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# FOOD SAFETY TRACEABILITY SYSTEM FOR PEOPLES HEALTH UNDER INTERNET OF THINGS AND BIG DATA

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**ABSTRACT:**

In the context of epidemic prevention and control, food safety monitoring, data analysis and food safety traceability have become more important. At the same time, the most important reason for food safety issues is incomplete, opaque, and asymmetric information. The most fundamental way to solve these problems is to do a good job of traceability, and establish a reasonable and reliable food safety traceability system. The traceability system is currently an important means to ensure food quality and safety and solve the crisis of trust between consumers and the market. Research on food safety traceability systems based on big data, artificial intelligence and the Internet of Things provides ideas and methods to solve the problems of low credibility and difficult data storage in the application of traditional traceability systems. Therefore, this research takes rice as an example and proposes a food safety traceability system based on RFID two dimensional code technology and big data storage technology in the Internet of Things. This article applies RFID technology to the entire system by analyzing the requirements of the system, designing the system database and database tables, encoding the two-dimensional code and generating the design for information entry. Using RFID radio frequency technology and the data storage function in big data to obtain information in the food production process. Finally, the whole process of food production information can be traced through the design of dynamic query platform and mobile terminal. In this research, the food safety traceability system based on big data and the Internet of Things guarantees the integrity, reliability and safety of traceability information from a technical level. This is an effective solution for enhancing the credibility of traceability information, ensuring the integrity of information, and optimizing the data storage structure.

***Keywords: Big data, Food safety, RFID, AI.***

## INTRODUCTION

As the global new crown virus (COVID-19) epidemic intensifies, there are more and more cases of COVID-19 spreading through cold chain logistics channels. COVID-19 has become the most important source of hazards to food safety in the cold chain logistics process. Although the overall prevention and control situation of our country's new corona virus pneumonia epidemic continues to improve, the accelerated spread of the overseas epidemic has led to the domestic epidemic prevention situation of "foreign import and internal prevention" is still severe. In the context of epidemic prevention and control, food safety monitoring, data analysis, and food safety traceability have become more important. Especially for cold chain food imported from overseas, every food should be monitored and traced to prevent the spread of COVID-19 virus and protect the health and safety of the population. Therefore, the establishment of a safe and reliable food safety traceability management system is an urgent requirement of the society and the people, and it is also an effective way to fundamentally solve the post-epidemic era and protect the health of the population. The food safety traceability management system is based on automatic identification and information technology to integrate information in the entire chain of food production, processing, storage, transportation and sales. A comprehensive service management platform that is presented to users an consumers in real time through the Internet, terminals, phone calls, and text messages. At the same time, the food safety traceability system involves food planting (breeding) purchase links, enterprise processing (packaging) links, storage and logistics links, and sales links [1,2]. Through the I formation traceability mechanism, the responsible body of each link of food production and circulation can b clarified, so as to more effectively control the safety and reliability of breeding (planting), processing, and transportation, and indeed prevent various food safety risks, and protect the people’s safety and health.

## LITERATURE SURVEY

[1] An improved traceability system for food quality assurance and evaluation based on fuzzy classification and neural network, AUTHORS : J. Wang, H. Yue, and Z. Zhou explain Currently, the food safety incidents happened frequently in china and the customer confidence declined rapidly, then the problems related to food quality and safety have attracted more and more social attention. Considering the concern with regard to food quality assurance and consumer confidence improvement, many companies have developed a traceability system to visualize the supply chain and avoid food safety incidents. In this paper, we proposed an improved food traceability system which can not only achieve forward tracking and diverse tracing like the existing systems do, but also evaluate the food quality timely along the supply chain and provide consumers with these evaluating information, to mainly enhance the consumer experience and help firms gain the trust of consumers.

