SMART TROLLEY WITHOUT BILLING COUNTER IN SMART INDIA

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Abstract:

At shopping mall wide variety of products are available. Major problem gear by people is a large queue at a bill counter and mainly during any offers or weekdays at shopping mall. Customer gets frustrated while waiting in the queue at billing counter and sometimes they get confused while comparing the total price of all the products with the budget in the pocket before billing. Secondly problem is cashless payment to make country as smart India. The proposed system is that at a shopping mall a smart trolley will be available with a kit which will be assembled of RFID reader, Arduino Uno R3, RFID EM-18 module, LCD, GSM Payment gateway etc. A product will have a RFID tag which will be scanned by the RFID reader before adding it into cart. After scanning the product, its details will be sent to the kit which is assembled of various gadgets and then only it will be added in the trolley cart with updated bill details displaying on LCD.With this system, there is no need for customer to wait in the queue for the scanning of the product & billing. This technique can be adopted by the Shopping mall to increase the number of customers.

Keywords: RFID reader, Arduino Uno R3, RFID, LCD, GSM Payment gateway

Introduction:

Number of people visit daily to get their daily necessities at shopping mall. Major problem tackle by people is a large queue at a bill counter and mainly during any offers or weekdays at shopping mall. Firstly while waiting in a queue customer get annoyed and then with this sometimes the budget which customer has decided for shopping is not in controlled after comparing it with the total price at billing counter. By focusing above two problems a smart trolley can be designed which will consist of an assembled kit of electronic gadgets in which the product scanning, billing and payment can be done very easily. Before proceeding tothis idea following research has been carried out.

Origin of the research problem

Customer gets frustrated while waiting in the queue at billing counter. This frustration occurs mostly during the offers or weekdays. Mainly the queue at billing counter occurs due to the scanning of the products. With this the track of expenditure i.e. customer budget control is not maintained.

Inter disciplinary relevance

By using the electronic equipment such as Arduino Uno, & software programming language the model for smart trolley is build up. The programming is performed mostly using the Embedded ‘C’. The Arduino support python programming, so for software design Python programming can be used, as many of the API’s are available in this programming language.

Review of Research and Development in the Subject:

- **International status**
  - The Smart Trolley idea is based on the most popular automated self-checkout system in most of UK retail stores.

- The concept is designed into a smaller version of the automated self-checkout system on a shopping trolley with
- A user interface screen which allows customers to make payment for items scanned and placed in the trolley before leaving the entrance of the store.

The smart trolley idea is based on most of UK retail stores. It's most popular self-checkout system in UK. The concept is designed with user interface screen which allow customer to read the tag of product before placing it in cart with simultaneously billing the amount. The interface also allow customer to make the payment for item read before leaving the store.

- **National Status**

One of the researchers carried out a research in India of "Human following smart trolley", in which a products being developed will end the discomfort of having to drag stroller all around any flat surface. It will also eliminate stroller being left behind, or stolen. This project was carried out in august 2018. A survey and many of the review papers are written by Indian authors. A kit is developed but not with the online payment facility. The programming is programmed using embedded 'C'.

- **Significance of the study**

After studying the national and international research papers & project work we have come with the idea for smart India basic need is also for Smart trolley. With above study following research can be perform

- Automated smart trolley.
- Online payment facility with the smart trolley.
- Anti-theft trolley.

Objective

1. The main objective of proposed system is to provide more relax able, comfortable, systematic and counter free billing system so that huge rush can be avoided on holidays and weekends.
2. The system provides billing gateway so that user can do online payment through debit card, Paytm, Google pay etc.
3. With the RFID technology, all the barriers caused with barcode system will be minimized.

Methodology

The proposed system is that, at a shopping mall when a person enter the shopping mall a trolley will work as a smart trolley when that customer will be having a membership card. This membership card will be read by the reader. After processing the card and confirming the customer is a membership card holder customer then only the trolley will work as a smart trolley otherwise it will work as a normal trolley.

When the customer will be identified as a member holder customer its detail will be send to the laptop where the track of customer having the smart trolley will be maintained. An identification number assigned to the smart trolley will contain the details of the customer who is carrying it for shopping with the help of membership card details.

When customer start to select a product for shopping, product will consist of RFID tag will be scanned firstly by using RFID reader before adding it to trolley. Without scanning the product cannot be added to trolley. After scanning the product, its details will be sent to the kit which is assembled of Arduino Uno R3, RFID EM-18 module; LCD, GSM Payment gateway etc. and then it can be added in the trolley. With this system, there is no need for customer to wait in the queue for the scanning of the product & billing. Payment verification is performed before the exit door with the help of RFID reader which scans all the items in the

smart trolley and check with the database if all the items in the cart have been paid. Following is the block diagram for assembling the smart trolley kit.

