iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** V **Month of publication:** May 2023

DOI: https://doi.org/10.22214/ijraset.2023.51351

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Smart Trolley System for Automated Billing using RFID

Adarsh Srivastav[1], Mohit Kumar[2], Gyaneshwar Trivedi[3], Akash Kumar Dwivedi[4], Ashwini Patel[5]
[1, 2, 3, 4, 5]*IMS Engineering College, Ghaziabad*

Abstract: ***Nowadays, in mall for purchasing variety of items it requires trolley. Every time customer must pull the trolley from aisle to aisle for collecting items and at the same time customer has to do calculation of those items and need to compare it with his budget in pocket. After this procedure, customer must wait in queue for billing. So, to avoid the hustle like pushing trolley, waiting in billing queue, thinking about budget, we have developed a project on the concept that is "SMART TROLLEY". In today's world, for automation of mall we are developing an IoT based TROLLEY which is totally automatic. It helps the customer while purchasing items.Customer must place the product inside and scan RFID tags of the product, RFID Reader will detect the tag and fetch the product details from the local database. The corresponding data regarding the product will be then displayed on LCD screen display which is mounted on the trolley. When the customer is satisfied with the shopping, they have to press a button which will wirelessly send the bill details to the billing counter. By using this trolley, customer can buy large number of products in very less time with minimum efforts. At the billing counter, computer can be easily interfaced for verification and bill printout.***

Keywords: RFID

I. INTRODUCTION

Shopping mall is a place where people purchase goods ranging from food products, clothes, electrical appliances etc. Now a day's number of large as well as small shopping malls have increased across the world due to increasing public demand & spending. Sometimes customers have problems regarding the incomplete information about the product on sale and waste of unnecessary time at the billing counters. Continuous improvement is required in the traditional purchasing and billing system to have better and speedy shopping experience to the customers. Another important objective for this project is that "How theory knowledge is applicable practically" so whatever subjects we taught to the students as per our academic, they are trying to apply this practically. So, we are making a working model for the same. All the products in the mall will have their own unique RFID tag attached to it. The reader will read the tag and get a unique identification code of that product. The total bill amount will be calculated by the raspberry pi and will be displayed on the LCD screen. After selecting all the products, the customer must manually press the send button, which will send all the product details to the billing counters wirelessly via a common server.

A new customer can use the trolley after pressing the reset button. The count of the products additionally will be kept by the IR sensor to prevent robbery. The total bill amount will be displayed on the LCD screen and the payment must be done at the counter. The product details will be sent to the billing counters only after the customer has pressed the send button. Continuous transfer of data will not take place. Accessing the purchase details on the mobile application is also possible. Most consumers worry the amount of money brought is not enough to pay for the total purchase until it's their turn to pay at the cashier. Consumers will be able to get information of all the items at shopping mall, total up the prices of items as they shop, and save unnecessary time at the cashier.

II. REVIEW OF LITERATURE

This part describes the base of knowledge which is used towards the research.

A. Smart Trolley Shops For You

These are Shopping trolleys with their own checkout consoles attached. With the help of console, you scan the selected item and drop it in respective trolley will automatically add the items details to the person`s database. The trolley is launched in US and Australian supermarkets. Console allows you to download shopping list and backed by network of in store sensors, warns you when you are approaching an item you wish to buy. It will advertise shop specials as you pass them, and you can scan your loyalty card into the system as well. You can even place a deli order and receive a message when it is ready for collection. Self-service checkout systems are being trailed by all the big supermarket chains, and they are proving to be popular as an alternative to the old-fashioned manual checkout.[9].

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B. Fujitsu To Unveil Australias Firstintelligent Shopping Trolley At 2005Retail Business Technology Expo

The new wireless shopping technology is the latest development in Fujitsu's range of U-Scan self-service products which demonstrate Fujitsu's integrated approach to reaching customers in stores. Running these systems in isolation createsa lot of issues with data replication.

It could take large retailersup to 10 days to change prices across all their stores in every device. With integrated approach, prices can be changed nationwide within a day.

