

Integrating Decentralized Ledger Technologies with the Internet of Things (IoT) to handle Operational Maintenance Data

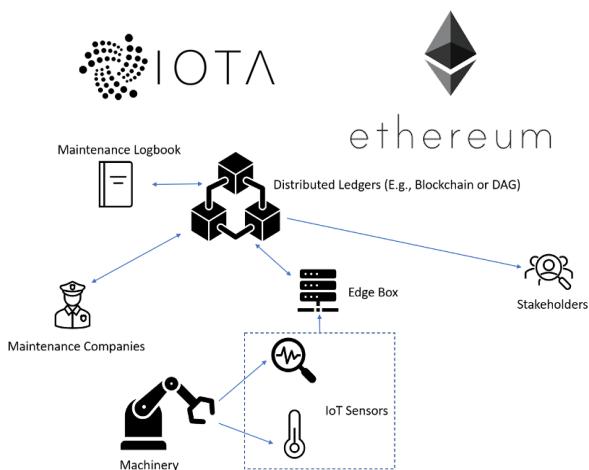
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Introduction and background:

As of 2020, over 20 billion IoT devices are interconnected. The data generated from these IoT devices introduces the challenge of data storage and privacy. The traditional data storage techniques use a centralized data server to control data transfer across different nodes. However, it increases maintenance costs and concerns about data privacy. The centralized hubs can be a constrain to the overall performance and a single point of failure. There is a need for a safe and trustworthy-based storage model. The use of Blockchain and similar decentralized technologies is a satisfactory solution to the problems in the IoT sector. Blockchain enables peer-to-peer interaction without a need for a trusted mediator. One of the applications of IoT and blockchain integration is logging operational maintenance data. IoT devices are used to monitor critical equipment and log maintenance data. The use of Blockchain and IoT generates immutable operational data and maintenance records.

Problem description and objective:

The thesis presents a use case for storing IoT operational sensor data in a decentralized ledger. Instead of storing data in a traditional database in cloud, the data is stored in both Ethereum blockchain and IOTA tangle. Ethereum is blockchain technology has programmable capabilities by means of a concept called smart contract. IOTA tangle is similar ledger but uses Directed Acyclic Graph technology. The developed solution acquires maintenance data from IoT devices. An Edge Box the data from IoT devices and store data in Ethereum and IOTA. The stakeholders and service companies will use Web-based client applications to view historical operational data recorded in the Blockchain. Maintenance companies can analyze operational data and store service records in the distributed ledgers. The records are immutable and secure stored in blockchain and IOTA tangle.



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