Chapter 6

Blockchain–Integrated Internet–of–Things Architecture in Privacy Preserving for Large–Scale Healthcare Supply Chain Data

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ABSTRACT

The supply chain forms the backbone of healthcare industry operations. The design and development of healthcare information systems (HIS) help different types of decision-making at various levels of business operations. Business process management decision-making is a complex task requiring real-time data collection from different operational sources. Hence, information technology (IT) infrastructure for data acquisition and sharing affects the operational effectiveness of the healthcare industry. The internet of things (IoT) applications have drawn significant research interest in the service of the healthcare industry. IoT technology aims to simplify the distributed data collection in healthcare practice, sharing, and processing of information and knowledge across many collaborating partners using suitable enterprise information systems. However, implementing blockchain technology in IoT-based data communication networks demands extra research initiatives. This chapter presents a review of security-related issues in the context of a HIS consisting of IoT-based blockchain technology.

INTRODUCTION

The coronavirus pandemic (simply known as COVID-19) is placing enormous strain on the global health care industry's workforce, infrastructure, supply chain and exposing social inequalities in healthcare. The current pandemic catalyzes change across the healthcare ecosystem and provokes private and public collaboration to quickly adapt and innovate service provision. Several foundational changes are emerging from and aggravated by coronavirus's spread around the world. Examples include patients' (or consumers') growing involvement in healthcare-related decision-making, quick endorsement of web-based healthcare services, and other forms of digital innovation practice.

Patients are steering and speeding up the pace of change in the healthcare industry. Their needs and aims are orchestrating innovation in healthcare-related products and services. Their preferences are guiding the development of seamless digitally enabled and on-demand connectivity of medics-patient communications. Their requirements guide the transition to patient-centric care delivery for different socio-economic groups in some parts of the world. Their expectations drive industry stakeholders to elevate a transactional patient healthcare encounter into a holistic human heath experience.

The long-held view that healthcare is "*sick care*" for the physical body includes patients' minds and spirits. Focus shifting from healthcare to health and well-being and providers should integrate this shift into the design of their service offering and delivery channels and locations. In addition, the patient will expect care to be available when and how it is most valuable and secure for them. It includes virtual care, at-home prescription and medicine delivery for elderly citizens, remote assessment (e.g., digital diagnostic and decision support), self-service educational applications, and social support.

Consequently, healthcare organizations started investing in replacing foundational structures, technologies, business process operational techniques. Digital transformation is helping individual healthcare organizations and the broader health ecosystem improve working methods, enhance access to service provisions, and deliver a more effective patient and clinician experience. Five important aspects of computing are playing increasingly pivotal roles around the globe – the Internet of Things (IoT), blockchain technology, service-oriented computing (or cloud computing), artificial intelligence (e.g., AI-based techniques), and virtual care delivery.

Along with technological advancement, healthcare service provision is changing rapidly. The IoT paradigm has revolutionized the healthcare industry. The IoT technology can help collect valuable patient and medication data, automate workflows, provide insights on disease symptoms and trends, and facilitate remote patient care.

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