

**SMART CART: A Smart Way of Shopping**

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## **APPROVAL**

This Project titled “**Smart Cart: A Smart Way of Shopping**”, submitted by Md. Yeakub Hossain Munna and Md. Shourov Sarkar and Md. Ahsan Habib to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 05<sup>th</sup> December, 2020.

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## DECLARATION

We hereby declare that, this project titled “**Smart Cart: A Smart Way of Shopping**” has been done by us under the supervision of **Amit Chakraborty Chhoton, Lecturer, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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## **ABSTRACT**

Day by day world is getting too much busy. Every day we have done a lot of things by respecting time. Regular 86,400 seconds are saving into our life account. If we better understand the time, at that point it can pick up experience and creative abilities over the long run. Every second are so much more powerful than money because you can always make more money, you can't always make more time. To understand the value of 1 week, ask a mother who lost their youngster in the most recent week. To understand the value of 1 hour, ask a student who came late to the examination hall. To understand the value of 1 second, ask an individual who has saved from an accident. To understand the value of 1 millisecond, ask an individual who came second at the Olympics. For our daily needs, we are going to the super mall. Many times after taking the necessary things, we have to stand in line to pay the bill at the counter. It kills our valuable time. That's why we make an amazing system that will save us from a waste of time. This paper proposes how to reduce time by using our system. Our system will reduce the workload of people who sit at the counter. The main objective of this project is "Reduce Unwanted Wasting of Time". So we can say using our system will save our Time and shopping will become easier and comfortable.

# TABLE OF CONTENTS

<b>CONTENTS</b>	<b>PAGE</b>
Board of examiners	ii
Declaration	iii
Acknowledgements	iv
Abstract	v
<b>CHAPTER</b>	
<b>CHAPTER 01: INTRODUCTION</b>	<b>1-2</b>
1.1 Introduction Board of examiners	1
1.2 Motivation Declaration	1
1.3 Objective Acknowledgements	2
1.4 Drawbacks	2
1.5 Expected Outcome	2
<b>CHAPTER 02: PROBLEM STATEMENT</b>	<b>3-4</b>
2.1 Problem Definition	3
2.2 Finding Solution	3
2.3 Related Works	4
2.4 Challenges	4

<b>CHAPTER 03: METHODOLOGY</b>	<b>5</b>
3.1 Methodology	5
<b>CHAPTER 04: HARDWARE REQUIREMENTS</b>	<b>6-10</b>
4.1 Used Hardware in project	6
4.1.1 Arduino UNO	6
4.1.1 Arduino UNO USB Host Shield	7
4.1.3 I2C Module	7
4.1.4 nRF24L01 Wireless Module with Antenna	8
4.1.5 nRF24L01 Base Module	8
4.1.6 16*2 Display	9
4.1.7 Jumper Wire	9
4.1.8 Barcode Scanner	10
<b>CHAPTER 05: MODEL OF THE PROJECT</b>	<b>11-14</b>
5.1 Spiral Model	11
5.1.1 Identification	12
5.1.2 Design	12
5.1.3 Builds	12
5.1.4 Risk Analysis and Evaluation	12
5.1.5 What type of project are we	13
5.1.6 Why Spiral Model for our project	13

5.1.7 Advantages of this model	13
5.1.8 Disadvantage	13
5.1.9 Why Other Model is not Adjustable for us	14
5.2 Waterfall Model	14
5.3 Agile Model	14
5.4 V-Model	14
5.5 Iterative Model	14
<b>CHAPTER 06: SYSTEM IMPLEMENTATION</b>	<b>15-18</b>
6.1 Project Functionality	15
6.2 System Implementation	15
6.2.1 Arduino UNO & Arduino Host shield	15
6.2.1 Arduino Host Shield & Barcode	16
6.2.1 Arduino Host Shield & I2C Module	16
6.2.1 I2C Module & Display	17
6.2.1 Arduino UNO & nRF24L01 & nRF24L01 Base	17
6.2.1 Power Supply	18
<b>CHAPTER 07: DESIGN REQUIRMENT</b>	<b>19-20</b>
7.1 Activity Diagram	19
7.2 Use Case Diagram	20
<b>CHAPTER 08: CONCLUSION &amp; FUTURE SCOPE</b>	<b>21</b>
8.1 Conclusion	21
8.2 Future Scope	21



