



A Framework for Using Blockchain To Enhance The Privacy, Security, Reliability, And Efficiency Of IoT-based Telehealth Systems.

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I certify that I have read this thesis and that in my opinion, it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science.

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DECLARATION

I, Isuru Sandakelum Rathnayaka Weerakoon hereby declare that the work contained in this thesis is entirely original to me and was not previously included in any other thesis or research work submitted to this or any other institution for a degree, diploma, or other qualifications. The research work was completed after I registered for the MSc program at the Sri Lanka Institute of Information Technology (SLIIT). Furthermore, I have reviewed the research procedures and take responsibility for carrying them out under the University's current research ethics, standards, and regulations, including those related to plagiarism.

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ABSTRACT

Intelligent technologies including the “Internet of Things”, “Machine Learning”, “Deep Learning”, “Artificial Intelligence”, “Neural Networks”, and “Cloud Computing”, that enable global connectivity every second are considered an integral part of our life. The development of intelligent systems that interact with real-world objects, from controlling a light bulb to automating healthcare facilities, has been enormously accelerated by Internet of Things. Simultaneously, people’s life expectancy is growing by the day, resulting in a massive growth in the elderly population, which has led to a huge need for healthcare services. This has caused an increase in hospital admissions globally. However, unless their health deteriorates seriously, the majority of elderly individuals may be monitored and treated remotely. Therefore, to conduct and handle medical transactions while upholding strict security and privacy standards, an autonomous sophisticated system must be established. A high-quality, highly reliable, and highly efficient system that uses many sensors to scan patient’s health parameters and via them to track and monitor non-critical patients may have prevented a pandemic like Covid-19 that has forced millions of people to attend healthcare facilities. The novel Internet of Things security framework presented in this thesis is built on blockchain networking technologies and is intended for usage in healthcare Internet of Things systems. All transactions handled through this framework will be encrypted using a unique encryption method suggested in this thesis that is constructed on top of the “Advanced Encryption Standards” algorithm, while the “Proof of Elapsed Time” consensus algorithm is used as the blockchain. The idea of blockchain technology is taken into consideration in this case since any information that is accessible over the Internet is subject to different security flaws, including the patient's private medical information, which should not be accessed by unauthorized parties. And the decentralized nature of blockchain technology causes an issue known as “disease overlapping”, notably in the healthcare industry. As a remedy for this, the suggested security framework would construct separate blocks in the chain for each transaction alteration allowing only the doctors and hospital management to update patient reports, analytical data, prescriptions, drugs, new symptoms, etc. The thesis’s overall goal is to provide healthcare stakeholders, particularly patients, with an effective, reliable, highly secure, and affordable healthcare solution. However, other stakeholders in the healthcare sector, will also profit from it. Furthermore, the adoption of blockchain not only protects transactions but also increases confidence among stakeholders in the healthcare sector.

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