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An Elegant Shopping using Smart Trolley

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Abstract

Objectives: In this paper a smart Trolley model is developed for an elegant shopping. **Methods/Statistical Analysis:** Supermarkets are the places which will be crowded always especially in weekends. To manage these crowds various technologies are used to support people coming for shopping. Even though some technologies are used, the main problem faced by the people coming for shopping is getting jammed into a cashier line and getting frustrated. To overcome this problem we propose a smart trolley system. This system is equipped with microcontroller, ARM processor, Bar code reader, ultrasonic sensors, and android phone. A mobile phone with Wi-Fi connection is required for showing the information about discounts, product prices, and the total updated bill. **Findings:** When the customer finishes his shopping he/she can just pay the bill and leave, no need to wait in the queue. This smart trolley system will change the way of shopping that people shop in traditional systems. **Application/Improvements:** This proposed system is mainly to save the time in billing, it improves the operational efficiency of the system and it reduces number of staffs required.

Keywords: ARM Cortex Microcontroller, Bar Code Reader, Smartphone, Smart Trolley, UART

1. Introduction

In today's era shopping involves some digitalised technologies to comfort the customers. In traditional systems the shopkeepers promote their products using banners or LCD displays, whereas in recent systems they try to promote their products price, offers, discounts in the mobile phones. In this paper the shopping experience is enhanced by using a smart trolley system by increasing the interactive experience and make customers comfortable.

Shopping can be done either in-person or by online. Even though in online shopping the time will be saved, but the customer cannot be able to analyse the quality of the product. Shopping in-person by visiting the shop, selecting the products, and finally standing in a queue for billing will take much time. The proposed system overcomes these problems and makes the shopping process faster and convenient.

Nowadays people are more attracted towards online shopping as they are more likely associated with price attractiveness and time saving. The problems that are faced by customers in on-line shopping are: i) the Price changes during the order process, for tax, shipping etc. ii) too many steps to follow to order a product.iii) Payment is done only by credit cards. iv) No warranty for the products will be given. v) Difficult to exchange the products. vi) Quality& Right Product is one of the main problem in shopping online.

In some existing systems[1] trolleys are attached with the barcode readers which needs high implementation cost and the customers will not get the updated total cost and product details and some use RFID technology[2] which is too costly to be implemented for item level in super markets.

2. Proposed System

In this paper we are using ARM Cortex Controller and this is the heart of our paper. The different input and output devices are connected to the controller. From the input signal feed to the controller, the controller will control the output device this is achieved by software programmed to the micro controller. The proposed system is shown in the Figure 1. The software in the mobile scans the barcode of the product and connects wirelessly to the

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shop PC and fetches the product details. The software also helps in controlling the trolley wheels by sending appropriate signals to the microcontroller. An obstacle detector is fixed in front of the trolley in order to avoid collisions, which is again controlled by microcontroller.

The ARM processor is programmed to update the billing information and also to calculate the total billing amount information.The flowchart for smart trolley is shown in Figure 2. The information between microcontroller and other devices in compliance with it are exchanged serially bit by bit using UART. UART[3] stands for universal asynchronous receiver transmitter. It is a hardware embedded in the microcontroller chip. This UART is used for receiving and transmitting the signals to other devices. It is mainly used for serial communication which is shown in the Figure 3.

When a customer enters into a supermarket, he should first pick a smart trolley .Then after selecting each product ,the barcode of each product should be scanned by barcode reader. The information read from the barcode reader is checked with the lookup table which consists of the product list and its corresponding information like product names, manufacture's name and its price. If the barcode information is matched with the lookup table , then the product name and its price will be displayed on the LCD. In this system ARM processor[4] is used and it is programmed for calculating the billing information. This updated billing information is sent to the stores' server and the customer also will get this billing information in his mobile with the help of RS232 protocol.

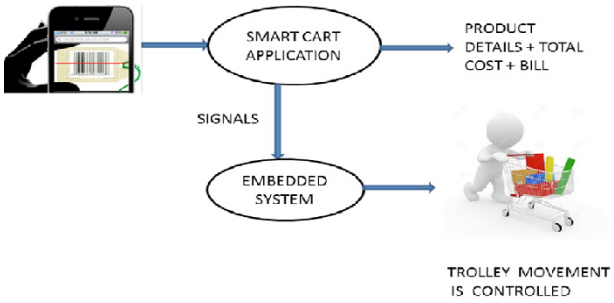

Figure 1. Proposed System.