Digital media networks content now in 3D. The Retail Business Technology Expo will also host theAustralian launch of Fujitsu's new 3D design technology for use with its locally developed digital media networks product TELentice.dramatic interactive 3D product and information messages and send these to devices on their digital media network such as large store screens, kiosks and trolleys to reachcustomers in a new and engaging way.

Fujitsu Australia will demonstrate the 3D technology at the Expo with product messages projected from a 3D-capable LCD screen. A software application for in-store grocery, liquor general merchandise channels; Retail Directions: a point-of-sale and retail merchandising management software application for specialty retailers.[10].

C. Is Amazon Go Shutting Down the Checkoutfor Good?

1) Amazon has unveiled Amazon Go, a physical grocerystorewith no checkouts or cashiers.
2) The technology that lets customers walk out without scanning items is likely to include AI, sensors and Bluetooth.
3) The radical new concept could mean cost savings for the business as well as a unique understanding of shopping behavior.
4) Amazon Go, the store concept entirely does away with payment terminals. Instead, customers walk in, scan their smart phone, take what they want, then just walk straight out. Leveraging a range of digital technologies, Amazon identifies the customer, the items they took, and charges their accounts accordingly.
5) Amazon can deliver on this new kind of store concept; it will reinvigorate its role as an industry disrupter.[11][12]

D. The Smart Shopping Basket That Can Detect Anything You Put In It - And Even Automatically Bag It For You

Panasonic is taking self-service checkouts to a new level with a smart shopping basket. It detects items placed inside, calculates the bill and even automatically bags your merchandise. To checkout, shoppers simply place it on a special till. After the basket is placed in a slot, the bottom of slides out and items drop into a plastic bag – all customers have to do is manually pay for their order.[13]

III. PROPOSED SYSTEM

To overcome problems stated earlier Smart trolley is the solution. This can be done by attaching RFID reader with LCD display on the smart trolley. With the adoption of this smart technology Customer can get the price of each item that are scanned. Total amount of purchased items and respective items' details like weight or expiry date.etc. This is highly specialized field that has the power of integrating thousands oftransistors on single silicon chip.

It helps the customer while purchasing items. Customer must place the product inside and scan tag of product, Reader will detect the product and fetchthe product details from the local database. The corresponding data regarding the product will be thendisplayed on LCD screendisplay.

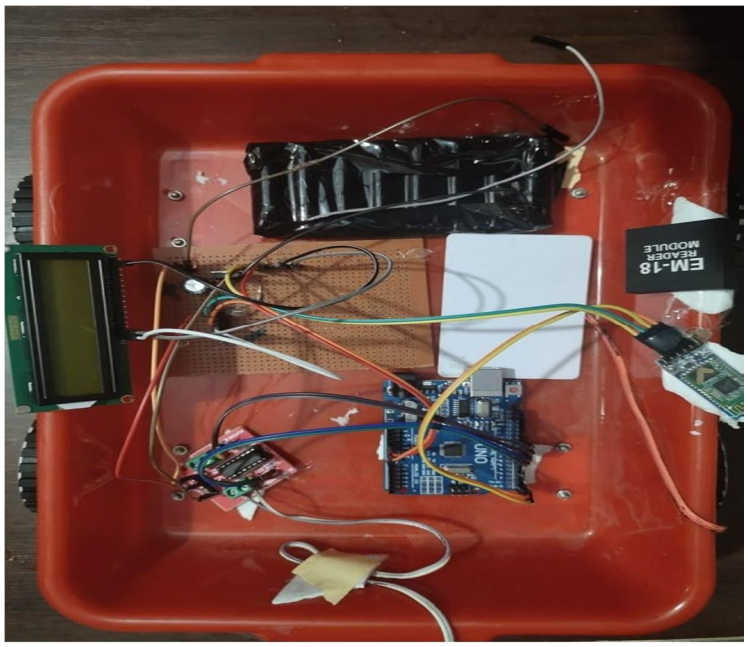
Once the customer is done with the shopping, they mustpress a button will send the billto the billing counter.

