Chapter 15
Enhancing Traceability in Food Supply Chains Using Blockchain and IoT Technologies

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ABSTRACT

The work centers around a connected viewpoint intended for the problematic information interface between blockchain and IoT for further developing information provenance and uprightness. The examination draws on the author's industry-based experience driving a two-year AUD 1.5 million undertaking that elaborates on the coordination of IoT and blockchain to follow and safeguard the legitimacy of Australian meat in the quickly developing Chinese market. The plan drove the system to direct the improvement of the food production network project as a particular mix of IoT and blockchain to a specific food store network context. The presentation can change the prophet's personality. The information legitimacy rehearses instead of looking for the unadulterated fact of the matter and crypto financial aspects. The suggestion uses a different methodology to enhance the traceability of the product. It uses a Merkle tree to generate hash keys. It detects security breaches by 2.93% and improves client satisfaction by 9.96% compared to previous work.

INTRODUCTION

The capabilities to sense, actuate, and communicate over the Internet are provided by a collection of technology. It is known as the Internet of Things (Abdel-Basset, Manogaran, & Mohamed, 2018; Alghofaili & Rassam, 2022). These technologies range from Radio Frequency Identification to Wireless Sensor Networks. The Internet of Things (Nagaraj, 2021) is crucial to transforming conventional cities into smart cities, electrical grids into smart grids, and homes into smart homes—and this is just the beginning. The Internet of Things (IoT) (Dian, Vahidnia, & Rahmati, 2020) depicts a world in which everything is connected and can exchange measured data with one another. Many areas use the Internet of Things (IoT) solutions to improve production and digitize industries.

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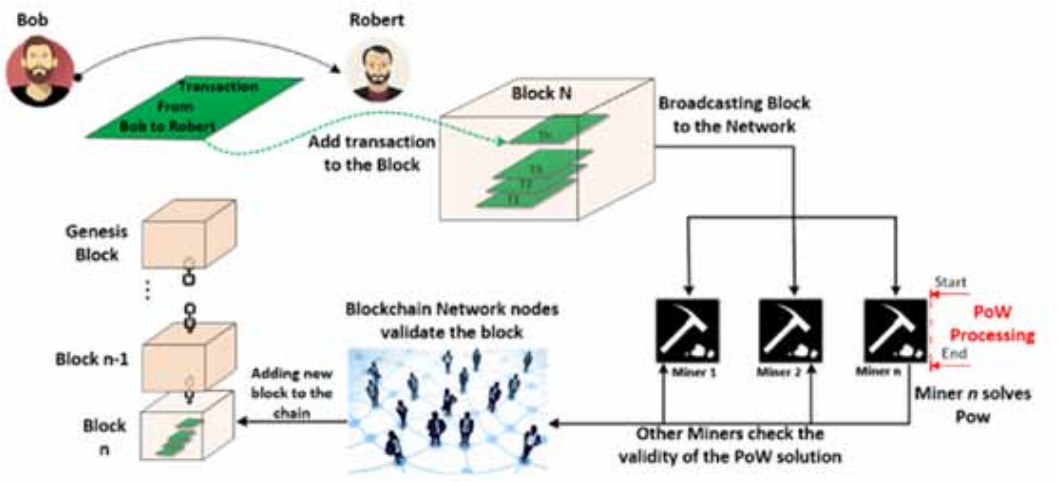
The mechanism that enables transactions to be verified by a group of unreliable actors is called the blockchain (Ambika, 2021; Hassan, 2019). A distributed, immutable, transparent, secure, and auditable ledger is provided by it. Access to all transactions that have taken place since the system's initial transaction is made available to anyone, and the blockchain can be verified and compiled at any time. Information is organized by the blockchain protocol in a chain of blocks, with each block storing a set of Bitcoin transactions performed at a specific time. A reference to the previous block links blocks together to form a chain. Figure 1 represents block validation.

Figure 1. Block validation
Source: Panarello et al. (2018)



The chapter is divided into nine sections. Section two provides Food chain in agriculture. Literature survey is detailed in segment three. Division four explains the background of the proposal. Fifth segment briefs the previous work. Sixth segment explains the proposed work. Analysis of work is explained in seventh segment. Future directions are briefed in eighth division. The work is concluded in ninth section.

FOOD CHAIN IN AGRICULTURE

One of the most critical fields in the world, agriculture (Bhanu, Rao, Ramesh, & Hussain, 2014) impacts all human existence. A nation's economy, as well as its population's security, nutrition, and health, are significantly affected by agriculture (Lichtenberg, 2002) production. The practice of agriculture involves a lot of choices and risks, such as seasonal weather changes, fluctuating market prices for agricultural products, deteriorating soil quality, unsustainable crops, produce damage from weeds and pests, and global climate change. It relates biotic or abiotic data with the development and probabilistic existence of pathogens, problems, and toxicants. It can utilize big data analytics in the agriculture supply chain to analyze the food quality, storage conditions, and weather patterns in a specific geographic area, soil quality, such as pH and nutrients, marketing and trade management, and the existence of food hazards. Figure 2 portrays the characteristics of Blockchain, AI, IoT and bigdata in smart farming.