## REFERENCES

22

## LIST OF FIGURES

<b>FIGURES</b>	<b>PAGE NO</b>
Figure 4.1.1: Arduinio UNO	<b>6</b>
Figure 4.1.2: Arduinio UNO USB Shield	<b>7</b>
Figure 4.1.3: I2C Module	<b>7</b>
Figure 4.1.4: nRF24L01 Wireless Module with Antenna	<b>8</b>
Figure 4.1.5: nRF24L01 Base Module	<b>8</b>
Figure 4.1.6: 16*2 Display	<b>9</b>
Figure 4.1.7: Jumper wire	<b>9</b>
Figure 4.1.8: Barcode Scanner	<b>10</b>
Figure 5.1: Spiral Model	<b>11</b>
Figure 6.2.1: Arduino UNO & Arduino Host Shield	<b>15</b>
Figure 6.2.2: Arduino Host Shield & Barcode Scanner	<b>16</b>
Figure 6.2.3: Arduino Host Shield & I2C Module	<b>16</b>
Figure 6.2.4: I2C Module & Display	<b>17</b>
Figure 6.2.5: Arduino & nRF24L01 & nRF24L01 Base	<b>17</b>
Figure 6.2.6: Implementation of power supply	<b>18</b>
Figure 7.1: Activity Diagram	<b>19</b>
Figure 7.2: Use Case Diagram	<b>20</b>

# CHAPTER 01

## INTRODUCTION

### 1.1 Introduction

Last year I went to the shopping mall and after shopping, I faced huge trouble that is type pay my shopping bill. In that time I realized that most of the people faced the same case of hurry cause it was EID special time where a corporate or busy person can't give a huge time .That's why they need instant, but in super shop or shopping mall good at eve side without one that is bill paying, so it should solve for everyone as well as myself. Then I searched at Google that how I can remove this hassle and generate the idea that only a smart cart can solve this problem.

### 1.2 Motivation

For shopping people generally go to super shop, take a cart, and fill it with products. Then goes to the counter to pay the bill. And when it became a popular shop it just a huge line to pay the bill. To remove this hassle we developed a “Smart Cart: A Smart Way of Shopping” that helps people to save time. As it kills a huge time, we feel that we should take an approach to solve the problem with a friendly environment. Where people take a product with bar code scanning and at the end the monitor which will be attached with the cart show the total value of the product and item number. It is a simple & important way to reduce the time. When we finally come to the front of the counter, they will pack the list and accept the money. So it is the best way to save time.

### **1.3 Objective**

Here some objectives of the project:

- ❖ Customer can save their time.
- ❖ Fastest shopping
- ❖ System updated
- ❖ Reduced labor cost
- ❖ Possibility to earn more in the festival time.

### **1.4 Drawbacks**

- ❖ Customer cannot pay their bill by credit/debit card.
- ❖ Take extra time for scanning the ADD barcode.
- ❖ Packing recheck from counter

### **1.5 Expected Outcome**

- ❖ Any customer can use this cart
- ❖ Time consuming
- ❖ User friendly and comfortable
- ❖ Cost reduce for owner

## **CHAPTER 02**

### **PROBLEM STATEMENT**

#### **2.2 Problem Definition**

A problem means an issue or situation viewed as unwanted or harmful and waiting to be managed and survived. For every system, there is a good aspect and also a bad aspect. So our Smart Cart system has some bad aspect like – it make easy to shopping but is less secure. It has scanning system but it is manual; Take an extra time for scanning the ADD barcode. It only makes the select item list; Since the system has electronic devices, so it can create an unwanted problem.

#### **2.2 Finding Solution**

Every problem has a solution. Regarding the existing systems, it will be very good idea to develop such system that will improve the security system for better performance, Here we have to scan one by one by using hand scanner .We have to convert it with auto scanner, By adding item we have to scan a barcode which name is “ADD” barcode .here we have to update our system to make it automatic. Here it display only select item list have to upgrade system for make it hard copy. Sometimes electronic devices create unwanted problem it’s natural but we have to maintain its quality and have to check after some days.

### **2.3 Related Works**

Usually, every super mall or Super shop has its Cart. But those are not updated. They are the same one that is available in the market. It can't help any customer by giving selecting an item list. For doing unique project we research many paper such as

[2] Supermarket Shopping System using RFID as the IoT Application . [5] Automation of Shopping Carts using Technology. [7] IoT-Based Smart Shopping Cart Using Radio Frequency Identification . On those papers they only work on one item but we have put them all together.

