

## IoT architecture, methodology of smart trolley system

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### ABSTRACT

A department store may be a place wherever customers come back to get their daily merchandise and acquire that asking method within the department store takes longer for asking of merchandise within the department store are going to be quite tough as a result of it takes longer as folks ought to watch for a protracted time in an exceedingly queue for asking. the purchasers ought to add the merchandise once a brief scan within the self-propelled vehicle and once they're done, the quantity are going to be displayed within the self-propelled vehicle. The client can even log in to the app which can show the list of all the merchandise value-added and their quantity. Once done, the client will pay digitally through the app; therefore, reducing on the time that may be otherwise spent in long queues and relieve them from the dullness of scanning RFID reader

**KEYWORDS:** RFID, trolley, ESP8266, RFID reader.

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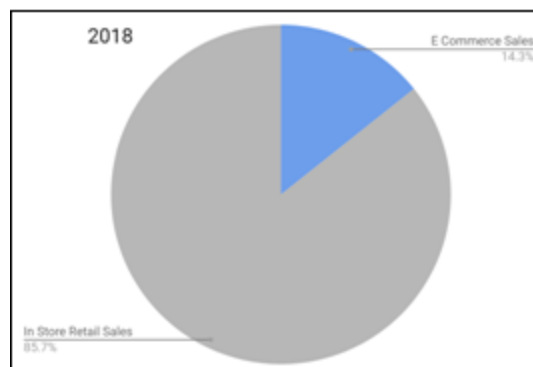
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### I. INTRODUCTION:

Nowadays, department store and shopping complexes became therefore common place, that they're not a luxury afforded only by urban cities. they need dilated on the far side the domain of huge cities and ventured into rural areas still. Anybody will move to these stores and obtain merchandise that they have, however they're not entirely convenient, particularly once a client has got to stay up for hours in queues on daily days.



**Fig-1** .The proportion of total sales occupied by in-store sales

According the debut of ESP8266 Electronic commerce needs to be developed to such associate degree extent to be offer convenience comport, and potency in lifestyle.

### II. ARCHITECTURE

The smart trolley system design involves 2 sections as embedded and java. within the embedded section, microcontroller is employed to coordinate with the RFID reader, weight scanner, and digital display bit screen, GSM/GRPS module to perform computing functions

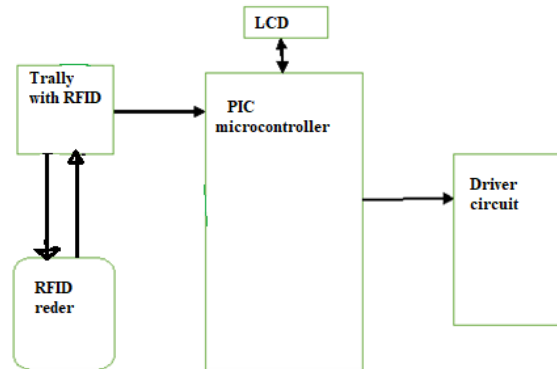


Fig-2. ARCHITECTURE OF RFID ENABLED TROLLEY

### III. ALGORITHM:

**ID3** In call tree learning ID3 is AN formula made-up by Ross Quinlan aware of generate a call tree from a dataset. AN ID3 formula generally used within the machine learning and language method domains. At the beginning of original set S was taken as root node within the ID3 formula. On every iteration of the formula, it iterates through each unused attribute of the set S and calculates the entropy  $H(S)$  or knowledge gained  $\gamma(A)$  of the attribute

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Algorithm (Id, Set)
//Scan_list: List of Currently Scan Item
//Bill_list: Bill id List
//Find_Newid: Compare two list and find
//new id
//Fetch Data: Get Data from Server
//Delete: Delete item
set=1
Repeat While set=1
{ Scan ();
Scan_list ();
If (Scan_list==Bill List) then
Don't Do Anything
Exit ();
Else if (Scan_list>Bill_list) then
Find_Newid ();
Fetch_Data ();
Display ();
Add_Bill ();
Update ();
Else if (Scan_list < Bill_list) then
Find_Newid ();
Delete ();
Update ();}
    
