Chapter 9
Application of Blockchain Technology for 7/12 Asset Tracking System

Y. V. Parkale, M. D. Buchake, S. P. Gaikwad, and M. R. Gawade

9.1 Introduction

A blockchain is an emerging technology in the age of the Internet and is employed in different areas such as fintech, healthcare, finance, pharmaceuticals, insurance, and digital security. A blockchain is an emergent list of registers termed as blocks that are connected through cryptography.

The researcher Christidis et al. [1] concluded that blockchain technology and IoT are a powerful combination and result in significant transformation in industries. Moreover, it creates new distributed business models. The researchers Rangel and Kleinschmidt [2] proposed a consensus algorithm based on a blockchain architecture. This architecture cogitates data composed in the wellness and health ecosystem. The researcher Hasan et al. [3] proposed a blockchain-based solution for locating and following the spare part details from the manufacturer. The researchers Hinckeldeyn and Kreutzfeldt [4] proposed a smart storage container for supply chain uses founded on blockchain technology. The researcher Ren et al. [5] proposed an intelligent traffic system based on blockchain which enhances and optimizes the traffic system. The researcher Singla et al. [6] developed a leave management system based on blockchain. The researcher Kang et al. [7] proposed blockchain-based smart homes. The researcher Schmitt et al. [8] proposed the Hyperledger Fabric blockchain technology to an IoT network. The result demonstrates the improved security and privacy of IoT communication with smart contracts [9–25].

The various systems in the government offices to find legal property documents are very complex. The state-of-the-art system for document handling has many

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intermediaries, and due to this, trustless transaction is very difficult. Moreover, lawyers and third parties make frauds in the property selling and buying.

The solutions over the existing system are blockchain-based smart contracts. The blockchain innovation will supplant legal counselors and brokers. This framework is a decentralized framework that exists between totally allowed parties, there's no compelling reason to pay delegates, and it spares your time and clashes. Smart contracts help you exchange money, property, and shares in a transparent form and fraud-free and trustless way to avoid fraud.

In this chapter, we have proposed the 7/12 asset tracking system using blockchain technology. This system is developed to monitor, enhance, and develop secure, trustless, and fraud-free property document handling.

The chapter is coordinated as follows: Sect. 9.2 depicts the block diagram and working of the proposed system. Section 9.3 depicts the algorithm, flowchart, software used, circuit diagram, and Printed Circuit Board (PCB) layout implementation. Section 9.4 presents the conclusions.

9.2 Proposed System

This part presents the square chart of the proposed framework. Figure 9.1 shows the square chart of the proposed framework. The support of the presented framework is composed of the accompanying fundamental squares:

- Arduino Uno (Atmega) microcontroller
- 16×2 LCD display
- Fingerprint sensor

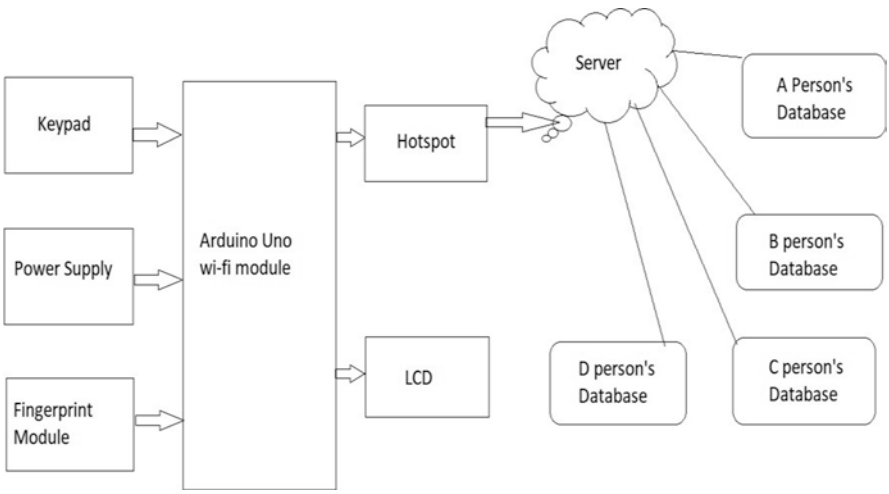

Fig. 9.1 Block diagram of the proposed system for 7/12 asset tracking using blockchain

- 4×4 matrix keypad

The details of each block are given as follows.