### **2.4 Challenges**

- ❖ Update security system which is a bit costly than a normal security system.
- ❖ Have to convert scanner Manual to Automatic
- ❖ Have to careful about Electronic device.
- ❖ Have to convert soft copy list to hard copy list.

## **CHAPTER 03**

### **METHODOLOGY**

#### **3.1 Methodology**

This project has been developed for Time-saving. Whenever we go to any super shop/mall, we can see the line to pay the bill especially when it is a holiday or any festival time. On that behalf, we make a Smart Cart system that will work step by step to save our valuable time. At first, Libraries included to use services like USB, hid, LCD. These will help the project to use the external components. Then assigned the required pins of arguing for the I2C circuit to use the LCD screen, initialized the variables to keep the data. And calculate the ending result. We use a barcode scanner for scanning and get desired data converted to ASCII which was later.

By using this step we can maintain our Smart Cart friendly.

## CHAPTER 04

### Hardware Requirements

#### 4.1 Used Hardware in project

- ❖ Arduino UNO
- ❖ Arduino UNO USB Host Shield
- ❖ I2C Module
- ❖ nRF24L01 Wireless Module with Antenna
- ❖ nRF24L01 Base Module
- ❖ 16\*2 LCD Display
- ❖ Jumper wire
- ❖ Barcode Scanner

#### 4.1.1 Arduino UNO

Arduino UNO is an open-source platform where anyone can build their framework that can control both the physical and digital world. It is designed with 14 digital pins included an input-output pin. Actually, it is a microcontroller board.it programmed by Arduino IDE software. In two ways It can be powered, one is USE another one is an external power supply.it has only 32kb memory additionally 2kb of SRAM and 1 KB of EEPROM. It communicates with a computer or another Arduino board or any kind of microcontroller. It provides a reset button also.



Figure 4.1.1: Arduino UNO



### 4.1.2 Arduino UNO USB Host Shield

Arduino USB Host Shield use to connect with a USB device to connect the Arduino board. It is also capable to connect Tinker Kit. This shield contains digital logic and a circuit to establish a full-speed host controller. It has also 14 digital pins.



Figure 4.1.2: Arduino UNO USB Shield

### 4.1.3 I2C Module

Inter-Integrated Circuit (I2c or IIC) allows multiple integrated digital circuits that use one or more chips of the controller. It are a serial and synchronous communication protocol.

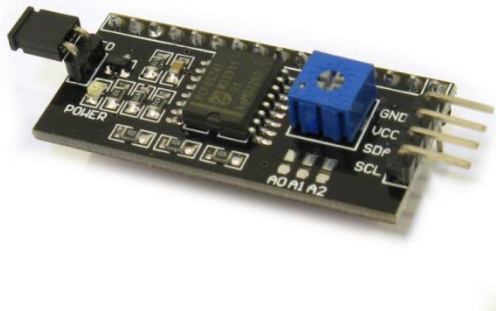


Figure 4.1.3: I2C Module

#### 4.1.4 nRF24L01 Wireless Module with Antenna

The nRF24L01 module is radio frequency module. It has also a PCB Antenna. It worked almost 1km range. This module used 2.4 MHz frequency range.



Figure 4.1.4: nRF24L01 Wireless Module with Antenna

#### 4.1.5 nRF24L01 Base Module

This module use for operate nRF24L01 wireless module, so that it can work with Arduino board. It has onboard capacitor for power stabilization.

