

# Smart Trolley: A Fast And Smart Shopping Experience Using Android And Cloud

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**Abstract:** *In today's dates, purchasing and shopping at big malls is becoming daily activity. There is huge rush at such places during weekends. People purchase different items and put them in trolley, after that for paying the bill one has to wait in queue at the payment counter. In this paper, we are working on the idea to saves customers time by providing automatic billing system using Android application to avoid standing in queue at billing counter. In this system trolley is attached with an RFID reader and an android display which is connected through Bluetooth. The products are attached with the RFID tag. Purchasing product information will be read by RFID reader and the product information will get stored in the database at the Cloud. The bill will get generated at the android display in the trolley as well as on the server. The main aim of this paper is to provide automatic billing system using android application.*

**Keywords:** *RFID, Cloud, Bluetooth, Android, Automatic billing system.*

## I. INTRODUCTION

Since the beginning of mankind, human have always developed a technology to support the need. The motive behind the advancement in technology is to minimize task and make daily life easier and faster. It is found that, human beings are spending considerable amount of time in shopping. According to the survey on shopping, approximately most of the human spend 1.5 hours daily. Large numbers of customer walk out from queue, if the queue is very long. Present shopping environment can be divided into two class 1) Shopping in-person 2) Shopping in- absentia. Shopping in-absentia include online shopping, tele-shopping etc where the shopper or customer does not have to present physically. Shopping in-person involves a personal visit of a person to the malls, super market. The smart trolley concept intends to assist

shopping in-person which will help the human to minimize the amount time spent in shopping. The proposed system is based on four technologies:

- ✓ RFID tag for product identification
- ✓ Wi-Fi for achieving wireless communication with server
- ✓ Bluetooth
- 4) Android display.

Radio frequency identification (RFID) is a rapidly growing technology. It uses electromagnetic fields to automatically identify and track tags attached to object. The tags contain electronically stored information. RFID tags are of two types: 1) Active Tags 2) Passive Tags. Passive tags collect energy from nearby RFID readers interrogating radio waves. Active Tags have a local power source such as battery and may operate at hundreds of meters from the RFID reader.

Bluetooth is a wireless technology for exchanging data over short distance from fixed and mobile devices, and

building personal area networks. There are two important parameters of Bluetooth devices-class and supported profiles. Class signifies the gap at that a Bluetooth affiliation is feasible. Most mobile devices are class 2, which means they have a range up to 10m. Class 1 devices are rare and have a range up to 100 feet. A profile is a type of Bluetooth connection. The most common are the headset and hands free profile.

Cloud computing is a form of Internet-based computing that has shared pc process resources and information to computers and different devices on demand. it's a model for facultative omnipresent, on-demand access to a shared pool of configurable computing resources, which may be speedily provisioned and free with stripped management effort. Cloud computing and storage solutions offers users and enterprises with numerous capabilities to store and method their information in third-party information centres which will be set removed from the user move in distance from across a town to across the planet. Cloud computing depends on sharing of resources to attain coherence and economy of scale, like a utility over associate electricity network.

Android is a mobile package developed by Google, supported the UNIX operating system kernel and designed primarily for bit screen mobile devices like good phones and tablets. Android's program is principally supported direct manipulation, using bit gestures that loosely correspond to real-world actions, like swiping, sound and pinching, to control on-screen objects, beside a virtual keyboard for text input. In addition to the touch screen devices, Google has additional developed android TV for televisions, android motorcar for cars and android Wear for gliding joint watches, every with a specialized user interface. Variants of android are also used on notebooks, desktop game consoles, digital cameras, and different electronics

