Research Article
The Design and Implementation of Eggs' Traceability System Based on Mobile QR Code

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Abstract: The study proposed an egg package tracing system which is composed of mobile phone software, database management system, server system, also includes egg production, sale information, transportation, inurement, communication with costumers' functions according to the tracking and tracing requirements of food supply chain management and quality and safety. The design describes Mobile phone client software system, the background data management system and the server database system modules of achieving food tracking management, detailed electronic trace information about food could be inquired through Web Service or intelligent mobile phones or other devices.

Keywords: 2D barcode, egg tracing, food safety, internet of things

INTRODUCTION

The development of food industry has been gradually refined and tends to the mode of global trade and the specialization of production mode and the channels of providing food are also increasingly complex. Food safety involves in every aspect of the whole process of food production, processing, storage, transportation, sale and so on (Le *et al.*, 2013). From the initial processing of raw materials to the final arrival in the hands of consumers, food has to experience more and more links. Why? On the one hand, the increase of the intermediate links that food experiences from processing to consumption improves the probability of causing the food security problems to some extent; On the other hand, along with the increasing number of food suppliers and vendors, some unscrupulous businessmen, under the drive of the interests, choose to take actions that go against the social development which keeps food safety problems emerging and leads to further deterioration. A great number of food safety problems have been occurred in recent years, from melamine milk powder to Sudan Red eggs and from Shuanghui clenbuterol to watermelon expansion and to the smoked wolf berry by sulfur incident lately, which all show the serious security problems of China without exception. Some cannot be resolved promptly and effectively because of the lace of accurate traceability resulting in safety issues.

In this study, the application of two-dimensional code combining with mobile client portfolio will be used to design a safe, reliable and low-cost system of egg package traceability which has vital significance to the prevention of the occurrence of food security incidents.

MATERIALS AND METHODS

A specialized agricultural product "Yang Zigou Egg" is taken as an example in this study, for that it is known as "ginseng in eggs" with the characteristics of high iodine, high selenium, high zinc and low cholesterol, etc., making it not only has a high nutritional value and unique flavor, but also easy to digest and to be promoted and received. On the basis of the large collection of egg production and management dates as well as the analysis of the influential factors of the egg's quality safety, this research is going to develop the egg package traceability system based on the mobile two-dimensional code. This system firstly supervises the whole process of egg production in the way of surveillance video and then saves it into a video database. Meanwhile, a platform makes record of the entire process of egg production through the wireless networking technology and the collected production information will be stored in a powerful database in order to facilitate unified manage and comprehensive inquiry. This platform will also build an information collection system based on the wireless networking in the sections of egg transportation and sale in supermarkets, thus can make a full track of eggs from production process in farms, transportation and sale and the tracked information is also stored in the powerful database of this platform. Finally, consumers can trace the terminal fixedly via mobile client or scan the two-dimensional code label pasted on the surface of eggs to watch the egg production videos and the detailed data

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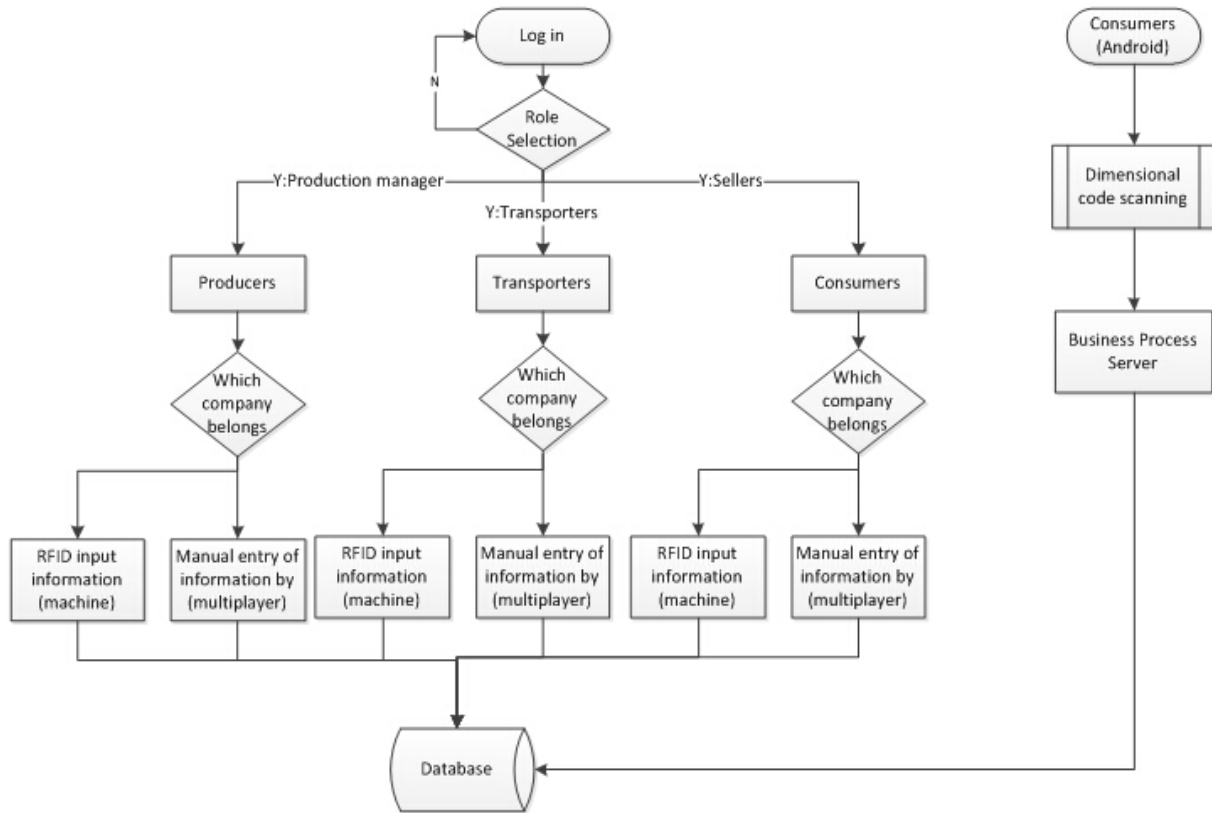
Fig. 1: Egg package information tracing system