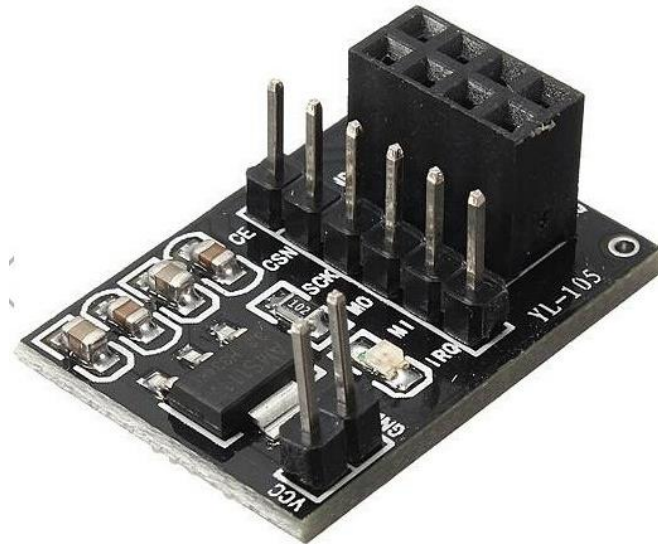


Figure 4.1.5: nRF24L01 Base Module

### 4.1.6 16\*2 Display

A Liquid Crystal Display (LCD) is an electronic display that is divided into 2 lines with 16 columns.

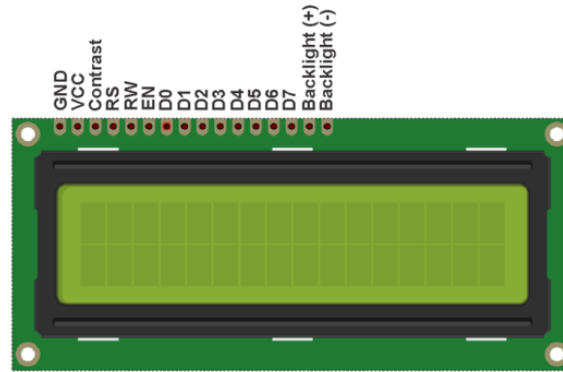


Figure 4.1.6: 16\*2 Display

### 4.1.7 Jumper Wire

A jumper wire is an electric wire which has a connector at each side. It has male to male-female to male and female to female category.



Figure 4.1.7: Jumper wire

### 4.1.8 Barcode Scanner

Barcode is a theme where information hides .to read this data we need a barcode scanner. To store data correctly and faster. It is used .it is an optical scanner that can decoded data.



Figure 4.1.8: Barcode Scanner

# CHAPTER 05

## MODEL OF THE PROJECT

We need a specific model for the project. We are select for the spiral model for this project. The spiral model has the benefit to re-develop the project that's why we chose this project. Our project is a customer based project, so we need some changes in need.

### 5.1 Spiral Model

It is the combinations of linear development model and iterative model in the spiral model there are four types of model mainly there are four types of steps.

