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The possibility of utilizing Blockchain technology in Internet of Things (IoT)

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Abstract

Two of the leading technological advancements, Blockchain and the Internet of Things (IoT), are already reshaping our future of the world of Technology. The aim of this research paper is to study and integrate the data trading under the Blockchain related IoT system. The Smart service delivery in a wide variety of environments, such as smart workplaces, homes and towns and encouraged by the rapid growth of the IoT. It uses sensors to gather and assess data or knowledge from physical world and exchange it with other devices without relying on human contact. In terms of processing, storage, and network capability, IoT devices are resource-constrained and they can help to maintain data privacy in an unmonitored human Internet of Things. The Blockchain is a technology with a specific combination of features like consensus algorithm, decentralized structure, storage mechanism and distributed notes, asymmetric encryption, and intelligent contracting to ensure the network stability, visibility, and transparency. So, this research paper recommends the architecture of the Blockchain technology for IOT identity authentication based on the concept of Blockchain technology, integrating the Blockchain technology with the IoT. The paper investigates to which degree the use of Blockchain technologies is possible for autonomous IoT devices that enforce authentication between the devices and cloud servers, IoT base stations and then analyze its feasibility to see if it provides more security for data. Many industries, including transportation, manufacturing, automobile, aviation, energy, banking, technology, healthcare, e-commerce and education, agriculture, and food with Blockchain based technology through improved visibility and enterprise process management can be upgraded successfully.

Keywords: Block Chain, Internet of Things (IoT), Blockchain and IoT, Technology

Introduction

By lending the object cognitive senses to serve us better, the IoT has brought it to reality life to bridge or close the distance between the digital and physical world. The idea of the IoT is an idea of linking objects that can somehow make life simpler. Communication technology, actuators, sensors etc., may be fitted with smart objects. In several areas such as transportation, manufacturing, business and health care, IoT is now attracting interest. The Internet of Things (IoT) is poised to change our live and produce immense economic benefits. Inadequate data security and confidence, however, are seriously restricting its adoption. The IoT aims is to provide smart device interconnections, gather and process data from various environments, and provide end-users application groups and sectors with products and services. Since 2004, several problems have been solved and solutions have been identified, but in fields such as power management and Big Data, they also need to be strengthened(Padhy, 2020). One must obviously understand from this point that IoT is not a single technology, it is a mixture of various technologies that will work towards the achievement of smart ness. These developments include network networking technologies, computer processing, technology for mechanical sensors and actuators and innovations in computing and analytic. Blockchain is a creative, open and distributed state of the art system that protects all transactions and data secrecy, transparency and availability. A distributed tamper resistant ledger, Blockchain has native data tamper resistance from which it is nearly impossible to retroactively alter the data after a transaction has been registered. We assume that, in maintaining confidence in IoT devices, certain tamper resistance properties may be of considerable benefit. In the context of integrated IoT technologies, the use of Blockchain technology will help to solve security concerns(Lokshina et al., 2019). Both participants need to reach a consensus on the transactional data states in the Blockchain network to achieve confidence. A main technology for handling computing infrastructure and network safely is authentication. Authentication technologies must take care of the drawback of limited IoT resources(Zhao et al., 2020). In comparison, unified Authentication and the requirement for all devices to contact a single individual provides a significant downside. The Authentication paradigm is null if the key organization is compromised. Such drawbacks in the architecture of IoT can be solved by leveraging Blockchain technologies. Blockchain is regarded as Bitcoin's underlying infrastructure(Thakore et al., 2019). The purpose of the Blockchain is to enable digital content to store and transmitted, but not edited. The decentralized, stable and trustless design of the

Blockchain makes it the perfect technology for powering communication between nodes in IoT network. So, this research paper discusses and includes what is the Blockchain and is it considered a solution to security problems related to IoT? And the examples of use case that show where we can use it. Through our research and reading that we searched for, we found that, there are different opinions on whether the Blockchain helps with data security or not which is related to IoT, also, experienced people were interviewed and they gave their opinion on this topic.

