Boco Grip Karts

Submitted in partial fulfillment of

Mini Project 2A

By

SURAJ KUMAR   11

RAKSHITA KHANTWAL   26

ADARSH RAO   47

GOURESH SANKHE   53

UMER SHAIKH   57

Project Guide:

MR. JITHIN ISAAC

Department of Electronics and Telecommunication
Don Bosco Institute of Technology
University of Mumbai

November 2022

Don Bosco Institute of Technology

(Affiliated to the University of Mumbai)

Premier Automobiles Road, Kurla, Mumbai - 400070

CERTIFICATE

This is to certify that the project entitled **"Bosco Grip Karts"** is a bonafide work of

SURAJ KUMAR	**11**
RAKSHITA KHANTWAL	**26**
ADARSH RAO	**47**
GOURESH SANKHE	**53**
UMER SHAIKH	**57**

submitted to the Electronics and Telecommunication Department in partial fulfillment of the Mini Project 2A.

Mr. Jithin Isacc
Project Guide

Prof. Namita Agarwal
HOD, EXTC Department

Dr. Prasanna Nambiar
Principal

i

Don Bosco Institute of Technology

(Affiliated to the University of Mumbai)

Premier Automobiles Road, Kurla, Mumbai - 400070

Project Report Approval for T.E.

This project report entitled **'Bosco Grip Karts'** by **Suraj Kumar, Rakshita Khantwal, Adarsh Rao, Gouresh Sankhe, Umer Shaikh** is approved for **Mini Project 2A.**

Examiners

1. _____

2. _____

Date : 31 / 10 / 2022

Place : **Kurla, Mumbai**

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea / data / fact / source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Adarsh Rao

Gouresh Sankhe

Rakshita Khantwal

Umer Shaikh

Suraj Kumar

Date : / /

ACKNOWLEDGEMENT

A project is a teamwork which involves the contribution of many people. We would like to thank everyone who have contributed by taking interest in our work and motivating us all the way through. Our sincere thanks to our project guide Mr. Jithin Isaac, for motivating, co-operating and guiding us throughout the project work, with her effective skills and huge knowledge base. For their continuous valuable guidance, support, suggestions and their precious time in every possible way throughout the project activity.

Date :   31   /   10   /   2022

ABSTRACT

Nowadays, most people go shopping daily for food, electrical product, and others. The number of people who visit the mall is increased every day because of the population. The customer faces so many problems when shopping like wasting a lot of time in the queue at the cashier, the smart trolley system is a device which helps customer and mall to calculate the total amount of all item inside the trolley when shopping in the mall. The smart device will put in the top end of the trolley. It will give full details of each item like detect the item name, price and create a total price. It reduces manpower required in billing section because the device will calculate total price so it reduces time spent at billing counter and Increases customer satisfaction, customers can see the full details of product, Users can be aware of the total bill amount before going to the cashier for the payment.

Contents

List of Figures

List of Abbreviations

I2C   Inter Integrated Controller

LCD   Liquid Crystal Display

RFID   Radio Frequency Identification

Chapter 1

Introduction

The advent of wireless technology along with the other communication techniques help in making e-commerce very popular. Modern futuristic product is the one that aids the comfort, convenience and efficiency in everyday life. In this project, we discuss an innovative concept of RFID Based Smart Shopping and Billing System. The main goal is to provide a technology oriented, low-cost, easily scalable, and rugged system for aiding shopping in person. The smart shopping trolley will help shorten the checkout lines thereby helping the customers at retail stores. The System consists of an RFID based trolley which communicates with the billing counter wirelessly. The customers will be able to scan the items themselves and the LCD screen on the shopping cart will keep updating the total. The billing counter can at any point of time inquire about the current items present in the trolley. This will turn out to be very beneficial for the retail stores as more people will enjoy the shopping experience and come more often to shop.

1.1 Problem Statement

Now a days, shopping has becoming a daily activity in today's world. We can see large queues in many shopping malls waiting for billing. The objective of our project is to overcome the problem of standing in queue and wasting time. To overcome the above problem, we are proposing a smart trolley billing system that will audit the purchased products .

1.2   Scope of the Project

The proposed outcomes and future uses are :

1. Consumer appliances

2. Office automation

3. Medical electronics

4. Computer networking

5. Telecommunications

6. Wireless technologies

Chapter 2

Literature Survey

RFID Reader: RC522

The MFRC522 is a highly integrated reader/writer IC for contactless communication at 13.56 MHz.