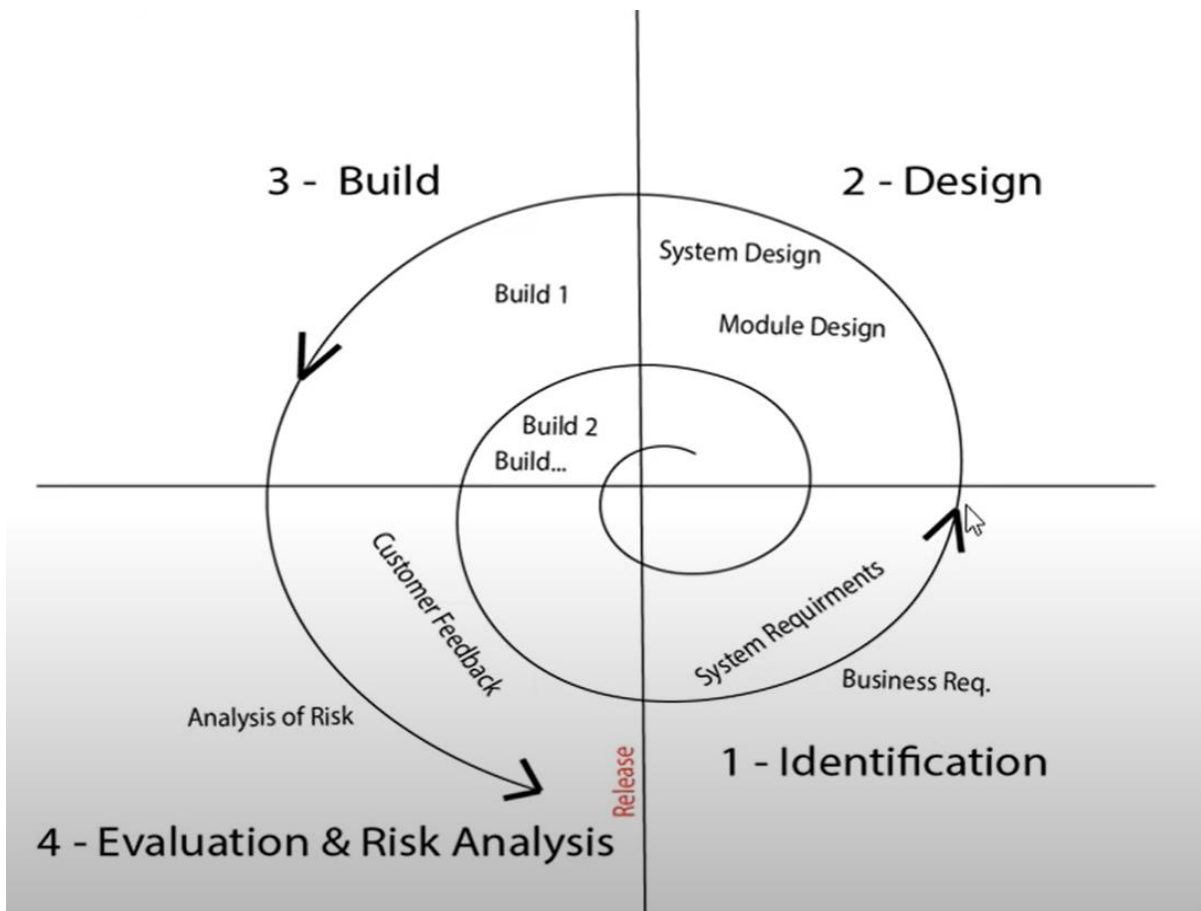


Figure 5.1: Spiral Model

### **5.1.1 Identification**

At this place, we just identify and collect the requirement that means all requirements are identified here.

Example: System requirement business requirement.

### **5.1.2 Design**

At this place, we are making the design of our project.

Example:

- ❖ Physical product design.
- ❖ Logical product design
- ❖ Architecture design
- ❖ Demo of the structure

### **5.1.3 Builds**

At this place, we build the main software which is design is already made and gathers requirements in the previous two phases.

### **5.1.4 Risk Analysis and Evaluation**

In this stage, we just identify the risk and estimate the risk.

Example:

- ❖ Cost overrun risk
- ❖ Schedule time risk

We also build the final builds of the project and get feedback from the customer.

If ok then stop otherwise it will be a circle from identification to risk analysis to evaluation.

### **5.1.5 What type of project are we**

- ❖ Our project is business-related and thinks about the client
- ❖ It's not the easiest process but we have to do for our client and rebuild.
- ❖ We can change the destination of our project gradually.

### **5.1.6 Why Spiral Model for our project**

- ❖ It's a good model for the complex model.
- ❖ It's easy to measure the correct thing of all the steps.
- ❖ It helps us for a long time ongoing process.
- ❖ We can find the problem very easily and re build-out project.

### **5.1.7 Advantages of this model**

In our project, we choose spiral mode and it has so many advantages in this model.

Here we give some benefit about this model

- ❖ We can edit if we need some change
- ❖ All the process is back to back process if any problem we can handle it easily
- ❖ At first, we make a beta version of the project if the client satisfies then we stop.
- ❖ All the phases are rechecking if the project is not done and easy to fix the problem.

### **5.1.8 Disadvantage**

- ❖ This model is for a high-class big project so the cost is so high.
- ❖ This is a very complex project model so the developer needs high skill.
- ❖ For a small project, it is considered a poor model.

### **5.1.9 Why Other Model is not Adjustable for Us**

We choose the spiral model case our project is business base .why don't we select other models is given bellow

### **5.2 Waterfall Model**

It is very difficult to measure the right things at all levels. This is not a good model for complex projects. Long this is considered a weak model for long and ongoing projects.

### **5.3 Agile Model**

This puts more risks on the sustainability and maintenance of the project. This model is suitable for small projects but it is better to avoid this model for large projects. This model continues to depend on the user's conversation, if the user is not clear at any time then can go off track.

### **5.4 V-Model**

The V-model is a highly risky and uncertain model. We need to go back to the previous steps once we have found a problem with the test and we need to test all the effectiveness. Although this model is so rigid and less flexible.

### **5.5 Iterative Model**

We need more resources in this model. It is very difficult to determine what the real risk is at the end of the project. It is not suitable for large projects. Highly skilled risk analysts are needed to analyze risk.



