

# International Journal of Innovative Research in Science, Engineering and Technology

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## Trolley System Using RFID Technology

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**ABSTRACT:** A shopping mall or complex is a place where people buy product/s for their regular use. The customers have to wait in long queues to get their products scanned using barcode scanner and get it billed. To get rid of this, we have proposed a new 'Smart Shopping Trolley using RFID (Radio Frequency Identification)'. This implementation is used to assist person while shopping and also to avoid standing in long queues and thus saving time. The smart shopping trolley would consist of a microcontroller, Android Device ,RFID Reader and an Electronic Display. The products in the shopping centers will have RFID tags to retrieve/access information about it. When a customer places a product in the smart trolley, the RFID Reader will read the Product ID and the information related to it will be stored in controller. There will be communication between android device, main server and billing system (gate system) via ZigBee module. The total amount of the products in the trolley will be calculated using android device and will be updated on server and the Central billing System.

**KEYWORDS:** RFID Reader, RFID tags, Central Billing System, Wireless ZigBee Module, Android, Security ,Central Server Database.

### I. INTRODUCTION

Humans have always invented and developed a technology to support their needs ever since the beginning of mankind. The basic purpose of advancement in technology has been in minimizing tasks and making

### II. LITERATURE SURVEY

Dr. Suryaprasad J in "A Novel Low-Cost Intelligent Shopping Cart" [1] proposed to develop a low-cost intelligent shopping aid that assists the customer to search and select products and inform the customer on any special deals available on the products as they move around in the shopping complex.

Instead of conducting the RFID observations at the level of individual carts, aisle-level scanning is performed. Satish Kamble in "Developing a Multitasking Shopping Trolley Based on RFID Technology" [4] proposed to develop a product to assist a person in everyday shopping in terms of reduced time spent while purchasing. The main aim of proposed system is to provide a technology oriented, low-cost, easily scalable, and rugged system for assisting shopping in person. Mr.P.Chandrasekar in "Smart Shopping Cart with Automatic billing System through RFID and ZigBee" [5] proposed to develop a shopping cart with a Product Identification Device (PID) which will contain a microcontroller, a LCD, an RFID reader, EEPROM, and ZigBee module. Purchasing product information will be read through a RFID reader on shopping cart, meanwhile product information will be stored into EEPROM attached to it and this EEPROM data will be send to Central Billing System through ZigBee module. The central billing system gets the cart information and EEPROM data, it access the product database and calculates the total amount of purchasing for that particular cart.

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## III. SYSTEM DESIGN

**Objective:** To develop a low-cost intelligent shopping aid that assists the customer to locate and select product/s and inform them on the product/s details dynamically as they move in the shopping arena. Additionally, with each product identified uniquely and usage of centralized server, support billing and inventory updates

### A. SYSTEM ARCHITECTURE

Each trolley is attached with Product Identification Device (PID). Through ZigBee communication, PID device sends choice. At the end of shopping, the customer can straight away pay the bill and leave the shopping center. Inventory status of the products is also updated at the end of shopping.

### Radio Frequency Identification (RFID)

RFID readers are high performance proximity readers featuring long range and small dimensions. Its operating frequency is 125kHz. The electronic tag or label is used for the purpose of identifying and tracking the object.

### RF Transceiver

The RF transceiver CC2500 is a low-cost 2.4 GHz transceiver. It is designed for very low-power wireless applications. The circuit of CC2500 is frequency bands: 2400-2483.5 MHz ISM SRD

### Serial Communication

#### • RS232

The DS14C232 is a low power dual driver/receiver that features an onboard DC to DC converter. It is designed to interface data terminal equipment (DTE) with data circuit-terminating equipment (DCE). [6]

#### • MAX 232

Voltage converters like MAX 232 are required for connecting RS 232 to micro controller. In serial communication, MAX 232 converts the TTL logic levels to RS 232 voltage levels and vice versa. The MAX 232 line driver (voltage converter) converts RS 232 voltage levels to TTL voltage levels and vice versa. MAX 232 has two sets of line drivers and receivers for transmitting and receiving the data. The line driver that is used for transmitting serial data is T1 while R1 is used as line receiver. MAX232 needs 4 capacitors of value 10uF.

