

RFID-Based Smart Trolley for Automated Billing System

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ABSTRACT

This paper presents a comprehensive RFID-based smart trolley system designed to automate billing processes in supermarkets and retail stores.

The system uses RFID tags attached to products and an RFID reader integrated into a shopping trolley to automatically scan items.

The system updates billing in real time, reduces queue time, and enhances customer experience. The proposed model also includes GSM-based notification

and user interaction features. The system demonstrates improved efficiency, reduced human effort, and higher accuracy compared to traditional barcode systems.

1. INTRODUCTION

Shopping in supermarkets often involves long queues and inefficient billing systems based on barcode scanning. These systems require manual

effort and are time-consuming. With the advancement of IoT and automation technologies, RFID provides a better solution by enabling contactless and

automatic identification of products. This paper proposes a smart trolley system that uses RFID technology to automate billing and improve the overall

shopping experience.

2. LITERATURE REVIEW

Several systems have been proposed to automate billing. Barcode-based systems are widely used but suffer from limitations such as line-of-sight

requirement and manual scanning. RFID-based systems overcome these issues by allowing multiple items to be scanned simultaneously. Previous research

has explored RFID with IoT integration, but challenges such as cost and network dependency remain. This work focuses on a standalone, efficient system.

3. SYSTEM ARCHITECTURE

The system architecture includes RFID tags, RFID reader (RC522), Arduino UNO, LCD display, GSM module, buzzer, and push buttons. The microcontroller processes input from RFID reader and updates the billing information

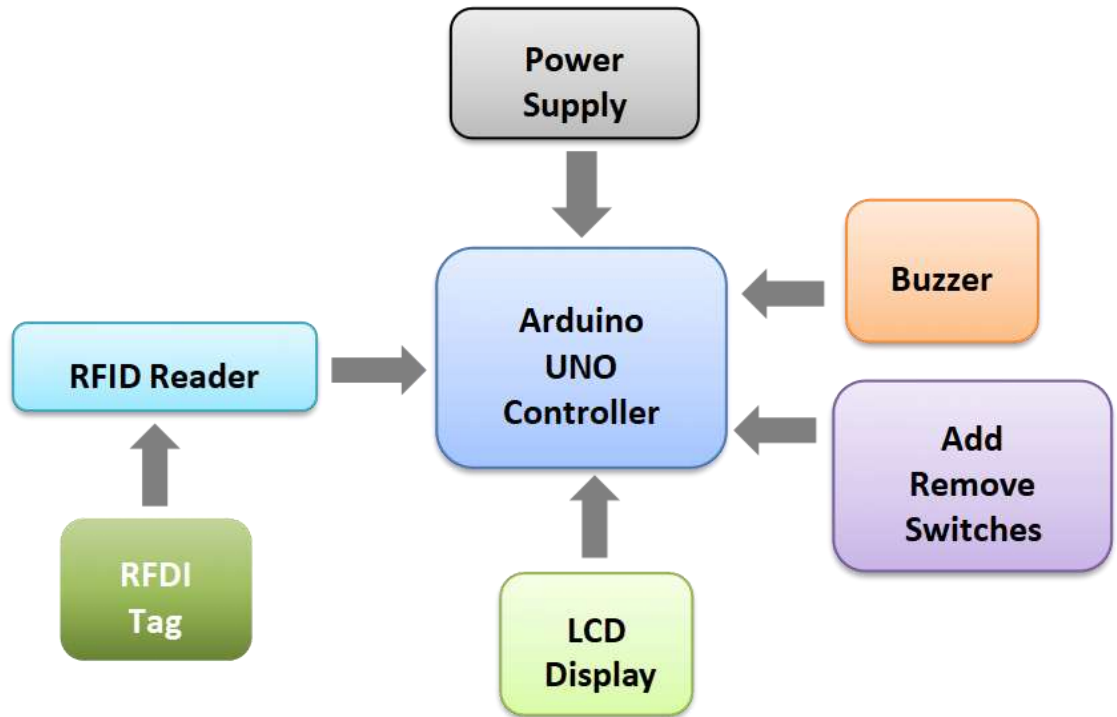


Fig.4.1: Block Diagram

displayed on LCD.

