

Research Article

Food Security Information Platform Model Based on Internet of Things

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Abstract: According to the tracking and tracing requirements of food supply chain management and quality and safety, this study built food security information platform using the Internet of things technology, with reference to the EPC standard, the use of RFID technology, adopting the model of SOA, based on SCOR core processes, researches the food security information platform which can set up the whole process from the source to the consumption of the traceability information, provides food information, strengthens the food identity verification, prevents food identification and information of error identification to the consumer and government food safety regulators, provides good practices for food safety traceability.

Keywords: Food security information platform, RFID technology, the internet of things

INTRODUCTION

In recent years, the Internet of Things (IOT) as an international research hotspot, have obtained broad attention. It's represents the future trend of development of the network and requires sharing interoperability and information, so as to realize human society, the information space, the physical world ternary comprehensive connectivity and integration as the goal. Therefore, the Internet of things is regarded as the third technological revolution in information field.

In IOT, due to the large number of sensors, individual sensor nodes with limited resources and processing capacity and have highly redundant data, transmit the data to sink node separate method is not reasonable in the collection of information in the process of using each node. To consider the accurate degree of data, network performance, resource consumption and reliability constraints, solve the associated data between nodes, sharing and integration (Min and Jin, 2010). The fusion performance in wireless sensor networks, the algorithm should be simple, easy to implement and reduce resource and energy costs.

An important feature of IOT network is data-centric, data processing is a key problem in IOT, largely determine the performance of the network. IOT nodes are generally battery-powered node energy is limited. How to save node energy and prolong the life of Yes IOT research is a key issue. In this study, a large-scale and high density IOT as research background, for its data collection, transmission, storage process, the problems, the introduction of compressed sensing theory, the focus of research networks in the process of collecting large amounts of

data present in large amount of data problems. In precision security IOT, the general area of relatively is large, relatively large amount of information acquisition.

This paper proposed the food supply chain requirements model based on the Internet of things technology, developed the food safety information platform and carried on the monitor, analyzed which can help realize monitoring from food source to the final consumer, provide all-round, multi-angle services to the enterprise, government and the public.

MATERIALS AND METHODS

System architecture: The system consists of food security information data center, food safety regulatory information platform and food safety information application system. The system structure adopted with engineering standard components and modular platform function design to facilitate future extensibility and openness of the system. As shown in Fig. 1.

Consumers through a variety of ways as the supermarket kiosk, smart phone and the Internet get what they buy (Lu, 2011). Consumers after buying food, through the RFID electronic tag identification terminals, smart phones or input food QR code, bar code, etc., can query the main information of the food in the circulation links: Whether the manufacturer of the product is registered and recorded, whether food comes from formal channels, whether excessive food exceeds standard and check the production date, batch of the product and whether the manufacturer in the administrative department for industry and commerce for the record, etc. As shown in Fig. 2.

