

## Revolutionizing the Monotonous Marketing Style Intelligent Store

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### Abstract

*Retail stores today, the Supermarket for example, houses a very large variety of products in different departments. Navigation within departments of a large store is difficult many a times. Presently large billing lines leads to much of time wastage.*

*We discuss the methodology of an intelligent system that aims at solving all the problems discussed above while not significantly increasing the implementation cost.*

*We discuss the use of RFID technology to track location of the customer in the store and use it to identify the particular section the customer stands in, communicate offers, location and establish an intelligent purchasing environment. Offers for a particular section are then communicated to the customer as and when the customer steps into that section. The proposed system gives self checkout counters rather than the regular billing stations.*

**KEYWORDS:** *Intelligent store, RFID, Location based system*

Many a times the offers are not communicated properly. Billing is a time taking task due to limited number of employees and billing stations. Hence, customers need to stand for long in queues.

So, this paper aims at increasing the levels of customer satisfaction while optimizing profits. Our system is customer centric and at the same time it is user friendly and gives a different perspective to the users about the supermarket environment. Using RFID and mobile devices it is now possible to build up a completely convenient purchasing and commercial environment. This includes technologies like GPS, Infrared, RFID and Wireless Networks.

The proposed framework aims at combining various technologies to create "an intelligent purchasing environment with smart recommendation mechanism system" to give the customer the location updates of various departments on his visit to a store and communicate the offers available at a particular store. It also provides the self checkout counters which avoids time wastage and reduces the employee costs. This paper is divided into different sections. Section II provides an overview of research done in various technologies for location tracing and usage of RFID technology in systems.

### 1. Introduction

There has been a rapid transformation in the retail sector. These days we have supermarkets which are a larger form of traditional grocery store. Their basic appeal is the availability of a broad selection of goods under a single roof, at relatively low prices. So, the customers need to wander in different departments.

However, existing stores causes problem to the customers in identifying the location of various departments and goods in those departments.

### 2. Literature Review

Padmabhan et al [1] gave the concept of location aware services using RF technology. It gave a solution to the problem of user location and tracking in an in-building RF network. Their

approach is based on recording and processing real-time signal strength information.

Qasim Pata et al [2] in his paper attempts to introduce a location based Ad service for a supermarket. This will allow different vendors to a new style of marketing and deliver their ad as per user location in a super store.

CC Chang et al [3] proposed and tested an indoor guidance system based on the RFID. The RFID is mainly operated for indoor locating, using accurate location information and other necessary data into the tags. Installing RFID tags on paths in a building and connecting an RFID reader to the guidance system for data retrieval. The guidance system can, therefore, receive the location information from the RFID reader, provide the shortest routing operation, and work with the graphic and vocal interfaces to guide the users to their designated positions.

Syed Md. Shahid [4] talked about use of RFID technology in libraries. RFID can be used in library operations and theft detection systems. RFID-based systems can also be used as tracking systems that gives more efficient tracking of materials throughout the library.

### 3. Technology Used

Radio-frequency identification (RFID) uses radio frequency waves to transfer data for the purpose of identification or tracking tag placed on any item. It does not require line of sight or contact between the reader and tag of an item. An RFID tag is an object that can be almost applied to anything like product, animal, or person. RFID system has four components: RFID tags, Readers, Antenna, Server

#### 3.1. RFID Tags

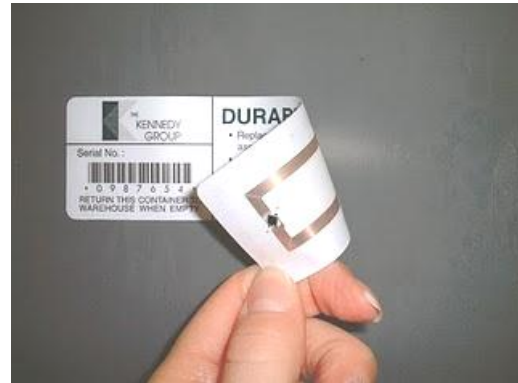
RFID tags contain at least two parts i.e. integrated circuit for storing and processing information and an antenna which receives and transmits the signal.

These are small transponders that can transmit identity information when identified by a reader. Each tag contains an engraved antenna and a microchip with a capacity of at least 64 bits.

Tags may be "read only", "WORM," and "read/write". Tags are "read only" if it has factory assigned number and not rewritable. "WORM" (Write-Once-Read-Many) tags can be

programmed by the user, but it could not be rewritten later. "Read/write tags," can have information changed or added multiple times.

Depending on the usage of battery tags could be of two types: active RFID tags, which contain a battery, and passive RFID tags, which have no battery. The tags nearly cost \$.40 to \$.75 each.



RFID Tag

#### 3.2. Readers

An RFID reader is composed of a radio frequency module, a control unit and an antenna to interrogate electronic tags via radio frequency (RF) communication. The reader uses an antenna to generate an RF field. When any tag passes through this field, the information stored on the tag is interpreted by the reader and communicated to the server.

#### 3.3. Antenna

The antenna is used to produce radio signals to activate the tag and read and write data to it. Antennas act as a channel between the tag and the reader. The electromagnetic field produced by an antenna can be constantly present when multiple tags are expected continually.