9.2.1 Arduino Uno (Atmega) Microcontroller

It is the heart of the system. It accepts the input from the 4×4 keypad and fingerprint module. Furthermore, it will perform the identification of the seller/buyer using the output of the fingerprint module and send the detailed information to the 16×2 LCD and the webserver.

9.2.2 16×2 LCD Display

All the information required about the property such as the name of seller/buyer and property details can be displayed using a 16×2 LCD display.

9.2.3 Fingerprint Sensor

The fingerprint sensor is used to fetch the image data and further send the data to the microcontroller. This module will store up to 162 fingerprints in the flash memory. Here, the fingerprint sensor is interfaced to the microcontroller through the serial protocol.

9.2.4 4×4 Matrix Keypad

This 16-button keypad gives a helpful human interface segment for microcontroller ventures. Advantageous cement backing gives a basic method to mount the keypad in an assortment of utilizations.

9.2.5 Working Principle

The proposed system creates a fraud-free blockchain-based property documents handling system. The data of actual documents are distributed on every user computer. The blockchain gives information from the origin. Also, while buying and selling the property, the third-party lawyers can be avoided. These results in the

saving of the number of fees paid toward the third-party lawyers. Additionally, for every buyer and seller, it's going to be a very trusted system. The proposed system uses a fingerprint sensor to check the property of the owner. The secret key is assigned to each seller/buyer so that whenever the user wants to sell and buy someone's property, they will get all the correct information about their property using the centralized system implemented in the government offices. The seller/buyer will get all correct information via SMS and call from the central authority, so he/she can trust anyone without getting lawyers in between.

9.3 Results

This section describes the algorithm and the flowchart of the proposed system. Furthermore, it presents the detail of the simulation software used, the circuit diagram, and the PCB layout of the proposed system.

9.3.1 Algorithm and Flowchart

This section describes the algorithm and flowchart of the proposed system. The different steps of the algorithm are as follows:

Start.
Initialize hardware; tap the fingerprint of the user.
Check whether the authentication is successful.
If yes, then check the distributed database on the server.
If no, then stop the process immediately.
Show information on display.
Stop.

Figure 9.2 describes the flowchart of the system.

9.3.2 Software Used

This section describes the different software used for programming the proposed system:

- **NodeMCU LUA:** The NodeMCU IDE is used to program the Wi-Fi module using the LUA programming language.
- **HTML editor:** The HTML editor is used to design the web page.
- **NetBeans IDE (PHP Website):** The NetBeans IDE is used to design the website for the server-side.
- **Arduino IDE:** It is used to program the Arduino microcontroller.
- **FileZilla Web client:** It is used for uploading our website to the server.

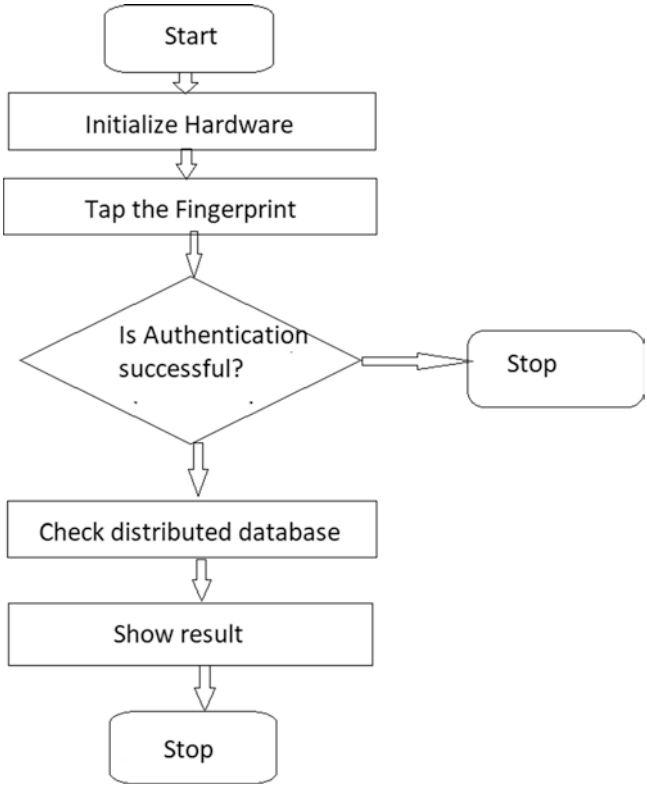

Fig. 9.2 Flowchart of the proposed system

9.3.3 Circuit Diagram and PCB Layout of the Proposed System

This part shows the circuit chart and the PCB format of the proposed framework. Figure 9.3 shows the circuit graph of the proposed framework. Further, Fig. 9.4 shows the PCB format of the proposed framework:

- **Inputs** keypad and fingerprint sensor.
- **Outputs** LCD and server.
- This fingerprint sensor module has four pins: (1) VCC, (2) GND, (3) TX, and (4) RX. The TX and RX pins are connected to the ATMEGA module.
- The LCD has VCC and GND pins that are connected to the A3 and A4 pins of the ATMEGA module.
- ESP8266 module to the SDA and SCL pins.
- The keypad is connected to the P0–P7 pins of the ATMEGA controller, respectively.

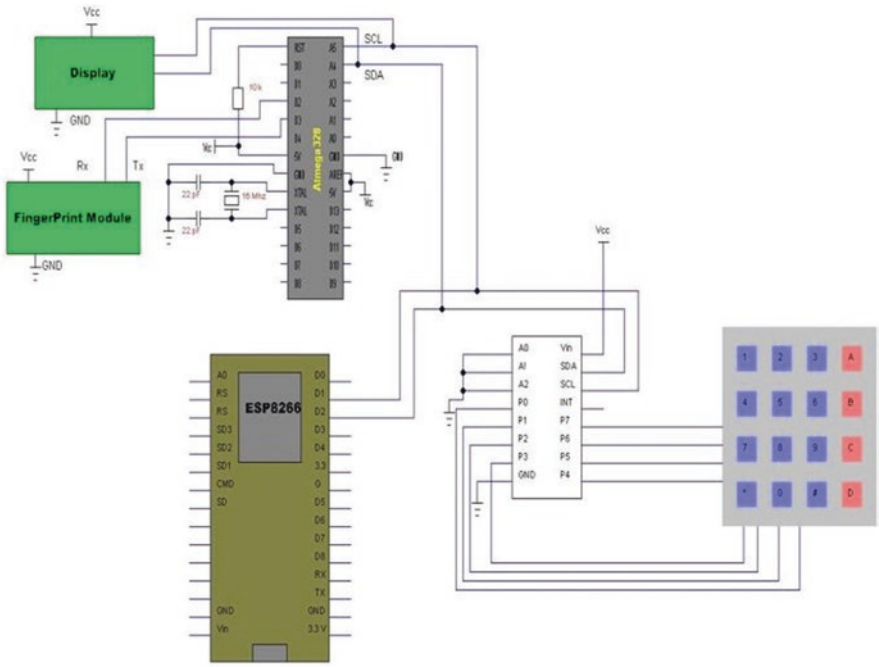

Fig. 9.3 Circuit diagram of the proposed system

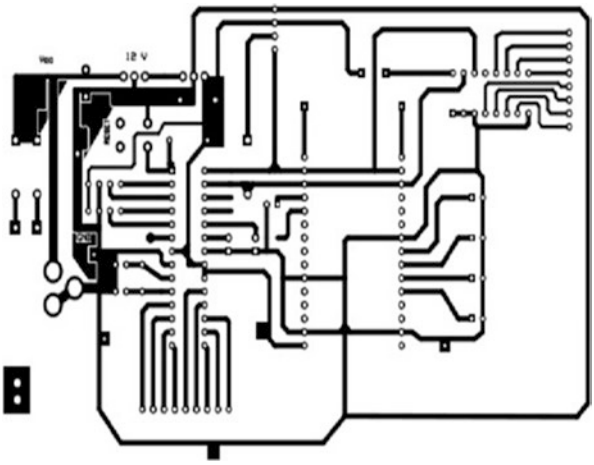

Fig. 9.4 PCB layout of the proposed system

9.4 Conclusion

In this chapter, we have proposed the 7/12 asset tracking system using blockchain technology. This system is developed to monitor, enhance, and develop secure, trustless, and fraud-free property document handling. In the state-of-the-art system, the dealing of legal property documents for buying and selling property is accomplished through the government offices. However, these systems result in various frauds due to the middle intermediaries and also have to pay for lawyers. In this work, we have proposed a secure system that provides distributed data on the computer of every customer. This will help to find the legal property papers and avoids the need for any third parties for property deals in between. The proposed 7/12 asset tracking using the blockchain is a promising advanced and more secure system that avoids frauds and makes a transparent deal. The proposed system has many advantages and applications in fintech, healthcare, finance, insurance, digital systems, security, and smart contracts.

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