

International Journal of Innovative Research in Science, Engineering and Technology

7th National Conference on Recent Trends in Engineering and Technology (NCRTE'19)

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Special Issue 2, April 2019

A Survey on Secure Smart Shopping System

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ABSTRACT: In the present days going to supermarket for shopping is expanding rapidly. People take the thing and place it into trolley. After finished with shopping they go for charging at the billing counter however as there are numerous people remaining in Queue for charging reason, so lots of time is required to people for charging in light of existing barcode innovation. To lessen this time we are proposed a framework dependent on RFID innovation. The framework contains the things joined with RFID tag, RFID peruser which peruses the label data when put into the trolley. By then this data is send to fundamental charging server which calculates the complete measure of acquired things and sends the determined bill to the gadget joined to trolley for appearing on LCD. The application depends on the Trolley number and complete measure of obtained things.

KEYWORDS: IoT; RFID; Smart Shopping; RFID tags; Raspberry pi 3; RFID readers (MFRC522); Radio frequency;

I. INTRODUCTION

IoT is an emerging technology in the present business, which greaterly affects society. IoT is a network of physical devices, sensors, embedded software which enables the devices to exchange information between them. The primary point of any technology is to make human life as simple as would be prudent. In the present modern life, shopping in a shopping center or a supermarket has become an everyday movement, where the customer needs to spend a great deal of time in the queue at the charging counter. Our real objective was to reduce the customer's holding up time, by generating a programmed bill. Our proposed Secure Smart Shopping System creates a better shopping experience for the customer. This system is based on RFID technology.

RFID technology makes use of radio waves to transfer the information between the reader and the movable RFID tag or card. RFID technology was invented amid early 1940's nevertheless it entered the mainstream amid 1990's and RFID tags were used for item labeling amid 2007 and beyond. RFID technology consists of three sections.

1. The antenna
2. The reader
3. The RFID tags which contains information

The antenna emits the radio sign to activate the tag; the reader encodes the information present in the RFID tags. The tag contains the memory chip attached to the antenna, There are two types of RFID tags available 1. Active Tags, 2. Passive Tags

An Active RFID tag contains its own transmitter along with its own power supply (which is normally a battery) for the transmission of information whereas a Passive RFID tag does not contain its own power supply, it trusts that the reader will send the energy to the antenna which is converted to the radio waves to transfer the information whenever the tag is present inside the read zone. RFID systems can operate at three different frequencies

Low Frequency (LF): operates at the frequency of 30 KHz to 300 KHz, and can be read inside a range of 10cm.

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High Frequency (HF): operates at the frequency of 3MHz to 30MHz, and can be read inside a range of 10cm to 1m.

Ultra-High Frequency (UHF): operates at the frequency of 300MHz to 3GHz, and can be read inside a range of 12m.

Our proposed system makes use of High-Frequency Passive tag. The information transmitted by the RFID tag is stored in the database and it is further processed by Raspberry pi3 to generate the programmed bill. The system makes use of Raspberry pi3 Model B. Raspberry pi3 is neither a microprocessor nor microcontroller, it is a little computer with the system on the chip (SoC), which contains a multi-core processor, I/O peripherals, USB port, ROM, RAM. Raspberry pi3 uses either free or open source software which helps in expanding the learning environment. It likewise provides processor sticks as GPIOs which are directly accessible and helps to understand the hardware implementation from the fundamental level.

II. RELATED WORK

A paper entitled "Arduino based smart cart" here gathering of people designed the smart cart in interesting manner; they likewise implemented the feature of security in it. The design of smart cart was like letter drop when item is dropped in it the entryway used to get closed consequently they will open only when the measure of the item was paid, yet this system had numerous downsides, for example, once the item is dropped and if the customer don't need purchase it the won't open unless payment is done. This system did not increase much notoriety because of this disadvantage [1].

A paper entitled "Intelligent shopping cart" here the shopping cart for speeding the charging process and used the Arduino microcontroller, and RFID tag and reader for selecting the items. Down to earth usage of these tag in shopping center is expensive and requires bunches of keeps up [2]. The creator in this paper discussed about use of WSN in IoT based application, the use of WSN in-health or human physiological monitoring, the user can interact utilizing different interface [3].

A paper entitled "RFID technology for IOT-based healthcare systems in smart spaces," The gathering of creators has explained about the use of RFID for personal healthcare, the device is used for monitoring the users health and gives remote assistances, the users can interact through any wireless communication medium, the sensors are able to detect the physical parameter of environment, for example, dampness, temperature and presences of dangerous agent [4]. A paper entitled "Future internet, the internet of things application, key challenges and architecture". The creator in this paper talked about the existing development trends, the generic architecture of IoT, its separate features and future application they additionally explained about key challenge associated with future IoT, for example, naming and standardization, information protection, object security, information encryption and network security. The creator additionally discussed about pervasive registering where processing of information is linked with each object that is encountered and IoT Security [5].