1. MFRC522 chip based board

2. Operating frequency: 13.56MHz

3. Supply Voltage: 3.3V

4. Current: 13-26mA

5. Read Range: Approx 3cm with supplied card and fob

6. SPI Interface

7. Max Data Transfer Rate: 10Mbit / s

8. Dimensions: 60mm × 39mm

STM Board

The STM32 Nucleo boards are the official Development Boards from STMicroelectronics. It features the ARM Cortex M4 32-bit STM32F401RET6 microcontroller which is in LQFP64 package. The Boards pinout is similar to Arduino UNO and has many other additional pins to expand performance.

1. The board contains 14 digital input/ output pins in which 6 are analog input pin

2. The board has a USB connection that can be used to a power supply to the board.

3. The Arduino UNO board has a list of several hardware components and has the capability to interact with those devices. The device includes Bluetooth, internet, motor control, and many more.

4. The board has a total of 32 KB size flash memory that is used to store the data in it.

5. The board has one LED fitted inboard to make the debugging process easy and help to find the bugs in the code along with one reset button that helps to restart the program using the board.

Chapter 3

Working

Our project includes STM nuecleo board as our microcontroller along with an I2C based LCD display and an RFID reader, RC522 module and few RFID tags. When we bring our RFID tag in asile our reader as an output we get an unique ID of that tag . We have a separate tag for every unit product it means every RFID tag when brought close to the reader we get details about that product and these details of the product are reflected in the LCD display which is also interfaced with our nuecleo board.

When the consumer is done with his shopping he/she can use the admin card to end the shopping session and get the total amount of his purchase on LCD display itself and hence they can pay the bill at the counter , thus saving there time and efforts to stand in long queues also reducing the crowd at the shopping centers .
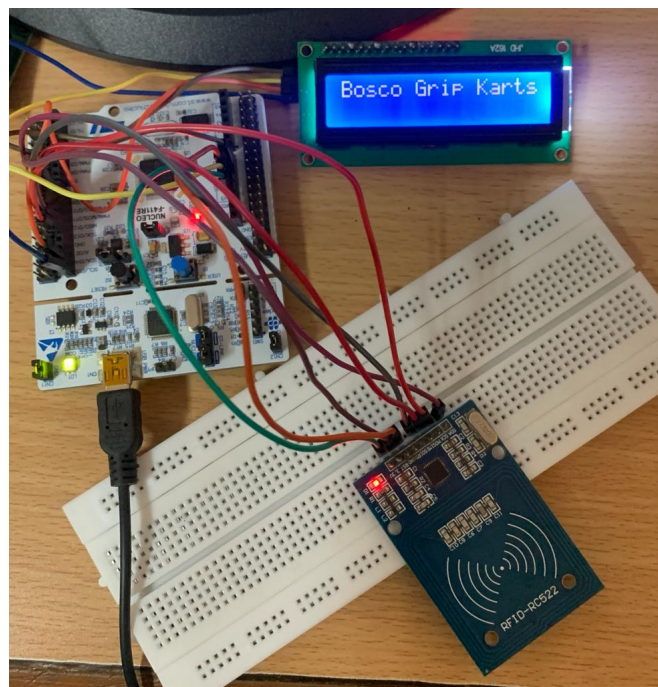
Figure 3.1: Display on LCD

Chapter 4

Testing and Troubleshooting

We initially faced a lot of issues while coding for reading the RF idcard. The I2C * LCD module brought by us at the first place had missing potentiometer this created problems as we added an external potentiometer. Finally we built our hardware by properly getting the potentiometer at its place.

Initially we purchased a RFID reader- EM18 module for our project but it had an RS232 port but what we required for the project was UART so we later switched to RC522 reader module.

Also while creating the code for reading the id and displaying it on the LCD at the same time, many problems were faced but at the end, a proper code was written.

Chapter 5

Results and Discussion

The working of the Bosco Grip Karts was carried out with the help of STM32 Nucleo board and RFID reader RC522. RC522 is a cost-effective sensor used for contactless communication.

1. When the RFID tag comes close to RC522 reader, the RFID cards communicate with the module at a short distance with radio frequency due to the mutual induction technique. It reads the name of the product and its price. It displays the same on the 16*2 12C with LCD display and the user can see the name of the product and its price with the help of this.

2. As the user keeps on adding different items, the number of items keeps on increasing and the total price also keeps on adding and increasing. Finally, when the admin RFID tag is brought forward, it stops the loop and the final price of all the products in the cart is displayed.

Chapter 6

Conclusion & Future Scope

The completed project has fulfilled most of the stated objectives. Effective time management and proper coding has played a large part in making the project a success.