```

### IV. METHODOLOGY

- **MICROCONTROLLER:** A microcontroller could be a tiny laptop on one metal-oxide-semiconductor(MOS) computer circuit (IC) chip. A microcontroller contains one or a lot of CPUs (processor cores) alongside memory and programmable input/output peripherals. ATMEGA is an 8-bit microcontroller chip that delivers high performance at a low price. It will be simply operated at 1-15 Volts.

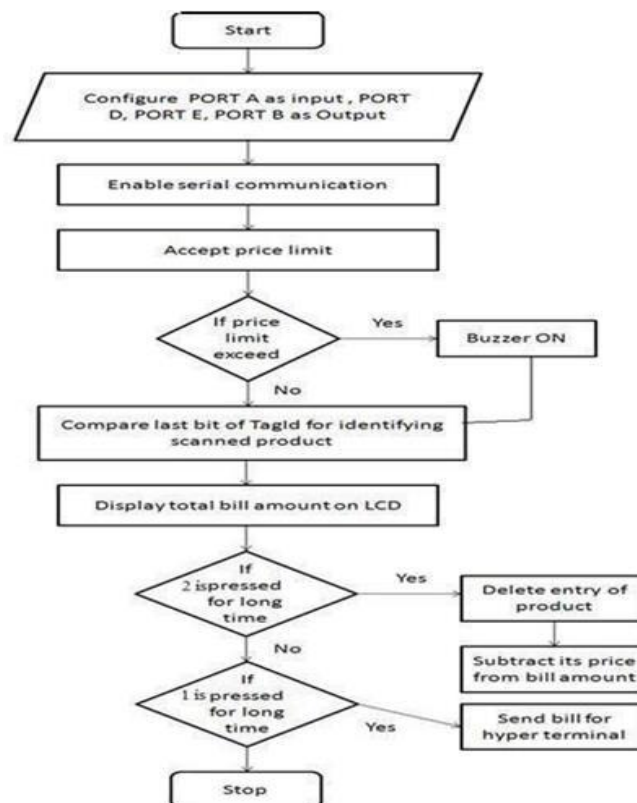
- **RFID TAGS:** Each tag is fitted with a semiconductor device that's used for storing the amount still as a coil that is employed as associate degree antenna for the radiation of knowledge through radio-frequency waves. Radio-frequency identification uses magnetic force fields to mechanically determine and track tags

hooked up to things. associate degree RFID system consists of a small radio electrical device, a receiver and transmitter.

- **RFID READER:** every trolley is bolstered with an RFID reader, and also the variety of reader that's utilized in RFID RC522. An RFID reader is that the brain of the RFID system and is critical for any system to operate. Readers, conjointly known as interrogators, are devices that transmit and receive radio waves so as to speak with RFID tags.
- **LCD Display:** A 16X2 LCD touch-enabled LCD screen is employed for displaying the knowledge. A liquid-crystal show (LCD) may be a flat-panel show or different electronically modulated optical devices that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals don't emit lightweight directly, instead employing a backlight or reflector to supply pictures in color or monochrome.
- **ESP8266:** An low value and extremely integrated solution to attach wirelessly, this microcontroller is hopped-up by a 32-bit Tensilica microchip, that makes it potential for it to consume minimum battery resources. The ESP8266 may be a low value WI-FI microchip, with a full TCP/IP stack and microcontroller capability.
- **SERVO MOTOR:** A servo motor may be a variety of motor that may rotate with nice preciseness. usually this kind of motor consists of an effect circuit that gives feedback on the present position of the motor shaft, this feedback permits the servo motors to rotate with nice preciseness.
- **PUSH BUTTON:** The OK button is employed to show the overall value of all the things within the self-propelled vehicle, that were scanned victimization either the screen on the app. The Cancel button resets the overall price to default

### V. WORKING

In sensible trolley system, the android automaton app is employed to send barcode information serially to the Arduino Bluetooth module once a button is pressed on the appliance. The Receiver Bluetooth module at different finish receives the information and sends it to the Arduino Uno through the receiver pin of the Bluetooth module.



**Fig-3. Flowchart of RFID enabled Trolley**

The key target of future framework is to convey a talent disquieted regarding, ease, effectively out there, and a good framework for supporting looking. The RFID management driven electronic looking trolley car is worked to enhance the full looking understanding for laptop gadgets store shoppers.

Some of these technologies are used whereas some square measure still in experimental section. therefore, essentially what this project will is that it enhances client looking expertise. The bill is generated at the same time, therefore you would like not fill in a queue, expecting individuals ahead of you to unload their things so the cashier might scan them and generate invoice. additionally, once the bill is being generated, you'll keep track of your budget and by this you'll additionally economize and time.

## **VI. LITERATURE SURVEY**

In the "IoT applications on Secure smart shopping System" the author Ruinian Li, Tianyi Song, St. Nicholas Capurso, Jiguo Yu, mythical being dressmaking, and Xiuzhen Cheng implement the thought victimisation UHF RFID reader therefore each good cart is supplied with UHF reader. this method consists of microcontroller, LCD, weight detector, and ZigBee technology. this method is implementing for the protection and privacy problems for create the system sensible. the ultimate result, final request is worn out the smart trolley system. that the users don't wait during a queue for very long time [1].

The "The Development of good pushcart with the Customer-Oriented Service" the author Hsin-Han Chiang, Wan-Ting You, Shu-Hsuan sculpturer, and Wei-Chih Shih implement a wise looking card which will be detected mechanically the item is accessorial into the looking smart trolley system. From the looking out of SSC the navigation the getting within the mall is with efficiency provided [2].