[2] Heavy metal contamination in food Due to the illegal disposal of waste water by some industrial and mining enterprises in cities and countrysides, the drinking water source of humans and livestock, as well as irrigation water source of crops in some areas, are polluted by excessive amounts of heavy metal elements such as lead, tin, mercury, and zinc etc., which is harmful to human health. When drinking water and agricultural foods contaminated with these heavy metal elements enter the human body, they will cause great harm to people's health. In addition, some packaging papers, packaging bags, and stainless steel utensils used to hold food are also significant sources of heavy metal pollution, introducing metals.

[3] The use of inferior raw materials in the manufacturing and processing of food poses a great risk to food safety Examples include processing cooked meat products from sick poultry and livestock, processing fried foods with illegally recycled waste cooking oil, and “water-injected pork” (supplying water to pigs is equivalent to poisoning, and it is extremely harmful to the human body after eaten). If these inferior raw materials with safety hazards are not removed and dealt with properly, they may evolve into food safety accidents that endanger the health of consumers.

## EXISTING SYSTEM

In recent years, food safety issues have drawn growing concerns from society. In order to efficiently detect and prevent food safety problems and trace the accountability, building a reliable traceability system is indispensable. It is especially essential to accurately record, share and trace the specific data within the whole food supply chain including the process of production, processing, warehousing, transportation and retail. Traditional traceability systems have issues such as data invisibility, tampering and sensitive information disclosure.

Blockchain is a promising technology for food safety traceability system because of the characteristics such as irreversible time vector, smart contract, consensus algorithm, etc. The existing system provides a food safety traceability system based on blockchain and EPC Information Services (EPCIS), and develops a prototype system. A management architecture of on-chain & off-chain data is proposed as well, through which the traceability system can alleviate the data explosion issue of the blockchain for Internet of Things (IoT).

## PROPOSED SYSTEM

The proposed system implements a food safety traceability system based on RFID technology and big data storage technology in the Internet of Things. The use of the Internet of Things and big data technology has realized the data collection of various food data. The use of RFID technology to realize automatic recording of relevant parameters avoids the contamination of food product traceability information caused by manual data input. At the same time, a set of small food industry data search engine was designed and implemented by using big data analysis technology. The traditional traceability system is integrated with the Internet of Things and big data technology to realize the traceability of the entire agricultural production process of agricultural and sideline products such as planting, processing, testing, warehousing, transportation, and sales. This ensured that the source of agricultural and sideline products can be traced, flow can be traced, information can be inquired, and responsibilities can be held accountable to protect people's health and food safety. The food safety traceability system constructed in this

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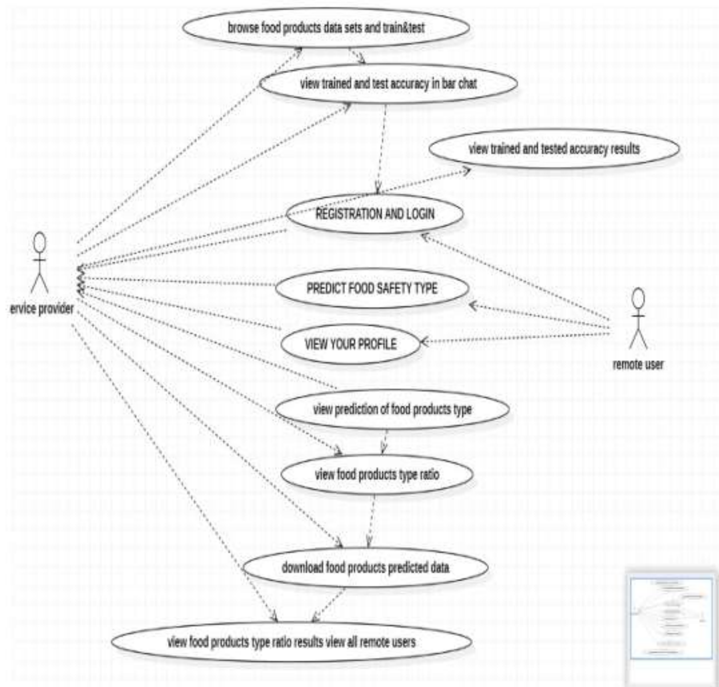
research has a perceivable realization process, traceability of the source, and early warning of risks. This is of great significance for improving the management level of China's food quality and safety, preventing food safety accidents, maintaining the balance of supply and demand, and ensuring people's health and safety.

