A Dynamic Retail Monitoring and Control System

Rahime Yilmaz*, Engin Mendi[†], Kenan Aydin[‡] and Coskun Bayrak[†]

*Computer Engineering Department, Istanbul University, Istanbul, Turkey
ryilmaz@iu.edu.tr

[†]Computer Science Department, University of Arkansas at Little Rock, AR, USA
{esmendi | cxbayrak}@ualr.edu

[‡]Management Department, Yildiz Technical University, Istanbul, Turkey
kenanaydin@gmail.com

[†]Computer Engineering Department, Istanbul Kultur University, Istanbul, Turkey
{e.mendi | c.bayrak}@iku.edu.tr

Abstract—Today, the real competitive advantage is highly dependent on businesses' technological developments. New technologies make all kinds of businesses to be much more aware about these developments. In retail marketing, if the unnecessary cost is somewhat avoided, consumers could benefit from not only the less expensive goods but also from the quality of service tremendously. In this paper, we describe a dynamic retail monitoring and control system to dynamically analyze the process, time, reliability and cost, between producer and consumer. We describe the key components of the system including Radio- Frequency Identification (RFID) technology to improve the quality of service through the guided service. The proposed system aims high return investment, reducing cost, raising revenue and improving customer satisfaction by providing an efficient inventory control for retailers and vendors.

I. INTRODUCTION

Rapid enhancements and developments in technology might be useful for providing advantage for consumer and producer. However, the most difficult problem is to please both of them at the same time, since each one has different agenda and expectation. Consumer wants to buy fast and cheap. At the same time, producer also wants to sell in a reliable way with in predefined time frame and cost. However, the cost, the time, and the required assurance are defined in terms of money. A guided look to see what technology has to offer brings tremendous excitements. Knowing that technology has the cutting edge to optimize any process using a centralized database, which is connected to a smart shelf via RFID, and a technologically enhanced smart shelf will not only meet the expectation but also improves the quality of service. Therefore, the proposed system provides a guided turn-around for both parties.

II. SYSTEM OVERVIEW

We propose a dynamic retail monitoring and control system to provide significant cost savings across the supply chain and speed up the shopping experience. It has two main components: RFID-based system and a guidance software. RFID-based system will use the RFID technology and ease the process flow among maker, wholesaler, retailer, and consumer. RFID is a wireless sensor technology which is based on the detection of electromagnetic signal [1]. RFID technology has an opportunity to enterprise wide technology with inter-organizational implications in the same tendency as the Internet and networked PCs. This can bring both business process and society fundemantal changes. It can improve information sharing in process flow [2] (Figure 1) among makers, wholesalers, retailers and consumers in real time. The guidance software is an ergonomic user-centric guidance application that will help consumers to shop more easily and quickly. It will communice RFID-based system will help consumers to shop in an efficient manner. It will have friendly user interface guiding the shopper to search items in the department store. As the locations of the items are specified by the department stores, consumers do not have to search where the items are. The intelligent guidance application will suggest the path of the item in the store, so that consumer save time during the shopping. The directions of the path will be displayed on the interface of the application.

III. RESEARCH METHODOLOGY

The proposed system is a promising solution to provide significant cost savings across the process flow in retail sector as well as speed up the shopping experience. It is composed of two modules: RFID-based system and a guidance application. The overview of the proposed RFID-based system is given in Figure 2. The technology contains smart shopping trolley that provides automatic registration. The smart shopping trolley has an interactive screen and scanner to the holder facing the customized shopping card enables the list of products to appear on the screen and shopping trolley can interact with the shelves so shopper could see an advertisement or an offer about products. In addition, it presents suggested list by alerting shopper to discounts or inventory information. During the shopping, when the shopper puts a product in shopping trolley, price of product appears on the screen, with the help of the smart technology. At the end of shopping, shopper do not have to scan the items one by one thanks to RFID antenna and RFID reader so it has saved time and money and provide privacy for the people. RFID antenna is the conduits for the communication of data between the tag and the reader. RFID antenna has a reading range both sideways and in front of the antenna.

