

# **Department of Information Technology**

**A.P. Shah Institute of Technology**

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**UNIVERSITY OF MUMBAI**

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A Project Report on  
**Monitoring Health of IIoT Devices using Blockchain**

Submitted in fulfillment of the degree of  
Bachelor of Engineering (Sem-8)  
in

**INFORMATION TECHNOLOGY**

By

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Under the Guidance of

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&

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# 1. Project Conception and Initiation

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# 1.1 Abstract

- This project aims to create a reliable method for secure information transfer industrial wireless sensor networks by monitoring IoT devices through blockchain technology.
- The vital component of the blockchain, immutability, carries protection from unapproved alterations.
- Our project elaborates on monitoring the organization data and the idea is dependent on blockchain innovation.

# 1.2 Objectives

- **Monitoring:** The monitoring module can detect status change of target device and send alert messages to the administrator.
- **Security:** To ensure the security of blockchain network, so as to prevent the system from being tampered by unauthorized users.
- **Scalability:** To achieve scalability by storing data on the cloud server.
- **Accuracy:** To ensure the accuracy of the monitoring module, and to eliminate false negatives that have a bad impact on the system.

# 1.3 Literature Review

- Blockchain-based Status Monitoring System {BoSMoS} published by Sen He, and Wei Ren, Tianqing Zhu, Kim-Kwang, Raymond Choo
- The framework is intended to track the software status of IIoT computers, identify and respond to detected malicious actions (e.g. intrusions). BoSMoS takes a snapshot of the tracked software's current state and tracks their file system calls.
- Benefits: Ledger will be the system of record for the business - Transactions (asset transfer) and Contracts (conditions for a transaction to occur).
- Drawbacks: The entire system may be malfunctioning, communication can be faulty

# 1.3 Literature Review

- Tornado Enabling Blockchain in Heterogeneous Internet of Things through A Space-Structured Approach (2020) published by Yinqiu Liu, Kun Wang, Kai Qian, Miao Du, and Song Guo
- A high-performance blockchain architecture built on a space-structured ledger and corresponding algorithms to allow blockchain in IoT. To increase network scalability, we first create a space-structured chain architecture with novel data structures.
- Benefits: Enhanced connectivity with partners, customers, suppliers.
- Drawbacks: Differentiated mining difficulty, Parallel workflows.

## 1.3 Literature Review

- Towards Secure Industrial IoT: Blockchain System with Credit-Based Consensus Mechanism (2019) published by Junqin Huang, Ling Kong, Guihai Chen, Min-You Wu, Xue Liu, Peng Zeng
- A blockchain system with credit-based consensus mechanism for IIoT provides data authority management system to control access to sensor data to maintain confidentiality.
- Benefits: Strengthens the industrial systems with secure data sharing, privacy preserving data aggregation, data confidentiality etc.
- Drawbacks: Single point failure, Sybil attack and tampering of data



# 1.4 Problem Definition

- Hackers have already deployed malware to exploit inter connected sensors and gained access to private networks.
- Critical threats to their infrastructure because of unauthorised intrusions intending to disrupt, degrade, or destroy systems.
- We intend to secure that by creating a reliable product that makes use of Blockchain technology.

## Reference:

IoT Technological Development: Prospect and Implication for Cyber stability

# 1.5 Scope

- Planning a reasonable consensus algorithm for this scheme and deploying the amplified framework in reality.
- A world of large scale industrial collaborations where substantial amounts of data can be processed safely is envisioned.

# 1.6 Technology stack

- IBM Watson Cloud
- IBM Watson Quickstart Virtual Sensor
- Node-Red
- React.js
- MetaMask
- Ganache
- Truffle Framework
- Node.js