LCD interfacing[5,6] shown in the Figure 4 is done to the microcontroller for the testing purpose. The LCD displays the information as soon as any movement to the trolley is made. The direction of the movement is also shown. The displayed information is made to standby for few seconds, so that user can see the displayed information. The movement of trolley is controlled by the android device by sending signals to the microcontroller through Bluetooth[6] is shown in the Figure 5. The Bluetooth device is externally interfaced to the microcontroller. The Bluetooth device sends signal to the microcontroller by serial communication.

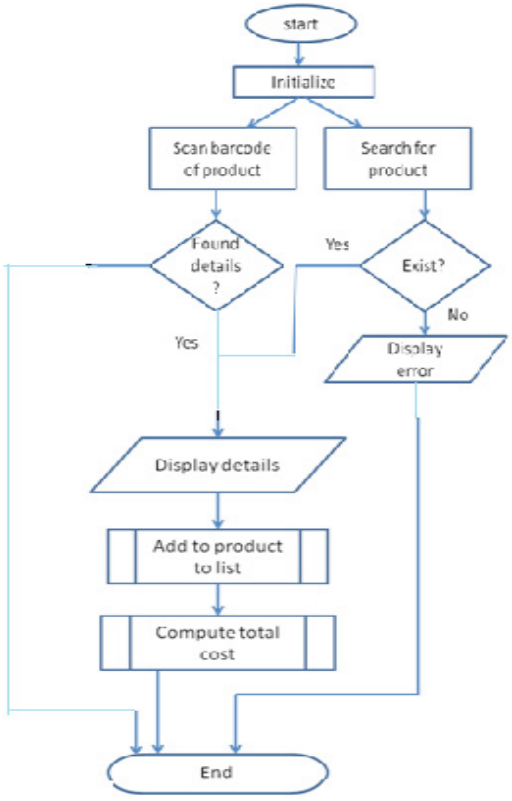

Figure 2. Flowchart of Smart trolley with android application.

3. System Architecture

The design of smart trolley system consists of four main things: hardware, software, database, and wireless communication. The block diagram of the smart trolley system is shown in Figure 6. The system includes a microcontroller with an LCD, barcode reader, a wireless card. Wi-Fi connection is required to connect the android phone to the barcode reader. The data from the barcode reader will be sent to the ARM processor and the bill is calculated. This billing[7] information is then sent to the store's server and the customer's mobile. The customer can now pay the bill and he can leave the shop without waiting in the queue. The movement of the trolley can be controlled by the DC motor[8]. Through mobile phone the signal is sent to the

microcontroller to control the DC motor and thereby it controls the wheels of the trolley.

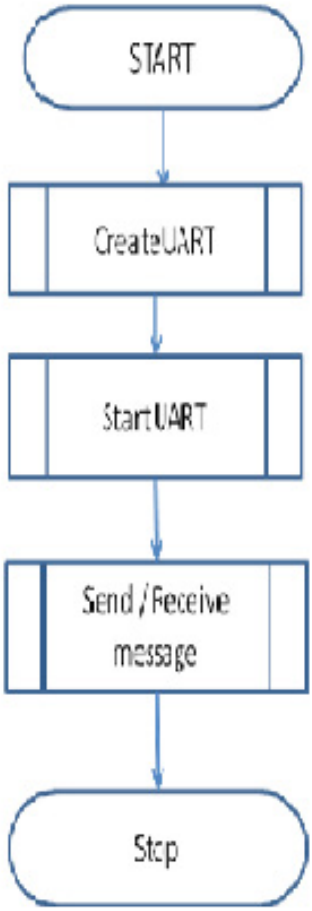

Figure 3. Flowchart for Serial communication.

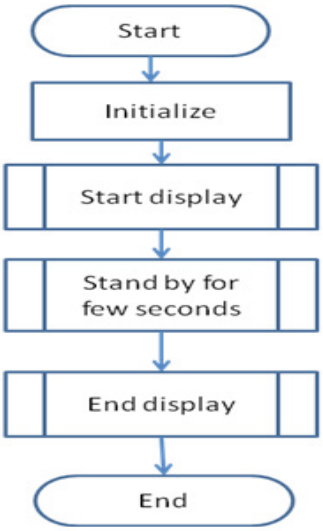

Figure 4. LCD Interfacing.