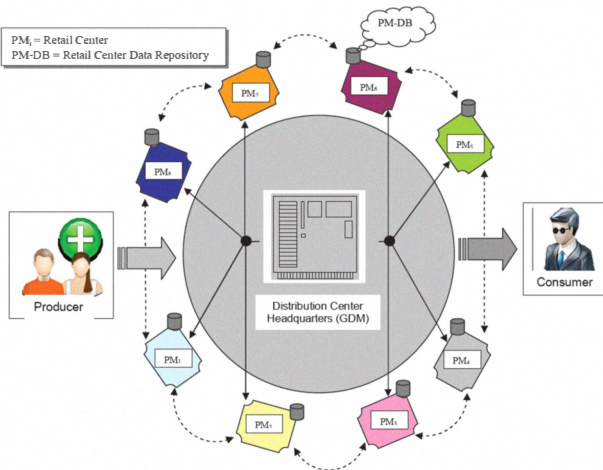Fig. 1: Process flow among maker, wholesaler, retail and consumer.

Fig. 2: The overview of the RFID-based system.

and transferred to a server through a computer network.

The proposed guidance software aims to provide easier and quicker shopping experience. It will be communicating RFID-based system and guide shopper through the shelves in the supermarket. The user-friendly interface of the application will be easy to use. The aim of the application is to provide specific information such as location, price, promotion, and consumer review, of the product that shopper interested in.. So that shopper will be able to save lots of time from searching the location of the item in the whole supermarket.
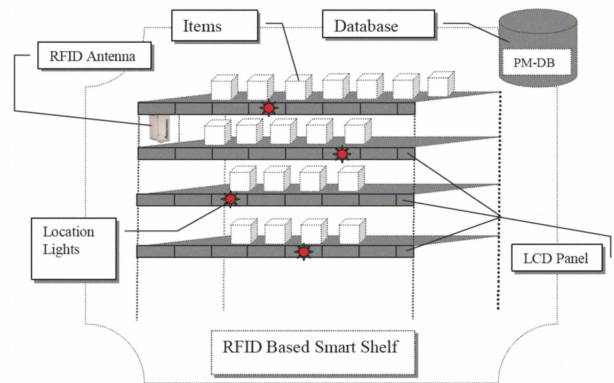
Antenna design and placement play a significant part in determining the coverage zone, range, and accuracy of communication of a tag consisting of an integrated circuit with memory, which is essentially a microprocessor chip, because the antenna both draws energy from the reader's signal to energize the tag and sends the data that are received from the reader [3]. Figure 3 illustrates a RFID antenna and LCD panel on a supermarket shelf. The reader consists typically of a transmitter and receiver, a control unit and a coupling element (antenna) to interact with the transponder [4]. RFID reader is a device that can read data from and write data to compatible RFID tags. Communication between tag and reader activates the location information of an item to be recorded

Fig. 3: RFID antenna and LCD panel on a supermarket shelf.

IV. Conclusion and Discussion

The proposed idea of dynamic retail monitoring and control System is uniqe and therefore introduces a cutting edge innovation. Today, commonly used technologies in retail sector are optic reader based systems. However, our system have

many advantages as compared to exisiting systems in terms of cost, time, and reliability.

Our system can reduce labour intensive operations with sensors tracking items needed to check inventory and facilitation of self-scan checkouts. Companies do not need to review inventory, since updating takes place in real time and informations about current levels of stock are much more accurate. The system can also facilitates the selling process. Retailers install RFID readers in stores with digital displays, it can help consumers in their search for product of interest or to provide them with information about certain product. In addition, product tracking enables real time response to decreased stocks either in the warehouse or on the supermarket shelves.

In the European Union 50% of the reported product innovations and 75% of the process innovations were enabled due to the use of iformation tchnology, some examples are: (Mobile) payment systems, anticounterfeiting solutions, sensornetworks, improved patient monitoring in hospitals, and especially innovations labeled as "smart product" [5]. According to the e-Business report of European Commision [6], RFID technology is more widely used in the US than Europe. The report [6] claims that RFID is more advanced technology than the existing ones in retail sector. The proposed dynamic retail monitoring and control system offers an enourmous potential for an innovative concept in terms of more accurate information, substitution of labor, improved tracking capabilities, integration of physical items with data identifier, and easy shopping experience.

Additionally, regarding RFID, other countries (particularly the USA) are already one step ahead of Europe - as they were with the adoption and diffusion, and the investments in IT years before - and are now reaping the fruits of these early decisive moves [5]. Therefore, our system appears to be a promising technology competing with a higher productivity and higher quality products.

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