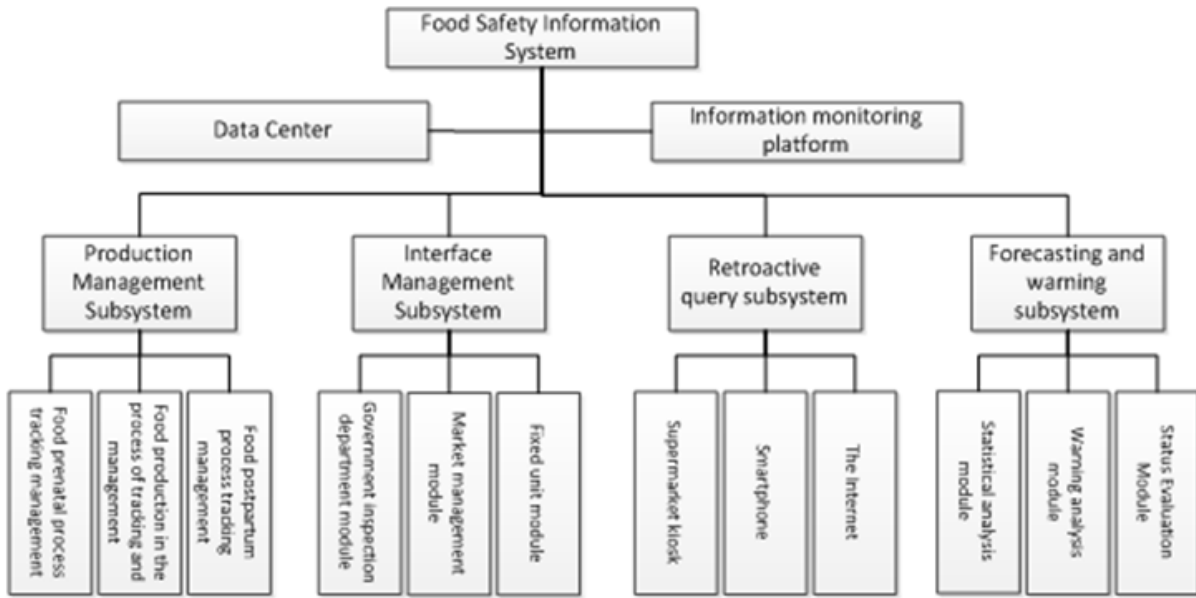


Fig. 1: System architecture

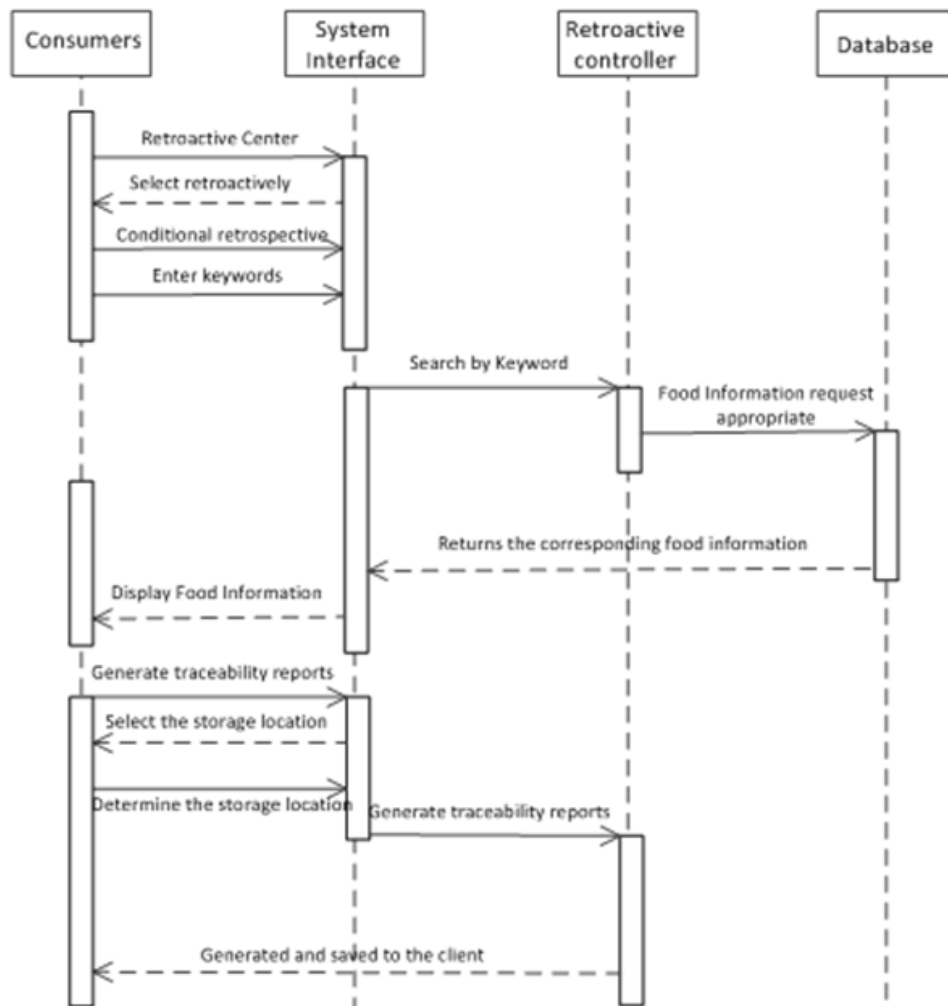


Fig. 2: Sequence chart

Based on the above method, the paper proposed RFID comprehensive management system applied in some food enterprise. RFID child tags applied to excellent cake in production, processing, transportation and sales for the whole monitoring and management, which include item raw materials, additives, packaging materials and packing labels writing, sales, warehouse management, RFID application outbound RFID logistics distribution and other functions. RFID integrated management system is a good way to track and manage each batch of pastry and production circulation information query, etc.