## WORKING METHODOLOGY

There are two types of transaction data that will be stored in the blockchain. One is that generated from traditional ERP legacy systems, such as the trade, logistics, delivery, warehousing information, etc. The second is that generated from IoT devices, such as the air temperature, air humidity, soil PH, soil nutrition, ground moisture data etc. After hashing and digital signing, those data will be sent to the entire nodes of the blockchain system directly or through the IoT gateways, where they will be verified, added into transaction pool, and stored into the blockchain. Customers can use their computers or mobile phones to retrieve all transaction data and verify them. For example, one buys a box of milk from a supermarket, and then he/she can use a smart phone to scan the 2-D barcode to retrieve all transaction data related to it, including which farm the milk was produced from, on which day and time it was produced, the ID of cow in the farm, the ID of the staff who collected the milk, collecting device information, packaging information, all the temperature and other environment data for the milk's production, process, logistics, storage, etc. All that information can be verified by the blockchain system without human intervention.




Component diagrams are one of the two kinds of diagrams found in modeling the physical aspects of object-oriented systems. A component diagram shows the organization and dependencies among a set of components. We use

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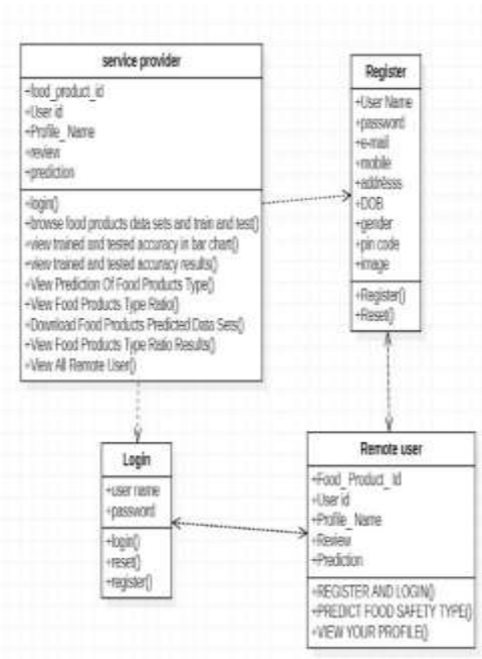
component diagrams to model the static implementation view of a system. This involves modeling the physical things that reside on a node, such as executables, libraries, tables, files, and documents. Component diagrams are essentially class diagrams that focus on a system's components. A component diagram shows a set of components and their relationships. Graphically, a component diagram is a collection of vertices and arcs.




Our ecosystem involves the traditional ERP (Enterprise Resource Planning) legacy system and a new IoT system. Farm companies, farming processing plants, plantation companies, planting processing plants, logistics companies and food retail storefronts as well as the customers can use their smart mobile phone as a portal or blockchain thin node to access the data stored in the chain. The core of the whole architecture is a virtual Trusted Trade Blockchain Network Cloud Platform (TTBNCP), which can help us to establish a trusted, self-organized, open and ecological smart agriculture application system.

## CONCLUSION

In summary, blockchain and IoT technologies can help us to build a trusted, self-organized, open and ecological smart agriculture system, which involves all parties in the ecosystem, even if they may not trust each other. To the best of our knowledge, this is the first work that applies blockchain technology and IoT technology on traditional smart agriculture ecosystems to solve food safety issues. The proposed method tries to use IoT devices instead of manual recording and verification, which reduces human intervention in the system effectively. In the future, we also can use the smart contract script technology to define a set of automated warning code in the system, to help law enforcement find problems and process them in a timely manner.

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