## CHAPTER 06

### SYSTEM IMPLEMENTATION

#### 6.1 Project Functionality

- ❖ First take the product at hand and close to scanner
- ❖ Second scan ADD for another one
- ❖ Third for show final result scan TOTAL
- ❖ To clear scan CLEAR

#### 6.2 System Implementation

##### 6.2.1 Arduino UNO & Arduino Host Shield

Arduino Uno connects with the Arduino shield because it takes all the complexity of hardware and gives a simple outcome. It is fast also. It is fulfilled with libraries. Here make a relationship between the scanner with Arduino we used it.



Figure 6.2.1: Arduino UNO & Arduino Host Shield

## 6.2.2 Arduino Host Shield & Barcode Scanner

To take data we used a barcode scanner and after scanning, the data will be passing to Arduino but the thing is that there is no USB connector at Arduino, so we used Arduino shield as an input process just like a keyboard input .also thing, is that the barcode device gets power with USB system.



Figure 6.2.2: Arduino Host Shield & Barcode Scanner

## 6.2.3 Arduino Host Shield & I2C Module

To make an easy connection with display we use a bypass module that is the I2C Module. Another thing is that from Arduino to show data at display I2C module is an easier technical way.

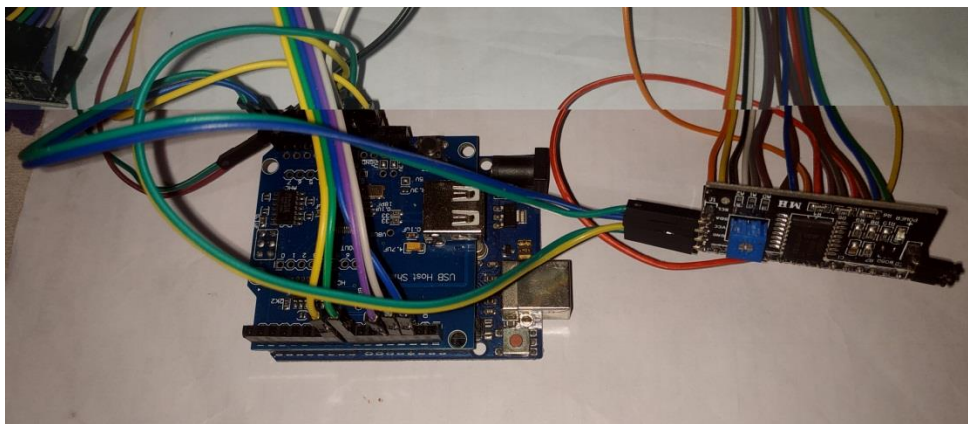


Figure 6.2.3: Arduino Host Shield & I2C Module

## 6.2.4 I2C Module & Display

Display shows the data value from Arduino, actually the raw data by barcode scanner gives the data I2C module.