Electronic tag design: Electronic tag read operation interface in the system. Click on the "read card" button that can read out the card ID number and EPC fixed information displaying in the "data" column (Cao and Yala, 2007). The user can read the commodity by RFID electronic tag, through the RFID fixed equipment, which has the function of RFID reader shouting distance smartphone, through Web Service services and SMS accessing product traceability query platform, embed the content of the query encapsulated within a query Service, users can get the basic information of the food.

RESULTS AND DISCUSSION

Tracing subsystem design: Food traceability information including basic information, food processing and inspecting record, enterprise qualified information, food additives and raw materials, raw material purchasing, sales information. In addition to food and production enterprise information, other records can be obtained by the foreign key processing batch directly or indirectly (logistics information need food name.) these records information can be accessed to obtained with Hibernate strategy.

In addition, because as a subclass of raw materials, additives can design them in the same list, after putting the additive and raw material record out, we also need to judge "the biggest standard" to add quantity biggest judgment, distinguish what is additive and which is the raw material.

Furthermore, when designing query stock information, we should get the first piece of food raw materials and additives to add into record list, as a method of querying stock information parameter, return every stock information adding the additives into the record. Traceability information queries involving multiple business logic including FoodInfoService, ProRecodService, DeliOrderService etc.

Specific process is as follows: according to the serial number and batch processing, food information are obtained through FoodInfoService (FoodInfoTb),

using Hibernate to load food production enterprise information (CompanyTb); According to the number of the enterprise, through QlfService qualification information List is obtained (List<QlfList>).

According to the processing records, food inspection report of information is obtained through ReportService (ReportTb); According to the batch processing, obtained through ProRecordService through add records to the Hibernate load additives (including raw materials), (the Set<AddTb>), logistics information (Set<DistrTb>) and control points monitoring records (Set<CpointTb>); According to the standard maximum allowable amount is greater than zero, raw materials and additives will add record (Set<AddTb>) to record information in separate, constituting additive record list (additiveList) and add records to the raw material list (rawMaterialList), respectively; According to additives and raw materials, through DeliOrderService for additive and raw material stock information (a List<DeliOrderTb>); Logistics information (Set<DistrTb>) and the control points monitoring records (Set<CpointTb>) is converted into a logistics information List (List<DistrTb>) and the control points monitoring record List (List<CpointTb>).

According to the above food traceability system, the products raw material information and attribute maintained by the manufacturer of database, the EPCIS events database provide logistics information of food production and circulation process, record and query process (Wang and Wang, 2009). The information can be queried through product traceability including the basic information of products, product name, manufacturer, production date, inspection conclusion, the supply chain process list and sales records, etc.

Generate traceability information report: Another important part of food traceability report function is how to query trace information into PDF and provides the corresponding data flow for users to download to the browser. For the former we can use iText writing traceability information into PDF and bound to a set of data flow. Through the Struts framework ByteArrayOutputStream will be output to the browser, the browser will prompt the user to download, so that users can download the report.

Terminal structure: TD-SCDMA/3G/3G wireless communication control module and ARM microprocessor are adopted, food electronic tag code with RFID reader will be sent to the ARM microprocessor, ARM microprocessor memory in the terminal database query that food and food safety will query to the transmission of food safety information to the terminal display, printer and voice system and other output devices. Terminal and food safety platform

exchanged data through data transmission and update in real time.

CONCLUSION

The Internet of thing is one of the hot spot in the systems and information industry currently, its application prospect is very broad the study using Internet of Things technologies, referring to the EPC standards, a food security information system platform model that based on Internet of Things and service oriented architecture has been put forward (Zhu and Yang, 2010). The design describes E-R model, network architecture, technology framework and functional modules of achieving food tracking management by RFID technologies on the basis of Internet. Detailed electronic trace information about food could be inquired through Web Service or intelligent mobile phones or other devices.

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