Everyone can rely on this in the future as this will help them to keep a check on the total amount while shopping and will also reduce massive lines in shopping malls/ shopping marts during the billing process.

We can later implement web servers in the project where total price of the product will be saved in the supermarket server due to which time will be saved and hence the billing process can be done more quickly.

References

[1] https://ukdiss.com/examples/smart-trolley-system-automated-billing.php

[2] https://create.arduino.cc/projecthub/justdoelectronics/smart-trolley-using-rfid-5ca047

[3] https://nevonprojects.com/smart-shopping-trolley-with-automated-billing-using-arduino/

[4] https://create.arduino.cc/projecthub/Daini/smart-trolley-using-rfid-and-arduino-nano-7e85f8

[5] https://www.engpaper.com/cse/smart-trolley.html

[6] https://www.alldatasheet.com/datasheet-pdf/pdf/227840/NXP/RC522.html

APPENDIX

Appendix A

Datasheets

A.1 RC522

Features

1. Highly integrated analog circuitry to demodulate and decode response.

2. Buffered output drivers to connect an antenna with minimum number of external components.

3. Supports ISO/ IEC 14443A / MIFARE®.

4. Typical operating distance in Reader/Writer mode for communication aISO/ IEC 14443A / MIFARE® up to 50 mm depending on the antenna size and tuning.

5. Supports MIFARE® Classic encryption in Reader/Writer mode.

6. Supports ISO/ IC 14443A higher transfer speed communication up to 848 Kbit/s.

7. Support of the MFIN / MFOUT.

8. Additional power supply to directly supply the smart card IC connected via MFIN/ MFOUT.

9. Supported host interfaces.

The MFRC522 is a highly integrated reader/writer for contactless communication at 13.56 MHz. The MFRC522 reader supports ISO 14443A / MIFARE® mode.

The MFRC522's internal transmitter part is able to drive a reader/writer antenna designed to communicate with ISO/IC 14443A/MIFARE® cards and transponders without additional active circuitry. The receiver part provides a robust and efficient implementation of a demodulation and decoding circuitry for signals from ISO/IC 14443A/MIFARE® compatible cards and

transponders. The digital part handles the complete ISO/IEC 14443A framing and error detection (Parity CRC).The MFRC522 supports MIFARE®Classic (e.g. MIFARE® Standard) products. The MFRC522 supports contactless communication using MIFARE® higher transfer speeds up to 848 kbit/s in both directions.
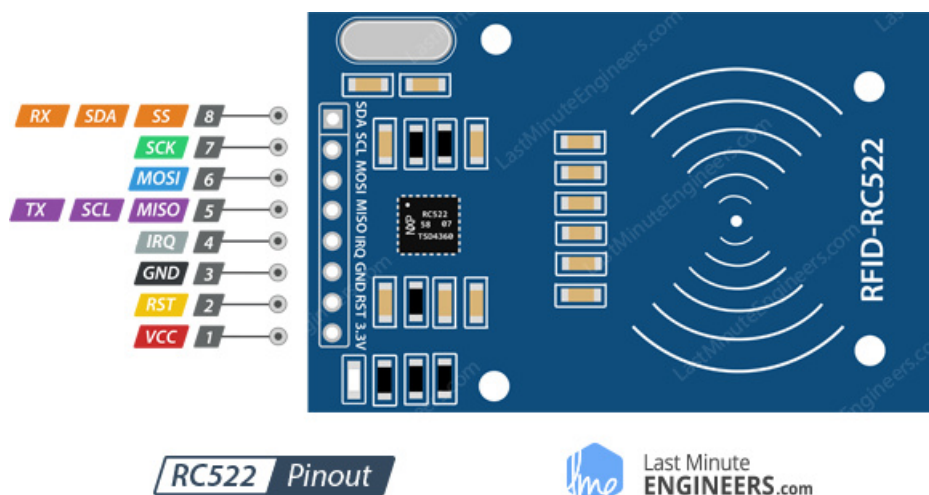

Figure A.1: RC 522 MODULE

A.2   STM-322 NUCLEO BOARD

Features

1. External SMPS to generate Vcore logic supply

2. 24 MHz or 48 MHz HSE

3. STM32 microcontroller in LQFP64 or LQFP48 package

4. user LED shared with ARDUINO®

5. 1 user and 1 reset push-buttons

6. 32.768 kHz crystal oscillator

7. Board connectors: ○ ARDUINO® Uno V3 expansion connector ○ ST morpho extension pin headers for full access to all STM32 I/Os