III. PROBLEM DEFINITIONS

In the existing system and as of related work we have done a large number of the papers and creators have stated the system of smart trolley yet not of the entire smart shopping system. Amid these days, shopping and obtaining items in shopping centers and supermarkets has become a day by day routine. In the vast majority of these shopping centers and supermarkets after the customer purchases the items and goes to the charging counter for paying the bill, the cashier uses barcode system to examine the item and generate the bill which is long and time consuming process and this leads to long queues at the charging counters. To overcome the above mentioned problem we have used RFID instead of barcode in our Smart Shopping System.

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Barcodes are continuous dark bars which contain some useful information and that information could be read by a scanner. Information in barcode can be recognized by measuring the width of bars and the distance between those bars. As we all realize that RFID stands for radio frequency identification, it uses radio waves to interact between an item and a system.

In our smart shopping system, we are replacing RFID instead of barcode because RFID has more advantages over barcode which are listed above. Barcodes needs sightline yet RFID does not need sightline. In case of a system which has barcode and if an item must be read/scanned, the item and the scanner must be placed directly in front of each other or else the barcode won't examine the item properly. In any case, in case of RFID it's not the same. Here the RFID reader and the item need not be in sightline because they use radio waves to communicate with each other.

Barcodes must be read yet RFID can be both read/write. Barcode system of shopping leads to heaps of confusion because barcodes must be read and they can't be rewritten. For example, if in a store, and if there is a markdown sale going on and if the store employee has forgotten to apply the rebate for a specific item then he can't have any significant bearing the rebate for the item once again because barcodes can't be rewritten/modified as needed. Yet, in case of RFID, the tags can be rewritten/modified as needed.

Barcodes are not durable but rather RFID are durable. On the off chance that any information must be written on a barcode, it must be printed on paper labels which are not very strong and can be easily damaged due to unforgiving climatic conditions and won't give proper results or else they are unreadable. In any case, in case of RFID they are normally protected by a hard case so they can withstand heat and brutal climatic conditions. Because of this present RFID's are more durable when compared to barcodes.

Barcode does not encrypt information but rather RFID can encrypt the information. Barcodes can easily be hacked and any outsider user can easily read the information because the information is constantly readable in barcode. In any case, in case of RFID, the information is very secure because the information is in an encrypted structure and it can't be easily read.

IV. IMPLEMENTATION

In our implementation framework, each savvy truck is outfitted with an UHF RFID peruser, a littler scale controller, a LCD contact screen, a Zigbee connector, and a weight sensor. The brilliant truck can normally peruse the things put into a truck by methods for the RFID peruser. "A little scale controller is introduced on the truck for data handling and a LCD contact screen is prepared as the UI. All together for the brilliant truck to speak with the server", we have picked Zigbee innovation (data trade reason) as it is low-control and cheap.

V. SYSTEM ARCHITECTURE

Every trolley is joined with Product Identification Device (PID). Through ZigBee correspondence, PID gadget sends its data to mechanized focal charging framework, where the net cost of all the obtained items is determined. Client can get their charging data at the charging or squeezing segment as shown by their trolley Identification Number. Indeed, even there is no requirement for a cash authority, if on the off chance that a client utilizes their charge/credit for the net bill installment. The robotized focal charging framework comprises of a ZigBee handset and a server/framework associated with access item database.

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Fig1: Central Automated Billing System product database

Hardware System Usage

Every trolley in general stores or strip malls is joined with one gadget which comprises of equipment segments, for instance, RFID peruser, little scale controller, EEPROM memory and LCD.

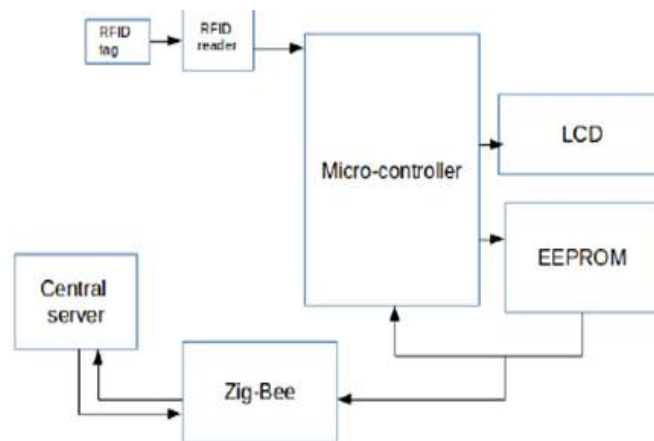


Fig2: Hardware architecture system

Working Environment

All trolleys in the grocery store are connected with the “gadget which contains the RFID peruser, microcontroller, Zigbee. So every trolley will send the thing data to the guideline charging server for determining the last bill of acquired things”.