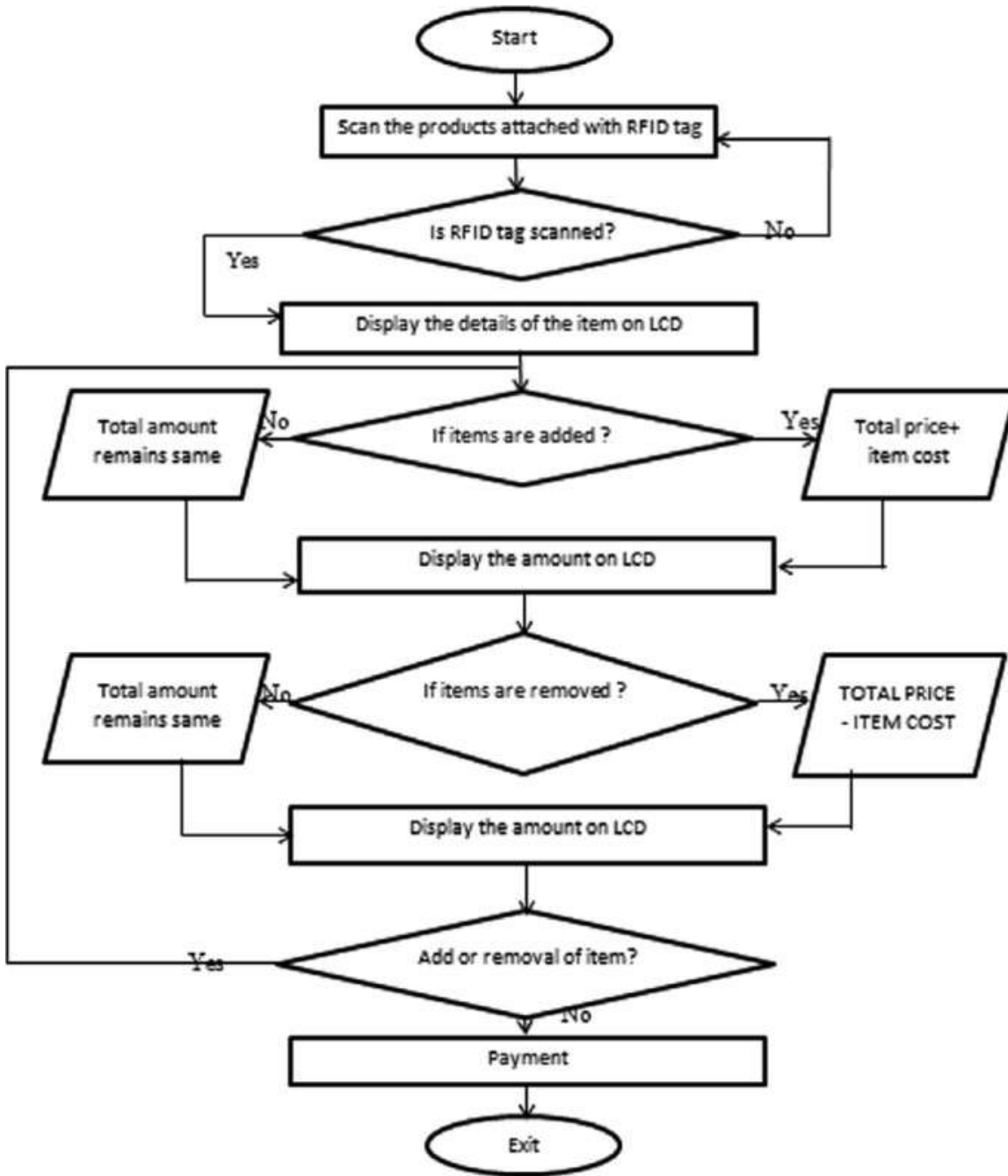
BLOCK DIGRAM OF RFID SMART TROLLEY SYSTEM

4. METHODOLOGY

The working of the system is as follows:

1. Each product has a unique RFID tag.
2. RFID reader scans the product.
3. Arduino processes the tag data.
4. Product details are displayed on LCD.
5. Total bill is updated in real time.
6. Items can be removed if needed.

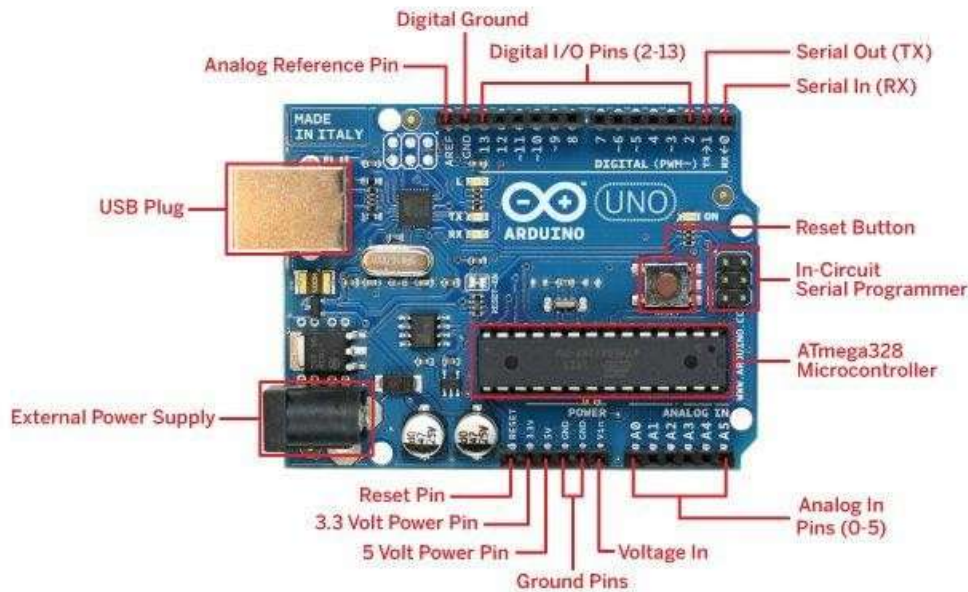
7. Final bill is sent via GSM module.



FLOWCHART OF SYSTEM OPERATION

5. HARDWARE DESCRIPTION

Arduino UNO acts as the central controller. RFID RC522 module reads tags using SPI communication. LCD display



shows output.

GSM module sends SMS notifications. Push buttons allow user interaction. The system is powered using a regulated power supply.

6. RESULTS AND ANALYSIS

The system successfully demonstrated real-time billing. Compared to barcode systems, billing time was reduced significantly.

Accuracy improved due to elimination of manual scanning. The system performed reliably during multiple tests.

7. ADVANTAGES

- Reduces waiting time
- Improves efficiency
- Real-time billing
- User-friendly
- Accurate and reliable

8. APPLICATIONS

- Supermarkets
- Shopping malls
- Retail stores

9. FUTURE SCOPE

Future improvements include mobile payment integration, cloud database, and AI-based recommendations.

10. CONCLUSION

The RFID-based smart trolley system provides an effective solution for automated billing. It enhances user experience and reduces workload.

The system has potential for large-scale implementation in retail industries.

REFERENCES

1. IEEE Papers on RFID
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3. Arduino Documentation