Review Article

Issues in Blockchain and IoT-based Monitoring of COVID-19

Abid Sultan*, Muhammad Azhar Mushtaq and Asad Hussain

University of Sargodha, Sub-Campus, Bhakkar, Pakistan

*Corresponding Author: Abid Sultan, University of Sargodha, Sub-Campus, Bhakkar, Pakistan.

Abstract

In current situation of COVID 19 (Corona Virus Disease 19) governmental institutes throughout the world try to develop a monitoring system that inform about confirmed cases around. Many researcher proposed a Blockchain based applications for this purpose. The major idea behind Blockchain based system for monitoring is quality services, data handling and avoid single point of failure. However, it raises different issues with regards to heavy traffic, block size and latency. This paper aims to highlight these issues of Blockchain.

Keywords: COVID-19; Tracking; Issues in Monitoring

Introduction

IoT is a new pattern. According to CISCO IoT encompasses of people places and things which makes services available to use. IoT network consist of 3 layers. 1. Hardware: sensor or embedded devices. 2. Middleware: Software and computational assets. 3. Presentation: software and visualization tools. Blockchain is actually a decentralized database to hold history of transaction with timestamp. Blockchain start trough a primary block known as a geniuses block. Public and private keys are used to access the network as well as for transaction. The node create a transaction signed it with its private key and broadcasted through the network. The other nodes on the network validate this transaction and discarded if invalid.

In current situation of COVID 19 (Corona Virus Disease 19) governmental institutes throughout the word try to develop a monitoring system that inform about confirmed cases around. Many research proposed a Blockchain based system. Because Blockchain is a distributed ledger of blocks which hold all transactions record transparently. In order to participate in this distributed network of Blockchain one needs to install the distributed application that means participate as a node in the distributed network by connecting to at least one node of belongs to the distributed network.

In order to analyze the situation around nodes needs to send query messages to network nodes by connecting to the Blockchain network via its public key and signed the message with its private key. After receiving the message node first verifies the authentication and then searches own information it holding and inform the requesting node. The message of requesting node is broadcasted throughout the thousands of connected nodes. This distributed system have many benefits but have some issues with regard to data quality and handling.

Analysis of current apps of COVID-19

In this paper [3] author performed, a descriptive analysis of all apps related with COVID-19. From 27 April 2020 to 2 May 2020, author searched iOSApp Store and android Google Play Store for COVID-19 related applications. After gathering the apps data, author categories data into following classes:

- News
- General information
- Self-diagnosis
- Contact tracing
- Notification of close cases
- Helplines

- Monitoring of clinical parameters

- Recording of symptoms and treatment

- Messaging with health care professionals.

After analysis author concluded that the apps' most common purposes are providing information on the numbers of infected and recovered. This apps provided the recorded data rather than real time evaluation. Johns Hopkins health and security center declared a nationwide strategy to save lives, decrease COVID-19's load on healthcare system, comfort compulsory communal separation methods, and self-confidently create growth toward returning to workplace and educational institutes [4].

Authors recommended that the US essentially make use of robust and broad system to recognize completely COVID-19 cases and identifies the all interactions of each recognized case. According to the assessment, if 1 affected patient spreads the virus to 3 others, that 1st positive case can go into 59,000 cases in almost 10 circles of infections.COVID-19 is previously distributed over societies through the US. So, for this approach will be unbearable to attain for COVID-19 without a novel nationwide creativity that group-together a immense growth of fast diagnostic assessments with the acceptance of novel machineries for identification of cases and interaction tracing in individual state. To succeed in the management of COVID-19 epidemics from currently to onward, societies in the US need:

- Quick diagnostic assessments for all cases

- The capability to identify the all interactions of each recognized case.

To achieve this objective needs actions to taken by governmental and other organization to stand up with the capabilities as soon as possible. Many Countries have been engaging in to be able for contact tracing. In Israel, regulation was approved to permit the administration to track public mobile-phone data who suspected with infection [5]. In South Korea, the administration has upheld a community databank of identified patients, containing info their current age, sex, profession, and travel routes [6].

In Taiwan, health organizations were given right of entry to patients' traveling history [7], and establishments have the right to access the phone site statistics for anybody under quarantine [8]. Also, Singaporean administration released a mobile application on March 20, 2020, Trace- Together is an application developed to support healthiness representatives trace the experiences after the identification of infected individual. But, there are significant confidentiality inferences from this apps. Whereas Singapore's Trace-Together application has various privacy issues [8]. This application's use is limited because it depend on straight interaction tracing by making use of Bluetooth networks without making use of location data.