To send data of every trolley we are using Zigbee as it has a few preferences over Bluetooth and Wi-Fi. “Working is begun when the client enters to the general store and takes the trolley. The RFID peruser in the trolley is combined to android application for bill age. At the point when the client puts the things the RFID peruser peruses the data, at that point it is send to the EPROM through the microcontroller. By using Zigbee this data is get sent to standard server for bringing cost of the thing, with the objective that cost subtleties are shown on the LCD appended to the trolley. If the client needs to expel the thing from the trolley, at that point cost of that thing gets subtracted from the outright bill in the midst of the procedure”. At long last the bill gets determined in the essential server.

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Algorithm Procedure

- Step1: Start
- Step2: Initiate the software
- Step3: Place the item in front RFID tag into trolley
- Step4: RFID reads the data of item
- Step5: Send data to micro processor
- Step6: Microcontroller transfer to ZigBee
- Step7: calculates the bill
- Step8: bill displayed in the lcd
- Step9: proceed otherwise step 12
- Step11: Server prints the bill
- Step12: Stop

Case Study

This segment builds up a model for IoT-empowered keen work shop creation and examines a Demonstrative case to confirm the practicality and proficiency of the proposed data examination technique. We have designed an IoT-empowered savvy work shop in our Lab, together with a keen distribution center. There are three workstations in the action shop, every one of them is joined with an exceptional dynamic RFID tag since they should be independently checked in the midst of their generation forms. There are in excess of 30 kinds of gathered heterogeneous generation data. To all the more likely comprehend the generation status in this brilliant occupation shop, we take the proposed strategies to break down the gathered data.

At first, when shrewd WIPs enter the savvy occupation shop, they impart and communicate with machine gadgets and other physical resources as shown by the procedure directions put away in the dynamic RFID labels. "If all the required physical resources are right and prepared, the primary procedure will be executed and after that the following. Furthermore, in the midst of the creation forms, RFID perusers and receiving wires gather the constant data of position changes of shrewd WIPs, vehicles, administrators, cutting-gadgets, and other streaming physical resources. Other IoT offices gather continuous data from encompassing condition and machining status. These continuous generation data are put away in the gathering database as shown by the proposed creation data model. Thirdly, by applying the proposed data examination strategy, the gathered constant creation data are converged into the continuous generation statuses, for instance, advance, current procedure, remaining weight of machine instrument and administrator, and material stream".

Plus, the gathered unquestionable RFID-based creation data are exhumed to produce generation related data, learning, and guidelines, which can be used for generation control and choice makings. "The present errand for him is No. 3 process (key seat preparing) of the Btype shaft. Another kind of exceptional job that needs to be done is the machine mechanical assembly's residual weight. The profile of EMCO Mill 55 is recorded and its residual job that needs to be done is 10 h-35 min-21 s on that day. Its present errand is No. 16 process (end handling) of the B-type shaft. This in like manner can be utilized for procedure observing. With the exception of the above administrative ramifications, the constant generation control can be figured it out". For instance, a data record in the database infers that #A2 shaft lands at the wrong workstation and the machine gadget at this workstation can't attempt its next procedure.

Thusly, a caution with point by point log jumps up instantly in the framework, which helps the chiefs to remember startling occasions. At that point, the brilliant WIP starts talking with other machine contraptions in the shrewd business shop to find a legitimate one as demonstrated by the preset guidelines and frequency relationship arrange. "From that point forward, the procedure direction is refreshed in the brilliant WIPs dynamic RFID tag. Note that this kind of generation control is continuous, self-ruling, and straightforward". Finally, through huge data examination,

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some shrouded guidelines and learning are accomplished. As the dispatching of various creation procedures can be abused.

With the exception of that, some other learning and guidelines can be abused from the recorded data to enable generation to control. "For instance, by processing the habitation time of savvy WIPs in the in-support and out-cradle of workstations, the generation hindering in various workstations can be uncovered. By building up a profound neural system (DNN)- based preparing time assessment model, the standard machining time for various highlights with various machining parameters on various machine mechanical assemblies can be anticipated. By figuring the extraordinary job that needs to be done of various cutting-mechanical assemblies", the cutting instrument lifetime expectation model can be attempted to remind the gadget developing.

VI. CONCLUSION

This work hopes to give learning into the RFID based creation data examination for generation control in the IoT empowered savvy business shops. Thusly the framework makes the modified bill of the bought things from the trolley using trolley number. This procedure spares the season of client and also decreased the work in the malls. So at last it turns into a least demanding technique for the shopping. The goal behind the application is that to supplanting the current cards based framework by android application. So the proposed goals were effectively accomplished in given framework.

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ISSN(Online): 2319-8753
ISSN (Print) : 2347-6710

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