## II. LITERATURE SURVEY

- ✓ Amine Kampuche in "Aisle-level Scanning for Pervasive RFID-based Shopping Applications" [1] proposed a system that scan dynamic and static products using RFID Reader antennas. Aisle-level RFID observation is performed, instead of conducting the scanning at the level of individual carts.
- ✓ Satish Kamble in "Developing a Multitasking searching trolley car supported RFID Technology" [2] projected to develop a system that facilitate someone in terms of less time consume whereas buying, in everyday searching. The most objective of projected system is to supply a technology directed, low-cost, simply ascendible, and rugged system for aiding shopping in person.
- ✓ Mr. P. Chandrasekar in "Smart shopping cart with Automatic billing System through RFID and ZigBee" [3] projected to develop a cart with a Product Identification Device (PID) which can contain a microcontroller, a LCD, Associate in Nursing RFID reader, EEPROM, and ZigBee module. getting product info are scan through a RFID reader on cart, in the meantime product info are hold on into EEPROM connected to that and this EEPROM knowledge are send to Central charge System

through ZigBee module. The central charge system gets the cart info and EEPROM knowledge, it access the merchandise information and calculates the full quantity of buying for that individual cart.

- ✓ Ankit Anil Agarwal (Corresponding Author), Saurabh Kumar Sultania, Gaurav Jaiswal and Prateek Jain[4], Diana S.S.Santos, Antonio M.J Pereira and Ramiro M.R.M. Goncalves[5] have conferred the proposal of associate design associated resolution of an innovative system for acquisition of merchandise in grocery stores. S. Raghupathi and V. Karthikeyan[3] have enforced the design for automatic asking victimization Context Aware looking trolley (CAST) technology. Darren Black, Nils Jakob Clemmensen and Mikael B. Skov [8] have delineate concerning the benefits and downsides caused through the usage of forged technology. Zeeshan Ali, Reena Sonkusare [9] have developed system contains of Cart location detection unit (CLDU), Server Communication unit (SCU), user interface and show unit (UIDU) and billing and Inventory management unit (BIMU).
- ✓ Bichlien Hoang, Ashley Caudill[11] and Mandeep Kaur, Manjeet Sandhu, Neeraj Mohan, Parvinder S.Sandhu[16] have mentioned in short regarding radio frequency identification technology (RFID) i.e. its regulation, standards and therefore the areas wherever it are often applied supported its advantages.

## III. EXISTING SYSTEM

### A. PRESENT BILLING SYSTEM

Presently, Barcode method is available in the shopping malls. In that system, the product is scan by the cashier through the barcode scanner and we get the total bill. This results in a long queue when lots of products are to be scanned. Because of such a long queue the billing process becomes slow. In the survey we found that instead waiting in a long queue for the few items, the customers prefer to leave the mall. In order to solve the above problem, numbers of technological solution have seen in recent years. All the solutions have the same aim i.e. to save customer's time.

### B. RFID VS BARCODE

Both RFID and barcode are used for data collection. They help in automating the process of collecting data. Still they are different in many areas. If we compare RFID technology with barcode technology, it is found that RFID is more comprehensive than the barcode. To read, barcode scanner requires sline of sight. Whereas RFID does not requires line of sight. RFID tag can be read from greater distance. RFID reader can get information of the tag from a distance of 300 feet. Barcode technology can read from a distance less than 15 feet. RFID can read multiple tags simultaneously whereas barcode coded items can only be read individually. RFID technology is better than barcode technology in terms of speed. Barcode tags interpreted slower than RFID tag. Since

barcode requires direct line of sight, hence it is slower than RFID.

In one second RFID can interpret approximately 40 tags whereas barcode reader interprets two tags in the same time. RFID are not subjected to wear and tear because it is well protected. Since the interpretation of a barcode requires direct line of sight hence it has to be printed on the outer side of the product. Because of this barcodes are subjected to greater wear and tear. Because of this reutilization of barcode is not possible. Barcode lacks the facility of read and write, so adding information to existing is not possible. Whereas rewriting on RFID tag is possible. This is the main advantage of RFID tag over barcode.