8. Flexible power-supply options: ST-LINK USB VBUS or external sources The ARDUINO® Uno V3 connectivity support and the ST morpho headers allow the easy expansion of the functionality of the STM32 Nucleo open development platform with a wide choice of specialized shields.
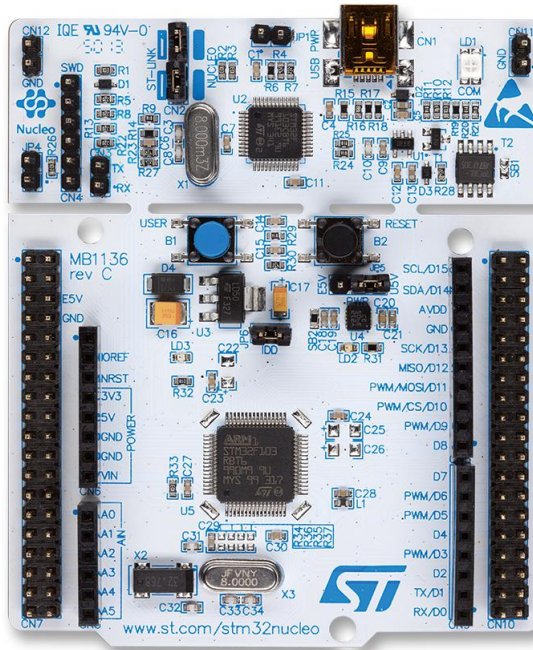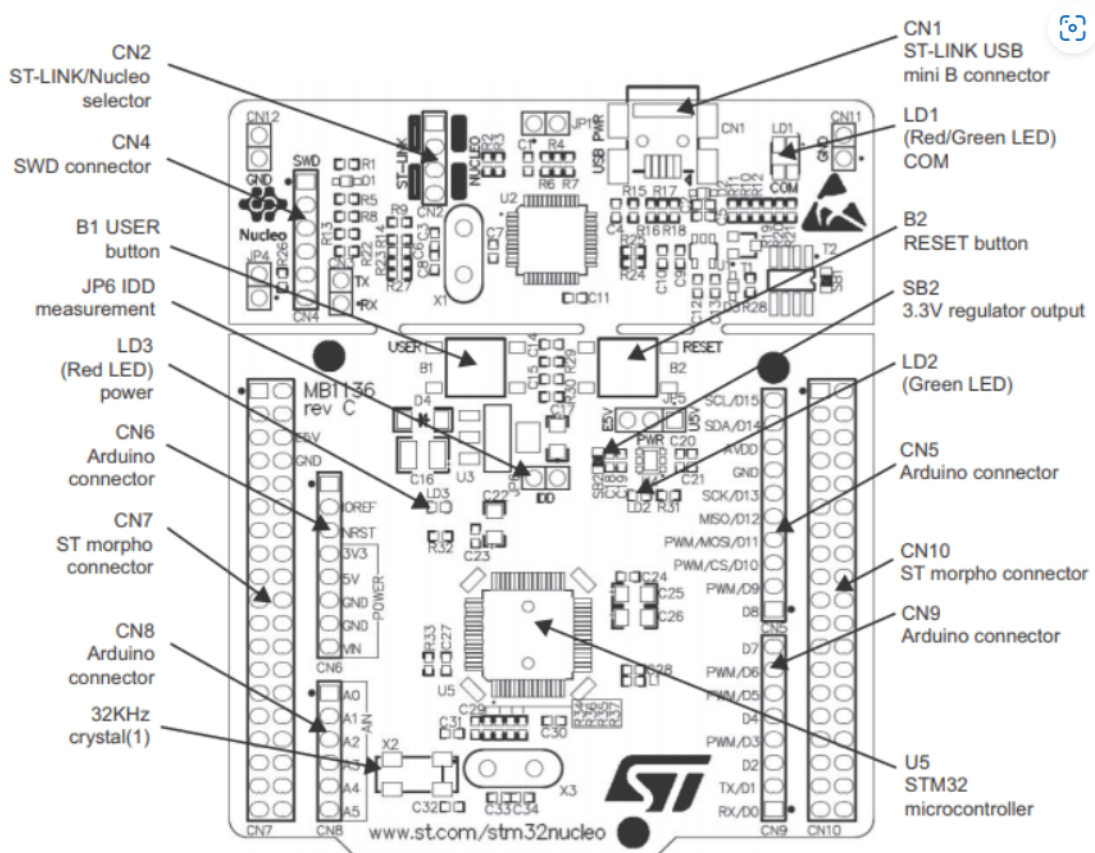
Figure A.2: STM-32 NUCLEO BOARD

Figure A.3: STM-32 CONNECTOR LABELS