

Chapter 12

Preserving Privacy of Patients With Disabilities in the Smart Healthcare Systems

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ABSTRACT

With a greater boost in the development of technology, the healthcare industry has had a huge development in terms of offering innovative diagnoses and services to patients. Healthcare has become an indispensable resource in the daily lives of humans leading to a huge innovation in the healthcare sector. To improve the efficiency of diagnosis and with the potential to offer better treatment to patients, the healthcare industry has adopted numerous technologies such as the internet of things (IoT), machine learning, blockchain, etc., to pave way for sustainability in the medicinal sector. These systems, though very advanced, have some drawbacks; like problems of security and privacy of medical data that can expose these records to threats of privacy, and loss of data through mishandling of records and data transactions resulting in delays, while the patient is being monitored. etc., which can pose a major threat to the patient's well-being. This paper will provide how a blockchain network in any IoT-based device can help in the preservation of these medical records, using suitable algorithms.

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1. INTRODUCTION

There is a steep increase in population that results in the need for quality and sustainable healthcare has increased rapidly. With a huge number of records of patients, there is a need for an efficient system that ensures security among these stored records to prevent any data breach. The past few years, health care technologies have witnessed a greater boom in terms of inventing wearable devices, health trackers, and various other equipment to monitor patients at a closer level, connected through the medium of technology. Nowadays, electronic health records(EHR), have hugely helped in improving the accuracy of ailment diagnosis, wherein patients are remotely monitored through IOT based health care systems. Though such systems seem to have progressed, they still seem to possess some drawbacks, when comes to factors such as privacy and security. To pave way for effective monitoring of disease and continue sustained efforts to carry out medical research, hospitals and doctors need to adopt massive EHRs that contain data on the similar medical history of diseases and records of the past to study and analyze efficient methods of diagnosis and treatments. Given a huge set of records and population, a patient or a doctor would be unable to recall their health records or their medical symptoms (Wang, Zhang, Zhang et al, 2019). sharing these EHRs can be a better solution for doctors to have greater insights into the patients, in terms of monitoring the disease, improving the accuracy of diagnosis, and contributing in a much greater manner to patients' well-being and recovery. Though the use of EHRs has gained greater accessibility, it has certain drawbacks when it comes to factors such as privacy, security, accessibility, etc. (Li & Li, 2015)) One way to deal with this issue is by sharing the patient's health record with the concerned doctor, in such a way that the records can only be accessed by the doctor. in a situation, wherein, the patient consults multiple doctors, the doctor shall be able to access his EHRs over a local network with the permission of the patient (refer to figure 1). In case, when a patient consults many other doctors, The doctors will have some access restrictions over sharing their PHI records (Zhang & Lin, 2018). When we come across such a situation, wherein the patient's records are shared among multiple people, such a system of data sharing requires centralized trust (Dwivedi et al., 2019).

The solution to this problem shall be overcome by using a blockchain network, that stores information, collectively in the form of a block. Any blockchain network manages and secures data by using a hashing algorithm along with a data structure known as the Merkle tree. A blockchain structure is a distributed database on a peer-to-peer network, that consists of a list of sequential blocks. It is a distributed system, that does not rely on third-party support. Rather than a governing authority, mathematical principles and cryptographic techniques are used to build confidence between each block in a blockchain network. Such solutions can overcome the disadvantage of a single point node failure. Because the network's complete data is centralised and all nodes have backups, similar system can provide data transparency and, as a result, integrity among records stored as nodes. Data inside the blocks could be housed in an encoded manner using various encryption approaches, depending on the type of application, ensuring confidentiality. The perception of pseudo-anonymity allows users to keep their actual credentials hidden. (Croman et al., 2016)) Hence by carrying out this work, we shall figure out ways to implement a blockchain-based system that can help in the retention of privacy among medical records of patients with disabilities. We shall have an overview of the existing discoveries and implementations, research being carried out, the challenges faced, and the future challenges that we shall encounter through the usage of this technology.

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