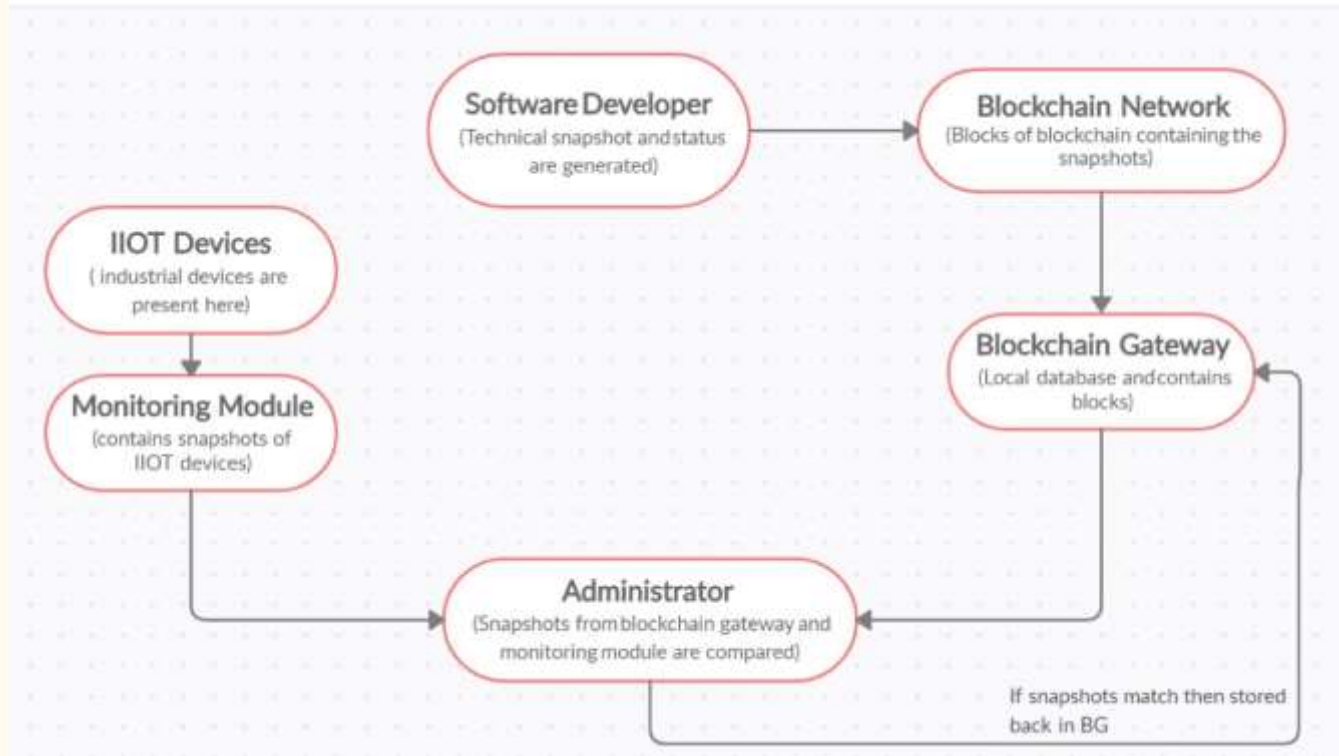
# 1.7 Benefits for environment & Society

- The requirement of the market is such that all parties involved in an industry collaboration can rely on a secure system to ensure their interests are being protected.
- Corporations from the sectors of energy, water, aviation, and manufacturing are at risk of having their data stolen.
- Our aim is to protect smaller scale industries from encountering disaster in their regularly scheduled operations by continuously monitoring activities and making sure that procedures are being carried out as intended.

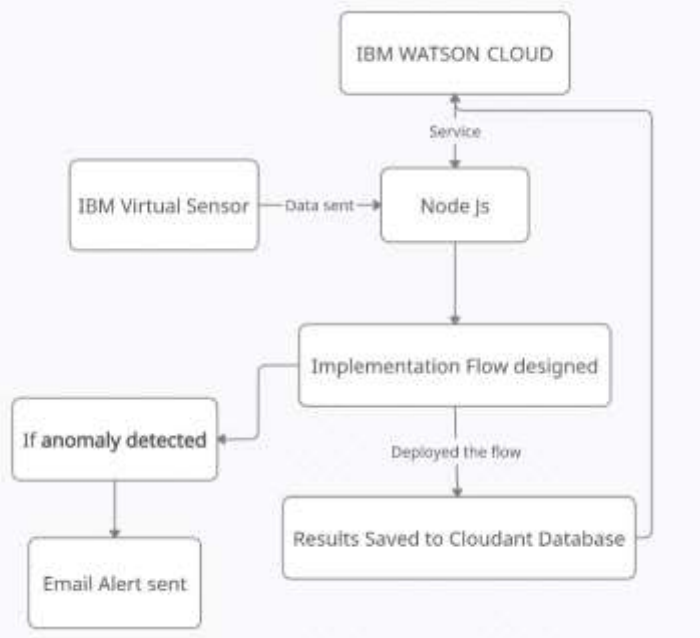
## 2. Project Design

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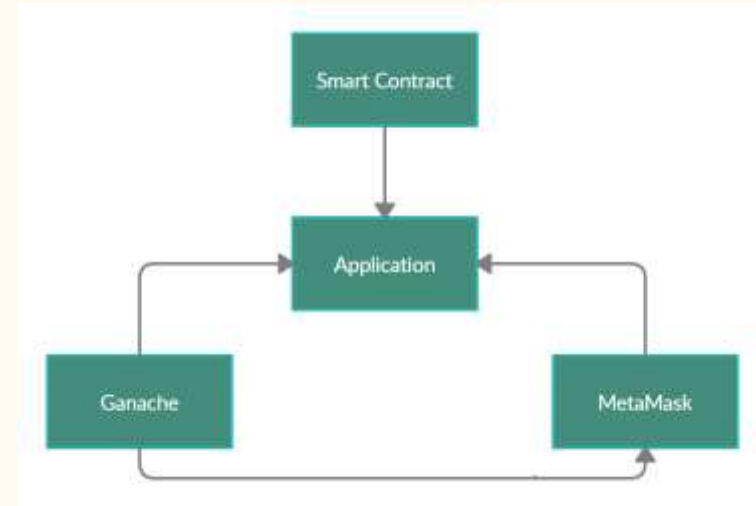
## 2.1 Proposed System