throughout transportation in order that they better understand the source and the sale process of eggs they buy. The foreground mobile program of this system is responsible for the data scanning, entry, query, analysis and management and the data system is mainly used to save egg traceability data and generates the corresponding mobile two-dimensional code in accordance with package traceability information, while the server system is primarily used for functions such as data transfer and management and so on (Anderson, 2001). The topological structure of this system is shown in Fig. 1.

In this system, each node has its own dependent server to store data, while the local server saves the EPC code and the mapping information of server address and puts them into the root server. In such a way, the consumers have access to root server and obtain the local server address corresponding EPC code and then get EPCIS server address and through this address to access the server to get the product information in the platform of integrated query management system.

RESULTS AND DISCUSSION

The design and analysis of system: In order to implement such a traceability system of egg packaging information based on mobile two-dimensional code, it demands that this system should be equipped with the

information of egg production and sale, but also including the transportation and sale inquiries, consumer inquiry and communication functions, as well as mobile two-dimensional code generated from package data and the mobile two-dimensional inquiry function. Therefore, this system is designed into three parts, mobile client software and data management and server database (Donald, 2009).

Requirements analysis: Through investigation and analysis, this system is fully integrated the characteristics of the current featured packing with the traceability system of product quality safety according to the mobile Internet and a variety of computer techniques. Therefore, this system synthesizes the conditions of business activities and data usage of mobile users and studies the types, scope and quantity of data as well as the communicative conditions they are in the business activities to meet the overall requirements of this system on the condition of ensuring its own normativity.

Mobile QR coding process: Mobile phone QR code information need to be encoded. Process mainly includes the analysis of information, encoding information data in order to get the most accurate data through rectifying and correction process. The process is as follows in Fig. 2.
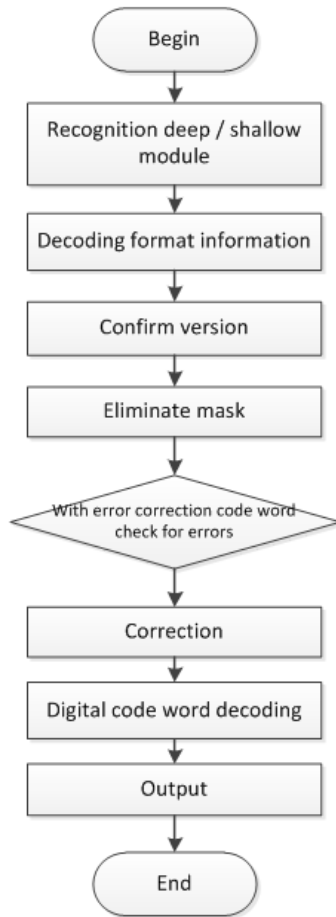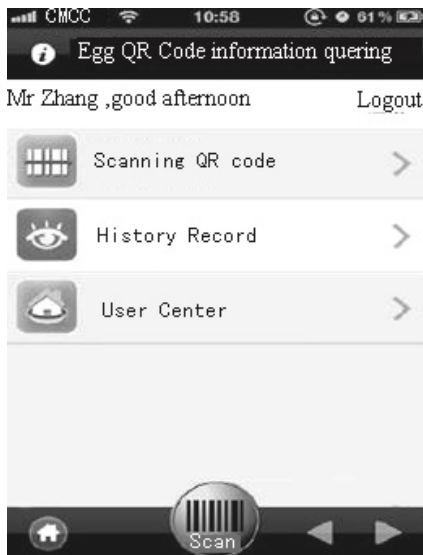
Fig. 2: Qr code coding process

Mobile client software system: Mobile Client System mainly includes the scanning and analysis of the two-dimensional code put on the eggs' outer packing by users via mobiles and the presentation of the results of data obtained from the above analysis in a decoding way (Wang *et al.*, 2014). It can query according to the keywords of the mobile users' information by sending the results of requests to the server and querying the detailed information of the traceability and ultimately showing the query results on the mobile interface and meanwhile it can also save the scanned image of two-dimensional code and query history to avoid repeatedly querying which make it become convenient to use. As seen in Fig. 3.

CONCLUSION

Food security is relevant to the vital interests of the people and the long-term stability of the country. This system is a typical example that uses the computer techniques and mobile Internet technology to realize the traceability intelligently on the basis of mobile two-dimensional code traceability system of egg package (Qing, 2004). From the requirements analysis to the structural analysis and many other aspects, we design this optimized system and introduce the construction and the implementation of it in the technical aspects, thus improving its efficiency and providing the traceability of other products packaging information with theories and data support in a further way.

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Fig. 3: The client querying page