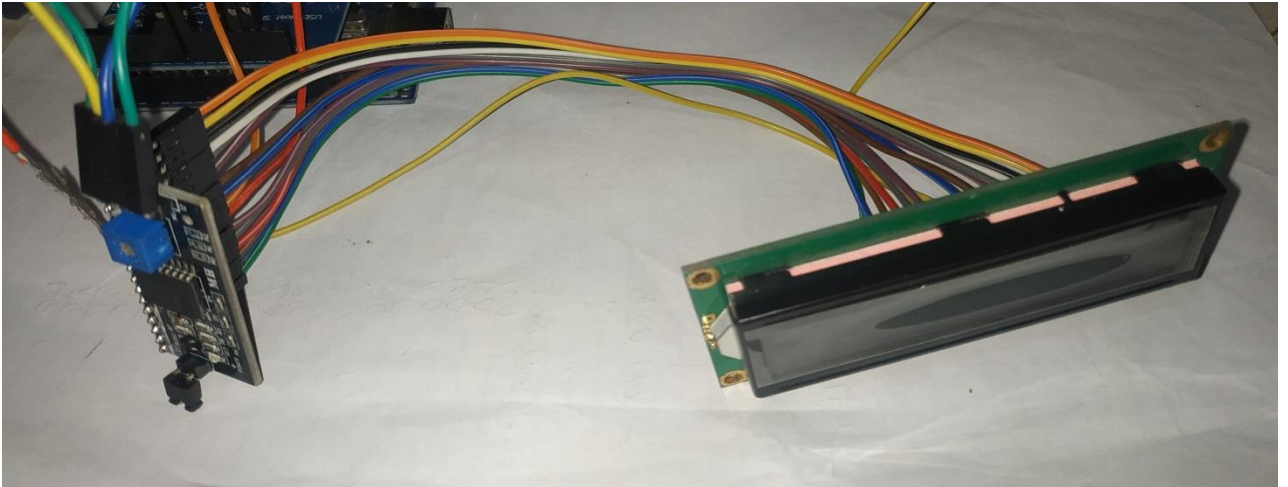


Figure 6.2.4: I2C Module & Display

## 6.2.5 Arduino UNO & nRF24L01 & nRF24L01 Base

To get data from sender or send data to receiver need two nRF24L01 module and base which is connected to Arduino UNO board.



Figure 6.2.5: Arduino UNO & nRF24L01 & nRF24L01 Base

## 6.2.6 Power Supply

Without power supply we cannot use this project so we need a max 12v power connection for long lasting and rechargeable. Test result we are testing battery properly .It work 100 %



Figure 6.2.6: implementation of power supply

# CHAPTER 07

## DESIGN REQUIREMENT

### 7.1 Activity Diagram

It is the flowchart or UML which is happens in activities by flow basically. That we can get an idea about the whole process how it works and how it benefits us. Flow chart diagram of this system given below.

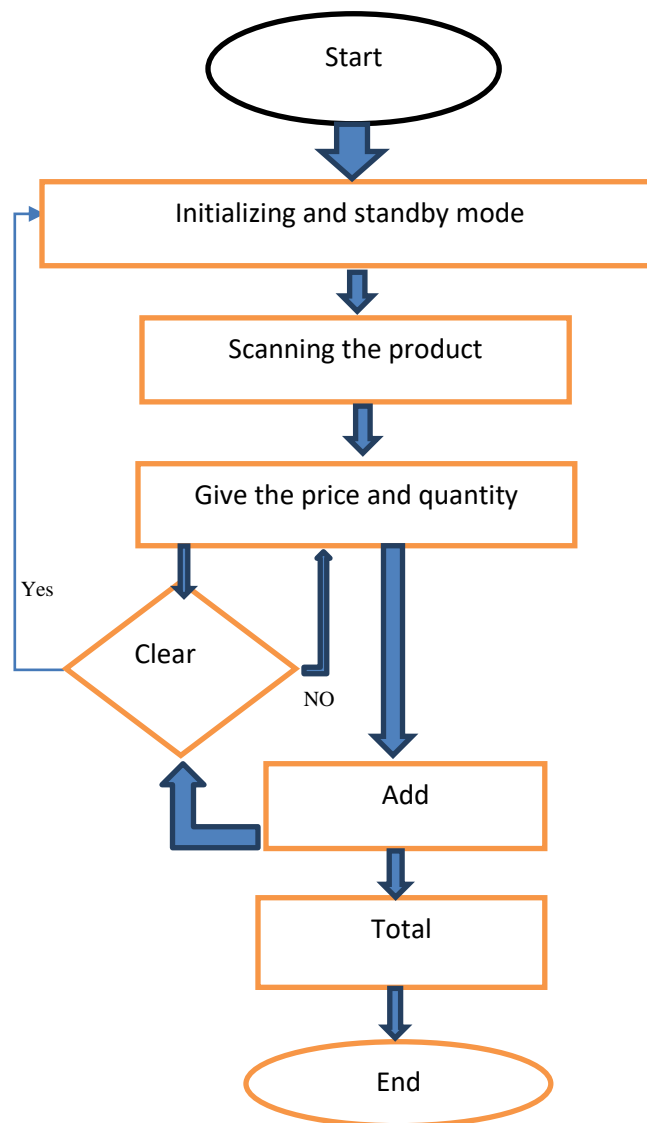


Figure 7.1: Activity Diagram

## 7.2 Use Case Diagram

This diagram shows the activities of actuator where relate with the system. The diagram is given bellow.