#### 3.4. Server

The server is quite important part of RFID systems. It acts as a communications gateway among the various components of a system. It receives the information from one or more of the readers and exchanges information and further acts accordingly.

## 4. Proposed Framework

An intelligent store could be developed using RFID technology for a location based system which eliminates the present anomalies of the system. This helps people find their areas of interest as they generally get confused in such large stores. It also helps in proper time management of both customers and the staff by avoiding the large queues for billing. Even the offers available to different customers are communicated efficiently.

### 4.1. Entry at a store

Whenever a fresh customer arrives at the Intelligent\_Store he/she is required to submit his/her information to the server and the required payment in order to obtain a smart card. Upon registration with the server the customer receives a smart card with an embedded passive RFID tag.

The customers that have already gotten them registered with the Intelligent\_Store just need to punch the smart card and the server will retrieve their information using their unique id. If the current balance of the customer is below Rs 500 the customer is alerted that he/she needs to recharge the account in order to make purchases. Upon authentication the user is allocated a cart which gets associated with ID assigned to the customer. It is embedded with a RFID tag, processor, display screen and a small range RFID reader.

### 4.2. Movement within a store

The store has been divided into multiple different departments like electronics, clothes. Each department has a RFID reader installed in it. The range of the readers depends on the usage.

Whenever any customer enters any department with his cart then the respective reader of the department reads that tag and interprets its information and sends it to the server. An RFID reader is composed of a radio frequency module, a control unit and an antenna to detect electronic tags. The reader uses an antenna to generate an RF field. When any tag passes through this field, the information stored on the tag is interpreted by the reader and communicated to the server. Then, the system

makes a message to be flashed on the screen of customer giving him the navigation details and makes it easier for him to move to different departments.

### 4.3. Shopping

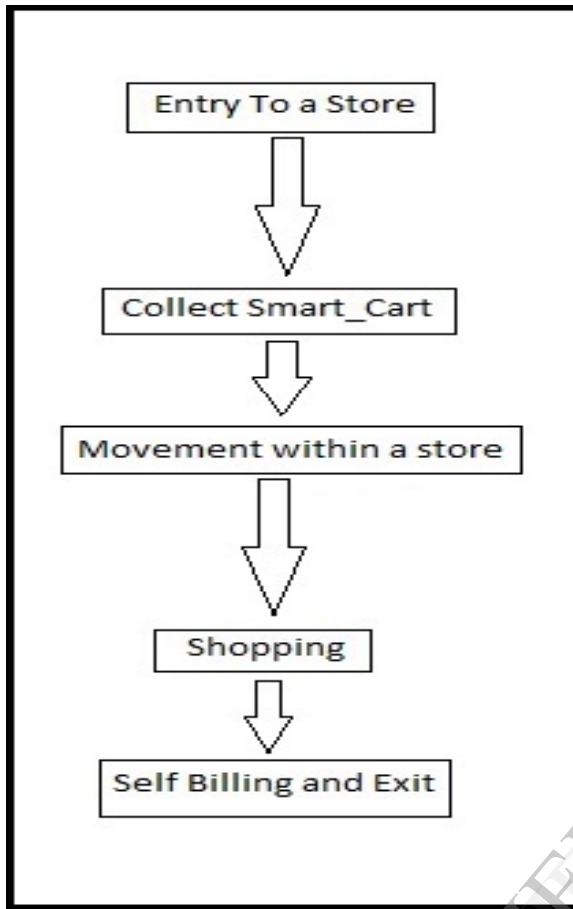
The soul of the system is the RFID tag, which is fixed on each product of the store. This tag has a programmable chip and an antenna. The paper-thin tag contains a microchip with a capacity of at least 64 bits. Products have a WORM tag ("Write-Once-Read-Many").

Whenever a customer picks up any product and adds it to his cart then the cart reader reads the product tag and communicates it to the cart server and then it checks the items added or removed. Further the cart processor performs all the transaction calculations and makes the balance flash on display of cart.

When the customer balance goes below Rs 500 an alert flashes on display screen of the trolley and asks the customer to get his card recharged. The server communicates various offers on the display of cart. Using the database purchasing patterns of a customer could be identified and data mining is applied to the data available to optimize the profits by giving special offers.

### 4.4. Self billing and exit

At the exit, the RFID reader has been installed with a billing machine which is programmed to perform the billing operations. Whenever a cart enters into that area the reader installed reads the tag of cart and extracts the whole transaction list from the cart processor. It produces the bill and then updates the card database with present details. Then the customer could make an exit.



Flow Graph

## 5. Conclusion

Coming towards the conclusion of the paper we would only like to say that markets these days are getting more and more competitive. In order to survive in these testing times each organization needs to innovate and experiment with new things. This is where our novel idea is directed towards optimizing profits, reducing efforts while increasing the levels of customer satisfaction comes into the picture. Our architecture includes an eclectic mix of fields like RFID technology, location tracking, market basket analysis. Our system is customer centric and at the same time it is user friendly and gives a different perspective to the users about the supermarket environment.

Though the system has one time installment but it's quite expensive as the readers and tags cost add up.

## 6. References

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