In the "Smart Trolley in Mega Mall" the author Awati.J. S, S.B. Await, They Developed microcontroller based mostly design for user who waits in queue therefore avoid the group at the request counter and headache like pull trolley. They used LCD display, Max 232, Barcode scanner; RF module, RF transmitter & RF receiver, & Object counter [3].

[4] Proposes a cart to produce billing services employing a combination of RFID and Li-Fi (Light Fidelity) systems. However, each aren't used along together. An option is provided at the start, once the trolley is place to use by the client, to decide on whether or not to use RFID or Li-Fi for scanning functions.

[5] The authors have designed a construct of looking shopping trolley by using Arduino Uno, infrared sensors, RFID Module, LCD display, Wi-Fi electronic equipment and accessorial a DC gear motor to modify trolley automation.

[6] Authors utilized the tactic for the automated billing system for supermarkets. the essential plan behind this paper is that to decrease the trouble within the supermarkets in order that nobody needs to wait in queue for hours and nobody got to waste their time in request.

[7] EM-18 RFID scanner module has been used. It uses a RFID browser which can read 125kHz tags. So, it'll be referred to as a low frequency RFID reader. It offers out a serial output and contains a variety of roughly 8-12 cm. there's an intrinsically antenna and is connected to the laptop computer with the help of RS232.

[8] The authors designed a system for mall. The system is placed within the trolleys. It consists of RFID reader and every product has RFID tag. The billing is finished in smart trolley itself. Product name and its worth is displayed on LCD screen. At the money counter the total bill is settled to Cashier laptop by wireless R.

[9] The authors have devised a system that consists of GSM, RFID, Automatic billing, OTP, ZigBee, PIC, etc. during this scheme, the item is browse by the RFID reader and therefore the total of the item is showed on the LCD screen. They characterised this paper as a result of the additional some further options in existing system; like straight away, factor is perused by the RFID pursuer and therefore the mixture of the thing is appeared on the LCD screen.

[10] Describes a shopping cart that uses the ATMEGA microcontroller to hold out varied functionalities and therefore the connections area unit created to ZigBee technology, power supply, EEPROM and show unit. ZigBee network provides low cost low power connectivity for instrumentation that desires battery life long for many months.

[11] There's a correspondence between android device, principle server and charging framework entranceway framework by means that of ZigBee module absolutely the web live of the things within the trolley is being determined utilizing android device and updates on server On adding a product in cart, the RFID Reader reads the merchandise ID and therefore the data associated with its hold on a controller.

[12] The authors proposed an automatic billing system by means of a smart cart which comprises of an RFID reader which will read the products containing the RFID tags when put into the smart cart, hence ensuring an auto-billing process for customers and the payment can also be done through mobile application.

[13] Proposes a system where every item would be read by scanning tag as soon as its drop in basket. Also the expiry date of the product is displayed alongside the product. The most profound and clear system has a unique id associated to each product as soon as the product is being read by reader it automatically generates the information regarding the product on the screen.

## **VII. CONCLUSION**

This paper can demonstrate the chance of using wireless system for developing a smart shopping system that automates the complete billing procedure. during this paper we tend to discuss regarding design of RFID enabled trolley car associate degreed used the algorithmic rule of ID3 method process is finished regionally among the cart thereby eliminating an overhead to the communication between the nodes and uses varied methodology like microcontroller, RFID Tags, RFID Reader, liquid crystal display show, ESP8266, Servo motor, push. From review on topic of sensible trolley car it's ended that sensible trolley car may be enforced with microcontroller and provides varied practicality like billing, data, weighs of purchased things. additionally, the system will reduce the rush at the billing counter and save the valuable time of shoppers.

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