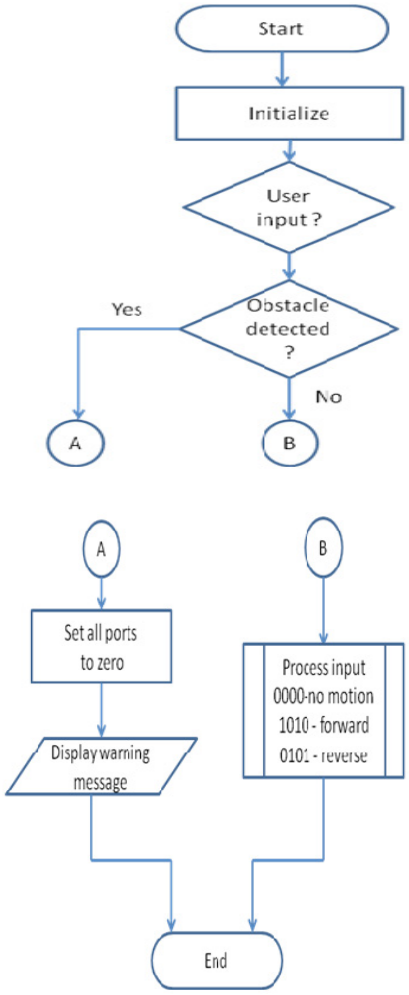

Figure 5. Flowchart for Trolley movement.

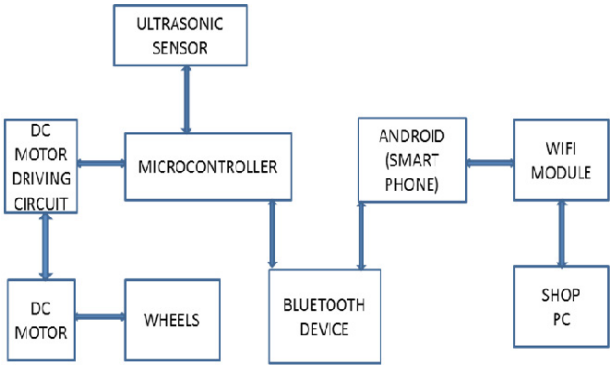

Figure 6. Block Diagram of Smart cart.

4. Implementation

- The application takes around 200 milliseconds to scan the barcode.
- Microcontroller:

- ROM- 64Kb
- RAM- 4Kb
- Data Flash Memory- 8Kb
- Power Supply- 5V

- The application uses the android phone camera which should have auto focus facility.
- The application must be able to scan the barcode even in low lights; hence the camera light/torch should get on.
- Huge queue near the bill counter can be reduced.
- User can get information very easily like price of product and expiry automatically.
- Since time is precious we can save the customer shopping time.

The smart trolley model is shown in the Figure 7.

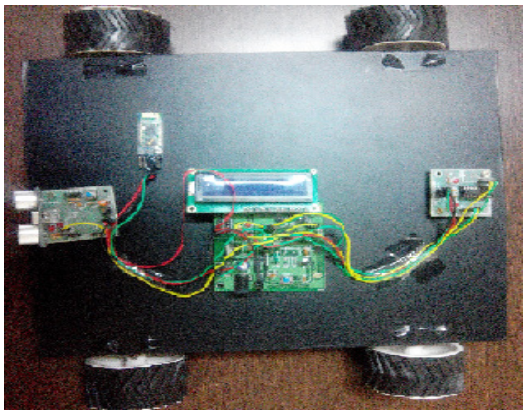

Figure 7. Smat Trolley.

5. Conclusion

As the technology and trend is changing in shopping, smart trolley will become a very essential system in super markets as it saves time without making the customers to stand hours in the queue for paying bills in the counter, reduces manpower and increases the efficiency of shopping by the customers. In future we can make the trolley which follows the customers without need of controlling it. The online bill payment method can be employed to avoid paying bills in the counter. The smart trolley application is successfully designed for the product identification and to control the movement of trolley. It helps the supermarkets to cope up with the advancement in technology and save time of the customers.

6. References

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