Issues in the blockchain and IoT based monitoring system of COVID 19

Author [9] designed a tracking system that makes usage of Blockchain based smart contracts of Ethereum and oracles for tracing data associated to the figure of new, recovered cases and death which is gotten from reliable sources. Figures related to 1. Positive and negative tests 2. Patients hospitalized 4. Deaths 5. Hospital beds occupied 6. Ventilator shortfalls, etc. this data helps the administrators trace the COVID-19 situation in real- time. But, these figures caries a main issue as decisions grounded on such facts are frequently deficient and imperfect. Additionally, tracing legal data is important to analyze the pandemic situation [10,11]. Data Accessible online possibly imperfect as it is susceptible for the data operations. Authors claim that Blockchain technology can transform the technique for tracing COVID-19 cases. They focusing on the advantages of applying a Blockchain resolution over a traditional centralized solution. But there are several issues in implementation of Blockchain based solution for monitoring COVID-19.

Tracing

The tracing of network data traffic flow turn into huge as the quantity of transactions rises every day. Every single node on the blockchain store history of all confirmed transactions, and therefore this turn out to be a problem by way of restriction on the block size and interval of time used for creation of a fresh block. Currently, the platforms of blockchain has the ability to process limited or only a few transactions per-second. Which turn into an issue of blockchain for using in a real-time IoT applications as billions of transactions are compulsory to be processed in real-time environment.

Latency

As the block size is limited, this becomes the origin for approximately few transactions to be delayed. Consequently, the problem

of latency highlights that from the prospective of scalability and latency, tracing by using blockchain platform is not suitable. This problem makes it problematic to understand the blockchain based tracing platform. Furthermore, blockchain required huge bandwidth and a large amount of computational power. So, blockchains are not fully appropriate for limited resource IoT devices intended for smart cities [12]. Still, blockchain used to resolve the safety and confidentiality issues of medical related data. An improved blockchain base technique was projected, which is appropriate for IoT devicesdepend on distributed network for extra privacy andsecurity [13]. In [14], author group together the Internet of Medical Devices (IoMT) apps and blockchain in medical for analysis of patients' data and study for satisfactory treatment.

Scalability

Proof of work (PoW) required a lot of computational power. However IoT devices are limited in resources. As the IoT network consist of a large number of needs so this blockchain network poorly scaled due to the computational power requirement for PoW [15].

Conclusion

In current situation of COVID 19 throughout the needs to develop a monitoring system that inform about confirmed cases around. Many researcher proposed a Blockchain based applications for this purpose. However, it raises different issues with regards to heavy traffic, block size and latency. This paper present the different works and highlight the issues of Blockchain.

Bibliography

1. Sultan A., *et al*. "IOT Security Issues Via Blockchain: A Review Paper". In Proceedings of the 2019 International Conference on Blockchain Technology, Honolulu, HI, USA, 15 March (2019): 60-65.

2. Bai Z., *et al*. "The Rapid Assessment and Early Warning Models for COVID-19". Springer: Berlin, Germany (2020): 1.

3. Collado-Borrell R., *et al*. "Features and functionalities of smartphone apps related to COVID-19: Systematic search in App stores and content analysis". *Journal of Medical Internet Research* 22 (2020): e20334.

4. Watson C., *et al*. "A National Plan to Enable Comprehensive COVID-19 Case Finding and Contact Tracing in the US". Johns Hopkins Bloomberg School of Public Health, Center for Health Security: Baltimore, MD, USA (2020).

5. Tidy J. "Coronavirus: Israel Enables Emergency Spy Powers". *BBC News* (2020).

6. Kim M and Denyer S. "A 'Travel Log' of the Times in South Korea: Mapping the Movements of Coronavirus Carriers". The Washington Post (2020).

7. Wang CJ., *et al*. "Response to COVID-19 in Taiwan: Big data analytics, new technology, and proactive testing". *JAMA* 323 (2020): 1341-1342.

8. Lee Y. "Taiwan's New 'Electronic Fence' for Quarantines Leads Wave of Virus Monitoring". *Reuters Technology News* (2020).

9. Cho H., *et al*. "Contact tracing mobile apps for COVID-19: Privacy considerations and related trade-offs". arXiv (2020).

10. Marbouh D., *et al*. "Blockchain for COVID-19: Review, Opportunities, and a Trusted Tracking System". *Arabian Journal for Science and Engineering* 12 (2020): 1-17.

11. Bischoff P. "COVID-19 App Tracker: Is Privacy Being Sacrificed in a Bid to Combat the Virus?" (2020).

12. Warner K and Nowais S. "Coronavirus: Doctors Urge Public to Help Track Covid-19 Cases with Tracing App". *The National* (2020).

13. Dwivedi AD., *et al*. "A decentralized privacy-preserving healthcare blockchain for IoT". *Sensors* 19 (2019): 326.

14. Aileni RM and Suciu G. "IoMT: A Blockchain Perspective". Springer: Cham, Switzerland (2020): 199-215.

15. Srivastava G., *et al*. "A Light and Secure Healthcare Blockchain for IoT Medical Devices". In Proceedings of the 2019 IEEE Canadian Conference of Electrical and Computer Engineering (CCECE), Edmonton, AB, Canada (2019): 1-5.