## 2.2 Design (Flow Of Modules)



Administrator

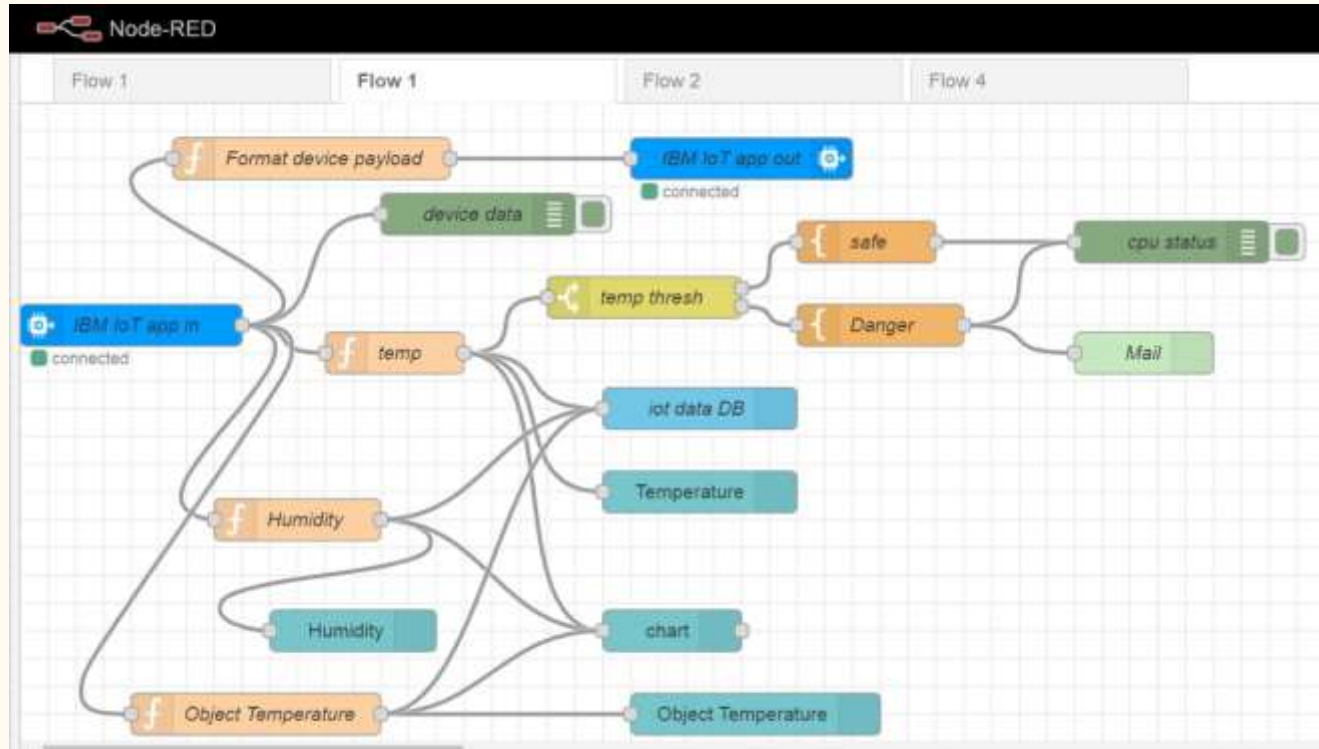


# 3. Project Implementation

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## 3.1 IIoT Module



## 3.2 Blockchain Module

What is the reading?

Add


 0x976E5309ff944E3153AF9182D3C21C6A1eA9c704

Temperature within safe limits 60°


TIPS: 0 ETH TIP 0.1 ETH

MetaMask Notification

http://127.0.0.1:7545


 Post Creator

→

 0x6402...51...

http://localhost:3000

CREATE POST

 0

DETAILS

DATA

GAS FEE

9.60976

No Conversion Rate Available

Gas Price (GWEI)

20

Gas Limit

144724

AMOUNT + GAS FEE

TOTAL

9.60976

No Conversion Rate Available

Reject

Confirm

## 4. Conclusion and Future Scope

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# Conclusion & Future Scope

- This project intends to make a way for IoT devices to achieve industrial-grade accuracy.
- Blockchain allows information transfer from remote sensing systems to AI systems using blockchain technologies.
- Future expansions incorporate planning a reasonable consensus algorithm for this scheme and deploying the amplified framework in reality.

# Paper Publication

Paper entitled “*Monitoring Health of IIOT Devices using Blockchain*” is presented at the IEEE International Conference on Intelligent Engineering and Management (ICIEM 2021) by Rutuja Patole, Rushika Ramane, and Soundarya Nevrekar.

## 3.3 References

- Blockchain-based Status Monitoring System {BoSMoS} published by Sen He, and Wei Ren, Tianqing Zhu, Kim-Kwang, Raymond Choo
- Tornado Enabling Blockchain in Heterogeneous Internet of Things through A Space-Structured Approach (2020) published by Yinqiu Liu, Kun Wang, Kai Qian, Miao Du, and Song Guo
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**Thank You**

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