### C. PROPOSED SYSTEM

Here we develop a system for automatic billing system in shopping malls. In mall, every product is attached with an RFID tag. The admin of the system creates the database on the cloud in which all the information about the product is maintained. In the trolley there will be an RFID reader which is connected with the android display using Bluetooth. The product is scanned through the RFID reader, and the product purchasing information gets stored in the database corresponding to the unique id generated by the server for the trolley. The total amount will be displayed to the user. After purchasing, the customer will pay the bill using the android application on their smart phone. For the customer who do not have smart phone they can make payment through desktop application provided by mall using the generated unique id. After all the payment processes, the purchased product get cross-checked at the exit gate and the RFID tag get removed.

### IV. SYSTEM ARCHITECTURE

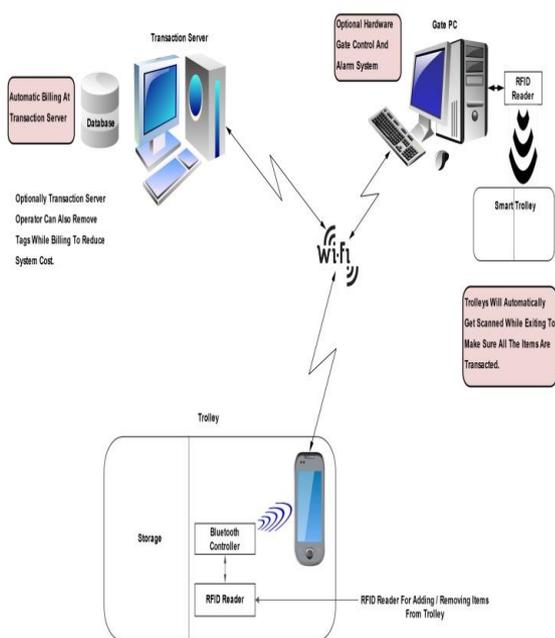


Figure 1: System Architecture

### V. MATHEMATICAL MODEL

Set Theory:

Let

$U = \{X, Y, SDB, C, P, R_{tag}, T, F_n, DD, NDD, Success, Failure\}$

where,

X is set of input.

$X = \{x_1, x_2, x_3\}$

$x_1$  = User Id for Login during payment.

$x_2$  = Password for Login.

$x_3$  = RFID tags for product identification.

Y is set if output.

$Y = \{y_1, y_2\}$

$Y_1$  = Total list and bill.

$Y_2$  = payment successfully.

SDB is the copy of the server database. This database is responsible for storing user information related to cloud interactions. The server is responsible for registering, authenticating and providing associations to the end user.

$SDB = \{UID, PWD, TID, PL, PD\}$

Database stored the information like,

- ✓ UID = User log ID
- ✓ PWD = Password.
- ✓ TID = Unique ID of trolley.
- ✓ PL = Purchased product list.
- ✓ PD = Payment detail.

C is a set of all clients using the server database and mining services from the server.

$C = \{c_1, c_2, c_3, \dots, c_n\}$

Clients are the customers of Super market or shopping mall.

P is set of products which tagged with the RFID tags. This is set of infinite products.

$P = \{P_1, P_2, \dots, P_n\}$

$R_{tag}$  is set of RFID tag which is placed on each product. It is infinite set of tags.

$R_{tag} = \{R_1, R_2, \dots, R_n\}$

T is set of Transactions in between user and the mall.

$T = \{t_1, t_2, \dots, t_n\}$

$F_n$  is set of functions used in system. Functions are communicate with each other for exchanging the information like user id, product details etc.

$F_n = \{f_1, f_2, \dots, f_n\}$

### VI. CONCLUSION

The system we proposed is useful for user and mall manager both. While developing this system we have considered all issues related to all the users of the system. Even if any customer doesn't know how to operate smart phone they can operate it. The product is very user friendly. To operate this, it does not require any special training. This system can be implemented at very low cost.

Our scheme will make the shopping process easy and also prove in saving customer's time.

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