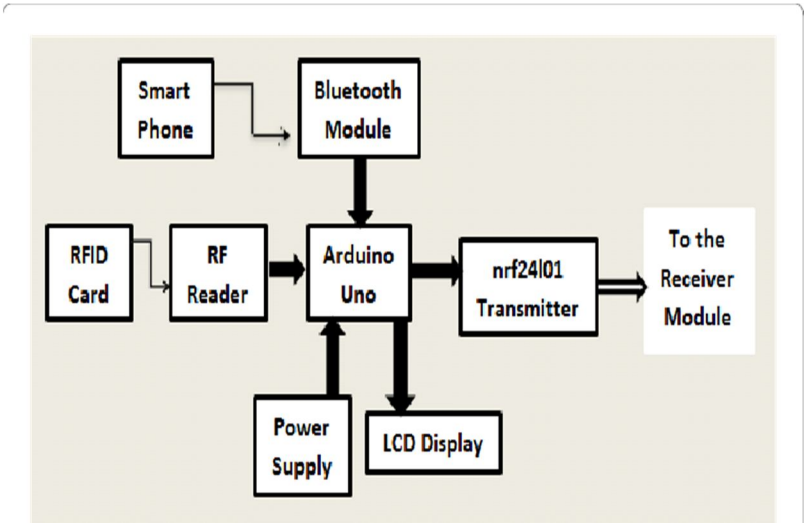
System consists of following component:

1) *Interface:* The interface provides various details suchasthe name, price, total number of items.
2) *Wi-Fi module:* The board consists of Wi-Fi modulewhichis designed for wireless communication.
3) Python Scripting
4) *Raspberry Pi Board:* The board consists of various integrated components that work individually to provide certain output.
5) *UHF RFID Reader:* Radio frequency Identification (RFID) is a wireless identification technology that uses radio waves to identify the presence of RFID tags.

Proposed system is based on various technologiesand domain such as embedded system, Internet of Things (IoT), data storage and communication, signal processing and communication between devices using short wavelength UHF radio waves.

Proposed system assures about the accuracy in tag reading, reliable and wireless communication etc.





IV. WORKING

Every product in the mart will be tagged with a UHF RFID tags. These tags are extremely thin and small which are comparable to the size of a price tag. Every shopping cart or basket within the mart will be installed with themicrocontroller raspberry pi system along with the UHF RFID reader.

When any of the UHF RFID tagged product is inserted intothe cart, the RFID reader will sense the product and fetches all the information about the subsequent product. All the fetched details of the product are added into a list format into the memory. Now, when several products are added into a cart. All the related details are filled into the memory in the textual format.

V. SCOPE

Our project can further be implemented for

1) School and college notification management
2) Crowd Management.
3) Location based marketing.

VI. CONCLUSION

Accomplishments The following is a list of objectives successfully satisfied by the device: Accurate and real time weight monitoring. Accurate tag reading and database comparison Reliable and robust wireless communication Efficient anti-theft mechanism.

Ethical considerations Most of the IEEE codes of ethics have been rigorously followed. A few Codes of Ethics are directly applicable to the projects which are: To be honest and realistic in stating claims or estimates based on available data

To improve the understanding of technology; it's appropriate application, and potential consequences. To seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others Thesepointers directly relate to this project, and it is important to credit Wal-Mart for this idea and rest of the ethical codes are not directly related to this project but have been taken care of.

A successful use of RFID system for the smart trolleyhas been demonstrated. The items can be detected irrespective of the tag orientation, size and shape. This may bring novel experience for shoppers as its time saving and reduced manuallabor for the stored. It is reasonably justifiable that this can by means of this project we intent to simplify the billing process, make it swift & increase the security. This willtake the overall shopping experience to a different level. Different parameters such as the system parameters of smart trolley like products name, products cost, total cost etc. are continuously display Thus with the help of the conclusion we can say that: Automaticbilling of products by using smart trolley concept will be a moreviable option in the future. The system is efficient, compact andshows promising performance. The utility of trolley will be firstof its kind for commercial use.

