Blockchain-Based Vaccination Record Tracking System

Shwetha G K[1], Jayantkumar A Rathod[2], Naveen G[3], Mounesh Arkachari[4], Pushparani M K[5]

Department of Computer Science and Engineering, NMAM Institute of Technology, Nitte, Karkala, India[1]
(Affiliated to NITTE Deemed to be University)
Department of Computer Science and Design, Alva's Institute of Engineering and Technology, Modubidire, India[2, 5]
Department of Information Science and Engineering, Alva's Institute of Engineering and Technology, Modubidire, India[3, 4]

Abstract—Blockchain technology is basically a decentralized database maintained by applicable parties and has been extensively used in colorful scripts similar as logistics and finance. In terms of operations in the medical field, it's getting increasingly important because the case's symptoms may be related to a certain vaccine. Whether the case has been vaccinated with this vaccine will lead to different individual results by the croaker. This study proposes a traceable blockchain-grounded vaccination record storehouse and sharing system. In the proposed system, the case gets the vaccination at any legal clinic and the VR can be saved accompanied by the hand into the blockchain center, which ensures traceability. When the case visits the sanitarium for treatment, the croaker can gain the details of the VR from the blockchain center and also make an opinion. The security of the proposed system will be defended by the programmed smart contracts. The proper record storage after encryption will ensure data privacy, integrity and security. Blockchain tracebility uses block-chain technology to record the movement of a product in the supply chain.

Keywords—*Blockchain technology, decentralized, vaccine record tracking, integrity, smart contracts, vaccination record storage, traceability*

I. INTRODUCTION

The global spread of Coronavirus Disease 2019 (COVID-19) in 2020 has posed unprecedented challenges to the healthcare sector, highlighting the use of innovative solutions to mitigate the spread of infections [1]. Contact tracing applications have emerged as a potential tool to break the chain of COVID-19 infections by identifying close contacts of positive cases and informing them about the possibility of being infected [2]. However, current contact tracing technologies face challenges in terms of privacy, accountability, and transparency, which can hinder their effectiveness and user adoption [3]. Our proposed method is noteworthy for its ability to track the origin and path of transactions related to vaccinations before they are used, in addition to preventing the circulation of counterfeit vaccines.

In this research paper, we propose a blockchain-based contact tracing solution that leverages the intrinsic features of blockchain technology to address the deficits of current contact tracing technologies [4]. Our solution aims to respect user privacy, provide transparency, and enable accountability by leveraging the decentralized, transparent, and immutable nature of blockchain technology [5]. Specifically, we utilize this blockchain with the smart contracts to eliminate the third-party servers, centralization, and identity abuse. Convergence algorithms, like proof of work or proof of stake, are used by the blockchain network to reach consensus on the ledger's current state and stop illegal changes. The accuracy and openness of the vaccination tracking data are therefore guaranteed.

Our solution utilizes the programmable logic of smart contracts to ensure transparency and trust among the different participants. All transactions on the blockchain are signed by their creators, holding every on-chain participant accountable for their actions [6]. By leveraging the immutable logs of the distributed ledger, our solution enforces transparency and trust, and eliminates the risks associated with centralized storage of user data [7]. The system architecture of our suggested application, Vaccine Tracker, which makes use of blockchain technology to offer complete visibility and transparency throughout the COVID vaccination supply chain. To guarantee the precision and dependability of vaccine tracking data, the Vaccine Tracker system uses a variety of algorithms for supply chain tracking and validation.

In this paper, we present the architecture, design, and implementation details of our blockchain-based contact tracing solution [8]. We also discuss the potential of blockchain technology in mitigating the spread of infections during the COVID-19 pandemic and highlight the advantages of using Ethereum blockchain with smart contracts for contact tracing [9]. The proposed architecture includes manufacturer Component which adds relevant information. The system verifies the information supplied by the manufacturer, such as location tracking and QR code generating. Our research contributes to the growing body of literature on blockchain technology in healthcare and contact tracing, and provides requirements for future research and practical applications [10]. Utilising cryptographic methods like digital signatures and hashing, the algorithm verifies the security and legitimacy of the information it has acquired from the blockchain. This guarantees the immutability and tamper-proof nature of the data recorded on the blockchain.

II. RELATED WORK

Several studies and projects have explored the want of blockchain in healthcare, including its application in COVID-19 vaccination efforts. Here, we highlight some of the notable related work and contributions in the field.