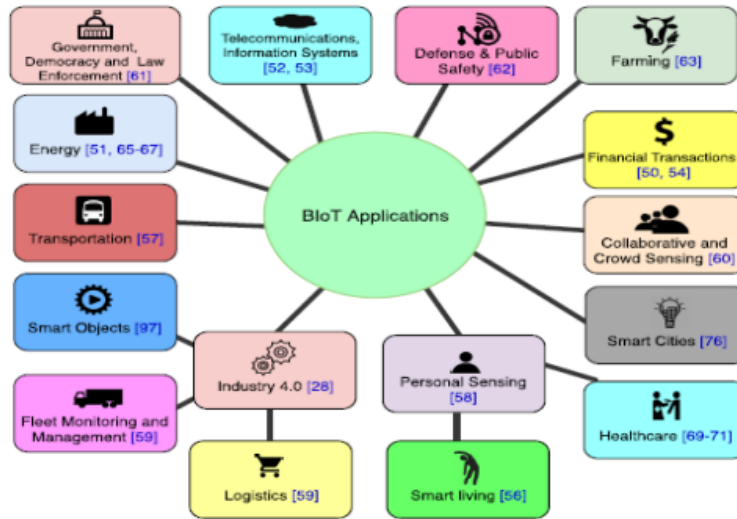


Figure1: Blockchain IoT Applications (source: S. H. Awan *et al*,2020)

Search Strategy and Criteria

In the beginning, we used Journals.com website to start and search about the articles that are related to the topic using Google Scholar. Some of the key words used are Blockchain with IoT, Blockchain application and Blockchain in IoT etc. Some menu articles were coming but most of them were in general, so we used the keyword Blockchain with IoT because it was closer to the topic. 15 research papers were chosen related to the specific topic.

Results and Discussion

IoT face so many security problems and to some extent, the Blockchain can be used to secure the data storage that uses the Internet of Things (IoT) technologies, but the Blockchain can be used as a tool and not as the complete solution. Both of IoT and Blockchain are new technologies, so they are currently under growth. Many of the issues tat relating to IoT will have potential solutions

listed by interviewees in some of the literature from various studies and it's not unlikely that, some of the problems will be resolved soon. This paper looked at the implementation of the Blockchain to the IoT for data and information storage purposes and the time being, Blockchain may protect those issues (Badr et al., 2018). That said, this could work much better and easier, than other fields of applications have turned out to be more and more desirable and useful. Some of the questions from other researches is to figure out what are the security problems that is related to the IoT, how the Blockchain can be used to ensure the IoT related to data management and what are the possible advantages. Mapping protection problems related to IoT is extensive and an explanation for this is that, many of the papers listed vulnerabilities which is related to the IoT. The finding of articles which looked at the use of the Blockchain and the IoT were also restricted as well as finding of people to interview who are expertise in both fields.

The emphasis of this study is that for example, Blockchain may be used to manage records, to protect identity and to be an immutable ledger (Tian et al., 2020). From another research report, six out of the eight people interviewed, spoke about the Blockchain in combination with the IoT and they all accepted that Blockchain does not boost all protection problems relevant to the IoT device in terms of potential risks. Some others said, the Blockchain may offer security for trust between the different parties. One concern with today's method is that, it's very difficult to keep track of all the records and archive them in one location and the data will quickly vanish. Many of the interviewees stated that, it's nearly impossible to have a secure traceability of a products using today's system and the Blockchain can be the potential solution to this issues (Älvebrink & Jansson, 2018). There are no specific applications of the Blockchain for managing protection inside IoT however, the Blockchain can be used to store and trace historical data that reflects the reality.