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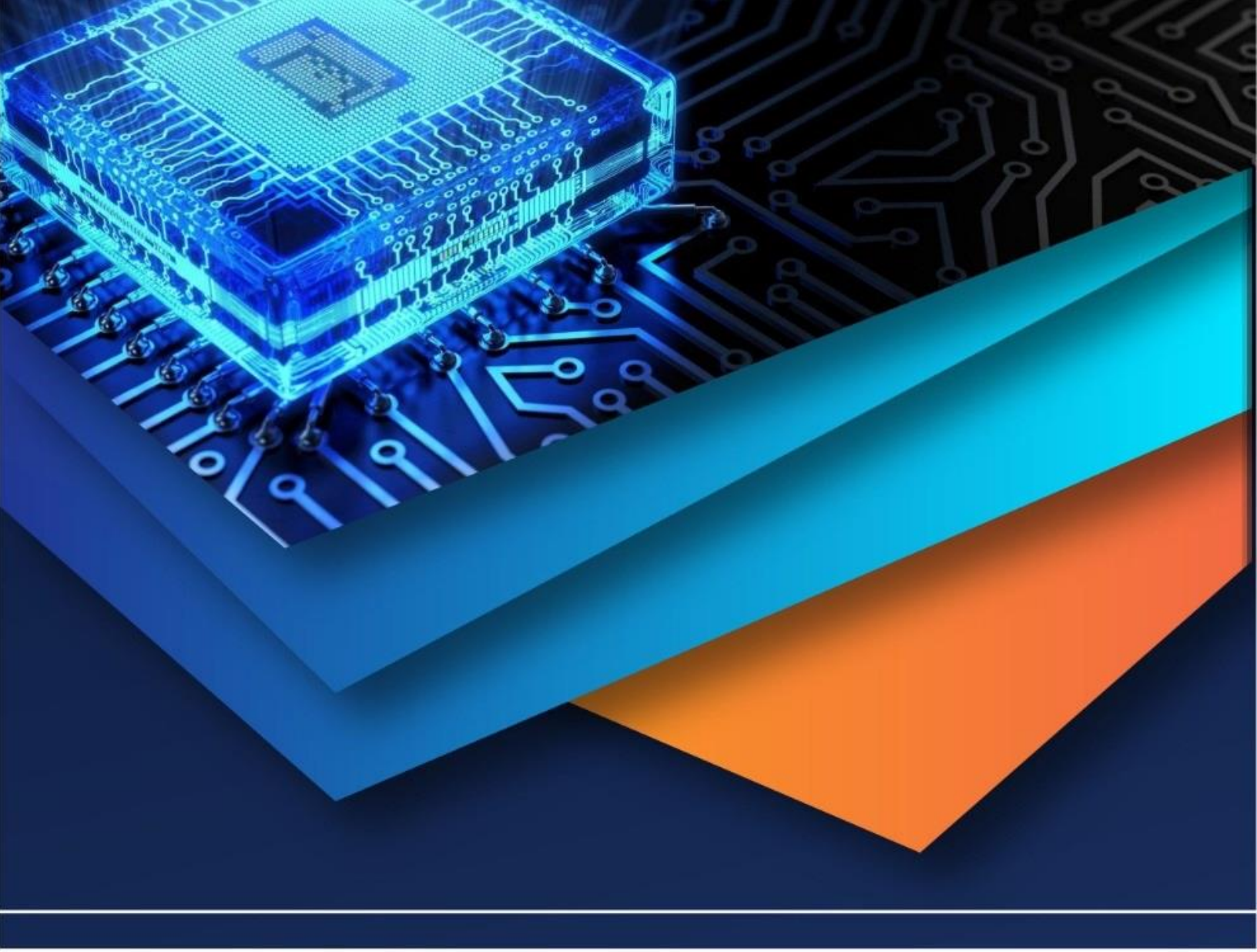
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