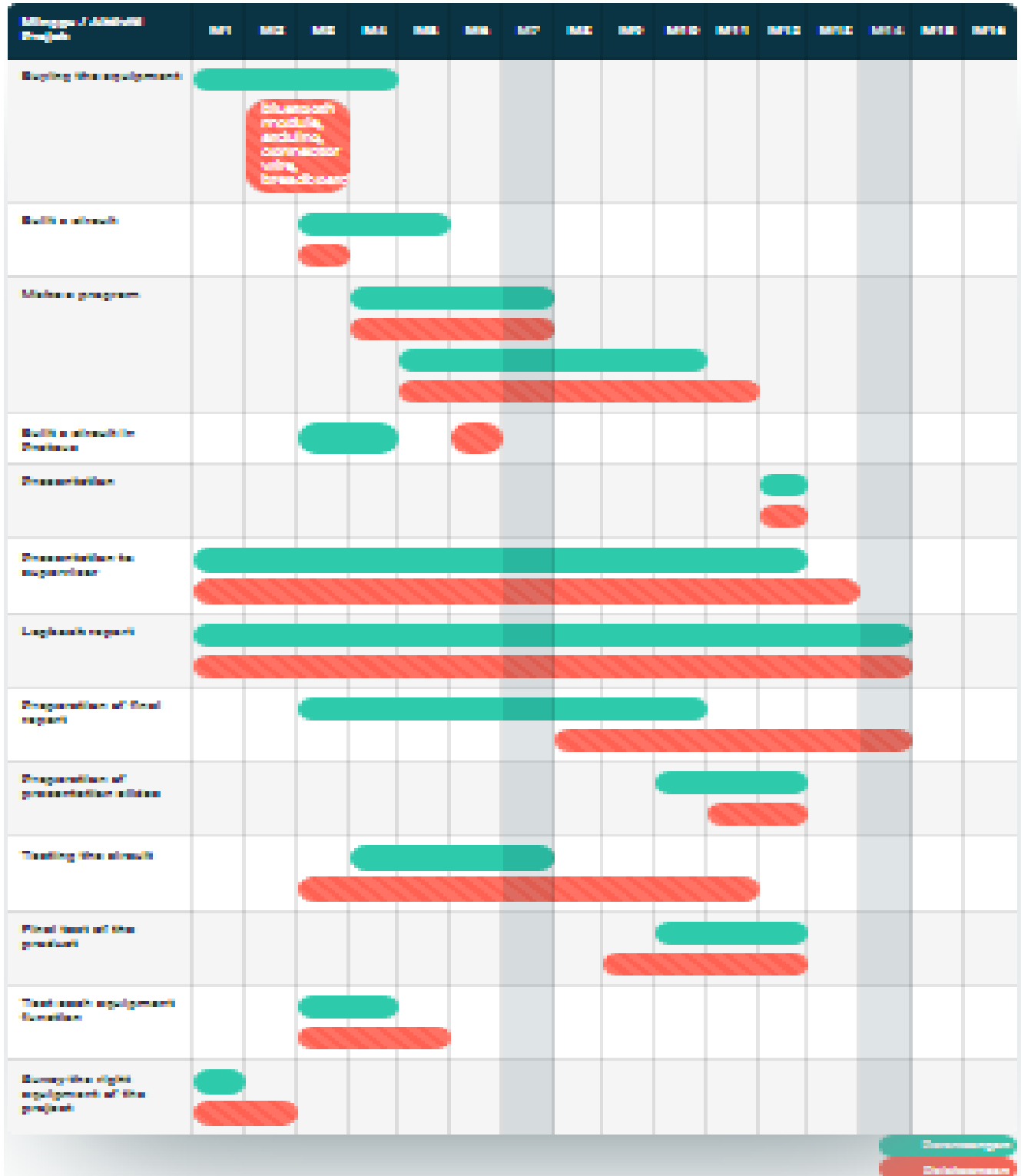


Figure 13 Gantt Chart Project 2

### 6.3 Cost and Budgeting

No.	Component and materials	The unit price	Quantity	Total
1	Arduino UNO	RM42.90	1	RM42.90
2	Shopping Cart/ Trolley	RM96	1	RM96
3	Connector wire	RM3.70	2	RM7.40
4	Barcode scanner module	RM100	1	RM100
5	LCD display	RM14.90	1	RM14.90
6	Bluetooth module	RM13.90	1	RM13.90
7	Breadboard	RM3.90	2	RM7.80
8				
9	Others	RM34	1	RM34
			<b>Total :</b>	<b>RM306.90</b>
	<b>List of other costing</b>			
1	Transportation	-	-	-
2	Postage	RM31.10	-	RM31.10
3	Craft Work	-	-	-
4	Internet			
5	Application			
			<b>Total :</b>	<b>RM31.10</b>
			<b>Overall total</b>	<b>RM338</b>

**Table 1: List of Components and Materials**



## 6.6 Summary

I have outlined the Gantt chart and the project's operations in Chapter 6. The cost and budget that I have suggested for the project development processes is the last item. The main parts of this chapter are the explanation of how the finished system works, the project planning (Gantt Chart) that was established from the start of the project, and the budget costing that was established during the project development.

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