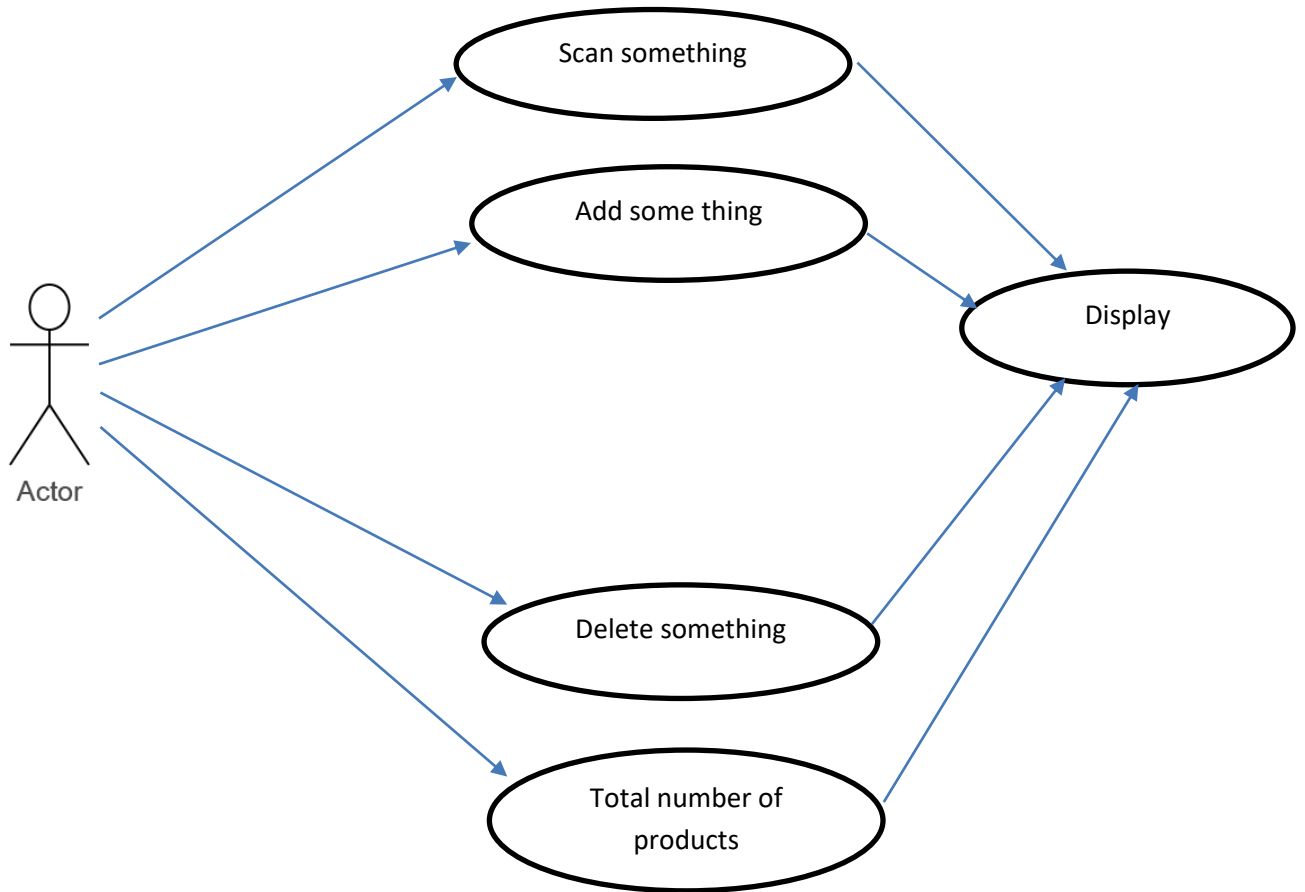


Figure 7.2: Use Case Diagram

## **CHAPTER 08**

### **CONCLUSION & FUTURE SCOPE**

#### **8.1 Conclusion**

This Smart Cart provides a shopping system with technology for shopping efficiently. In this era time is a very valuable thing. We want such a wonderful thing that helps people to save their time. This is an intelligent cart that worked as intended. This can use in a model grocery shop or super shop or market with a smart shopping experience.

#### **8.2 Future Scope**

In the future, we can use different sensors through which it can detect humans and move after the customer. We will add a container that can carry kids. We will add an RFID system so that people can pay their money by credit or debit card. Not only card we use the mobile banking system. We use a Wi-Fi module so that customers can see the suggestive product. No need to charge the display. Use dc motor so that it can provide electricity. If after finishing the purchase one thinks that he does not want to take one or more products it is not possible now.

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