The Blockchain is one of the fast-growing innovations that has a major role to play in the world of criminal investigation. Security has been a big concern to all sectors, such as Electronic Health Record (EHR), Accounting, Smart Application (SA), Supply Chain Management (SCM) and the IoT world in recent years. The Artificial Intelligence (AI) is a hopeful technology that could learn from an IoT and the Blockchain environment where an AI robot might for example, be linked to the machine and receive critical data in real time, leading to knowledgeable and trusting decisions (Dutta et al., 2020). Another example for the IoT and Blockchain framework may be

devices that are attached to developing the plants or seeds and supplying water and unique supplements to them for optimal growth. These information may be linked to the Blockchain(Kullig et al., 2020). The realistic implications that, the results could have more effective and safe means of treating such details between the corresponding parties. Another factor, this research might help to point out is that, the developers don't take seriously of protection. In interviews with some of the other experts they said that, individuals need to become more conscious of new technology and what they're sharing online. Some other perspectives showed that, the theory was that Blockchain could be able to address IoT protection problems, however when the analysis continued and the interviews were carried out, it appeared as if the Blockchain was not the ideal answer to all of these concerns. The idea was that, the Blockchain can help to secure IoT related data and information storage.

Many of the IoT protection problems were found on the computers and machines, as it turned out and the Blockchain does not contribute to the software protection as it actually exists(Rožman et al., 2019). Another important viewpoint that has developed during this analysis, is that the scalability issues of the Blockchain will hinder future IoT use. The result suggests that, in term of all external attacks, the Blockchain can't improve the protection of the IoT scheme, but the Blockchain can provide confidence-based security for different parties. This finding seems fair given what the interviewees claim and how technology works(Di et al., 2020).

Another factor is that, several examples of effective applications of the Blockchain and the IoT are released on the websites of the company and it might easy for them to exaggerate performance. Another interview, for example, one person said that, even though the software is hacked, it would not affect the machine too much, whereas other people were more worried about security concerns. For a long time, over 20 years, IoT has been around, though previously called the Machine to Machine name(Kumar & Mallick, 2018). While it has been available for a long time, this technology's seed of acceptance has gone very slowly, businesses were very cautious because they did not able to grasp what it was, how to use it and what the potential benefits are. The main obstacles were expense and not for hardware only, but for system implementation, data storage and data processing tools. The concern here is, it pushes the overall price and let people to select and choose cheaper variants instead of preferring better, so this will be contributing to safety

problems. Today businesses are generating incredibly vast volumes of data which can only grow if IoT is introduced by companies. Some businesses collect so many data and information that it is impractical for them to do it themselves whilst others easy and secure to outsource to a third party(Lokshina et al., 2019).

According to another researcher, Blockchain is used to manage sensor data and avoid duplication of other malicious data. So, instead of going to a third party to create trust, sensors will share data through a BlockChain. Combining Blockchain and IoT helps to promote autonomy and encourage P2P connectivity, as the combination will eliminate technological bottlenecks and inefficiencies. Due to the lack of any other mediator, IoT implementation costs can be greatly decreased. IoT and Blockchain combinations are well adapted for commercial needs and cost savings(Liu et al., 2020). There are some examples of how the different sectors will have a positive effect on the mixture of Blockchain and IoT like, Supply Chain, Automotive industry that is allow the customers to exchange the data and knowledge quickly and easily. See figure 2, and Smart house industry which help homeowners to remotely control their home protection device from their smartphone(Awan et al., 2020).



Figure 2: Automotive industry Application (source: Blockchain IoT Transforming Business,2020)

Conclusion

The Blockchain and IoT both are quickly evolving and are likely to be used by businesses in the near future. They are two major technical disruptions and their combination will deliver a stronger outcome in any possible area. This research paper dealt with the various potential problems of

protection and privacy in IoT and discussed the fundamentals of technology, their incorporation and their breadth of implementation. The numerous potential implementations of IoT for Blockchain technology have also been illustrated. Furthermore, the advantages of combining IoT with Blockchain have been addressed. Blockchain technology is described as one of the strategies for solving IoT problems and challenges. The extent of the Blockchain integration with IoT is clarified. This technology can be applied to a wide range for example in engineering services. The Blockchain provides greater flexibility in accessing data. In future, IoT research will meet the needs of more scenarios and because of the ever-increasing accessibility of complex electronics on a small scale almost all devices on the Internet of Things would be able to analyze and exchange information recorded by sensors. The combination of the Blockchain technology and its features such as reliability and decentralization could bring benefits to these IoT devices.

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