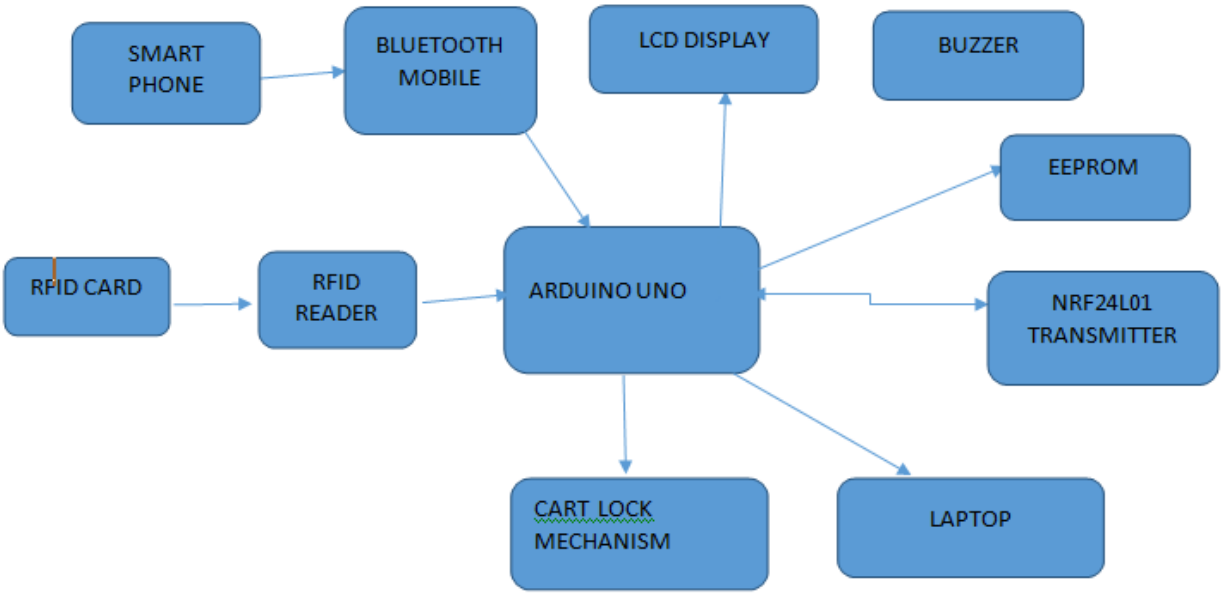

Fig. Block Diagram of Smart Trolley System with Payment Gateway

RFID Tags and RFID Reader: The Smart Trolley can be used by those customers who are having the membership card. In general, RFID Tag is attaching with membership card. RFID Reader is attached to the trolley. Whenever a customer put RFID Tag near to RFID Reader, RFID Reader detects the RFID Tag and trolley act as Smart Trolley. All this process going to works using radio frequency.

Arduino UNO: The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.

NRF24L01 Transmitter: The NRF24L01 is a simple chip which is designed for wireless applications and it operate on low power. It operates on ISM band (Industrial, Scientist and Medical) at 2.400-2.4835 GHz. We used this module for one way communication only. It means data is going to transfer from trolley to computer at the billing counter.

Bluetooth Module: In smart trolley system, the android app is used to send barcode data serially to the Arduino Bluetooth module when a button is pressed on the application. The Receiver Bluetooth module at other end receives the data and sends it to the Arduino Uno through the receiver pin of the Bluetooth module. The barcode scanned from the smartphone is transferred to Arduino Uno through Bluetooth Module. We used HC 05 Bluetooth module in which data is serially transfer to the Bluetooth receiver.

LCD Display: Once the user is done with his/her shopping and near to billing counter, user press the button on the trolley and data which is displays on the LCD would transfer to the computer and smart phone.

EEPROM (Electronic Erasable Programmable Read Only memory): Used to store the customer details with its smart trolley shopping details of product and total bill amount.

Buzzer: Whenever the product is added or removed from the tag the buzzer will buzz. At starting when the customer membership card will be read by the reader, customer can store its budget shopping amount in it. When the billing amount exceed to it at that time also buzzer will buzz. When the customer would take the trolley out of the shopping mall boundary line without payment the buzzer would buzz.

Cart Lock Mechanism: Trolley would be lockedif without billing the customer is taking out of the boundary line. Wheel locking systems will have to be implemented otherwise it would be a drawback of it. For it electronic wheel have to be used. Either one or two wheels of the trolley are called Smart Wheels and have electronic locks embedded in it. Also a cable goes below the yellow boundary line which serves as an antenna to send out the signals. When the wheels reach the proximity of the yellow line (cable), the electronic lock in the smart wheel receives the signal and activates, thus stopping the trolley and the buzzer would buzz.

Smart phone: The billing details can be send to the customer smart phone so that the payment can be processed online. The details can be send to the customer mobile through Arduino and Bluetooth.

Software design: For existing system Arduino programming is written in C, C++ programming language for the compiler which converts the programming language to binary machine code for the target processor.
In proposed system Arduino programming will be written using the Python Programming language. By using the API's of python the implementation can be done in very easy and efficient way.

Conclusion:

With this paper, we have tried to simplify the billing process with automated trolley system so that shopping experience will become easier and simplified and people do not have to wait in a long queue for paying bill.Online payment can be easily done with our system. Every product in a shopping mall must have RFID tag on it. Each cart must have RFID reader so that it will read product's details s. whenever product will be added to the trolley, its price gets added to the total bill. If the product will be removed, its price must be deleted from total bill. We have also provided anti-theft capability so that customer cannot go out without paying the bill.

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