#### • LCD

A 16 X 4 LCD is used for display of the product name, product id, product cost and the total bill amount. [6]

#### • PIC 18F4550

The various functions performed by the microcontroller PIC 18F4550 [7] are:

- Storing data scanned by RFID system.
- Sending this data to LCD for displaying output.
- Providing the signals to the respective output devices. Everyday chores easier and faster, irrespective of the various domains available. the current shopping environment can simply be classified into two categories

- Shopping in-person and
- Shopping in absentia

Shopping in-absentia is supported in many ways including online shopping, tele-shopping, etc

The enhanced Smart Shopping Cart System intends to assist shopping in-person which will minimize the considerable amount of time spent in shopping. The proposed system is based on four important technologies

- Infrared sensors
- RFID tags for product identification
- ZigBee for achieving wireless communication with Server, and

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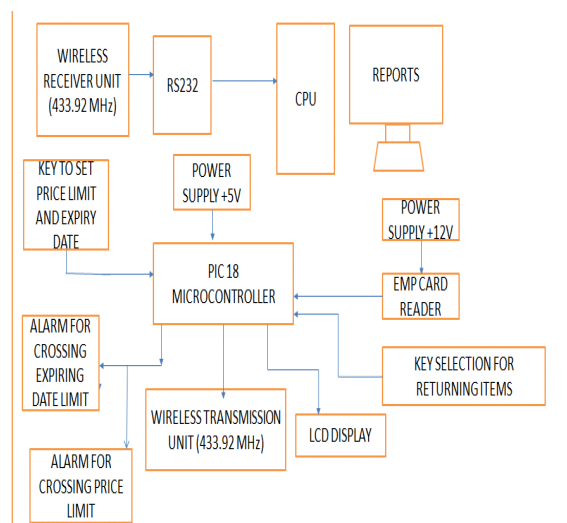
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(iv) Integrated System with display for billing and inventory management. Radio frequency identification (RFID) is a rapidly growing technology. RFID systems consist of small tags, attached to physical objects. When wirelessly interrogated by RFID Readers, tags respond with some identifying information that may be associated with arbitrary data records. Thus, RFID systems are one type of automatic identification system, similar to optical bar codes. In this paper, we discuss about opportunities of enhancing the cart to make it into a commercially viable product as an excellent way to help customers reduce the time spent in shopping by displaying the list of products, their cost and automatic billing. The system helps the store management section with an automatic update of the inventory on every purchase of a product. The Smart Shopping Cart has the potential to make the shopping experience more comfortable, pleasurable and efficient for the customer and the inventory control easier for the store management. Its information to automated central billing system, where the net price of all the purchased products is calculated. Customer can get their billing information at the billing or packing section according to their trolley Identification Number. Even there is no need for a cash collector, if in case a customer uses their debit/credit for the net bill payment. The automated central billing system consists of a ZigBee transceiver and a server/system connected to access product database.

## B. DESIGN METHODOLOGY



## C. SYSTEM WORKING

When the customer enters the shopping mall, he/she will receive a trolley on which there will be a RFID Reader, LCD Display and Android device now the customer can use the smart trolley for shopping. Whenever the customer places a product into the trolley, the RFID Reader will read the tag information and display the related results on the LCD Display. These steps are repeated till the customer finishes his shopping and the "STOP" button is pressed by the vendor. Once the "STOP" button is pressed there is an option provided to end the shopping with the same purchased products or to delete or remove some of the products from the trolley. This totally depends on the customer

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### IV. RESULTS

- The message displayed on LCD to prompt the customer to After the welcome message.
- The data of a scanned product is displayed as follows:



Fig. 3 Scanned product details on LCD

The product detail consists of product name, price, product id and total bill amount.

Analysis of fig. 4: Product name:

Kurkure Product cost: Rs 20 Product

Id: 58213 Total bill: Rs 40

The RFID reader reads the product name, id and cost using RFID tag attached to the item. Total bill amount is calculated by the addition of the product cost to the amount saved in the memory of the microcontroller.

- The figure below displays the bill displayed on hyper terminal.

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