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IoT Power Monitoring Network

A Blockchain implementation with Appliance Classification

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Introduction

With the rising demand for a smart grid of interconnected equipment and services, more IoT devices are expected to come online in the next few years. Therefore, it is imperative to protect these smart devices against cyberattacks and tampering. This project looks at adopting a blockchain implementation of an IoT Power Monitoring network to improve the security and immutability of tracking electricity consumption within a household.

Objective

To build a data collection framework to track electricity consumption in households by developing a decentralised application (dApp) powered by smart contracts in the Ethereum blockchain. Subsequently, machine learning classification techniques are then employed on the collected data for knowledge discovery.

System Overview

1. **Data collection**: WiFi Smart Plugs are used to measure voltage and current consumption of specific power sources in a household.
2. **Data consolidation**: A hub present in the local network interfaces with the multiple smart plugs to consolidate all readings and is responsible for uploading the dataset into the Ethereum blockchain.
3. **Blockchain Data Management**: A smart contract deployed onto the Ethereum blockchain will track all incoming records by uploading the dataset to the InterPlanetary File System (IPFS) host node. This allows the unique and permanent hash produced to be stored along with each transaction in the blockchain, making them immutable.
4. **Knowledge discovery**: Subsequently, machine learning techniques are then employed onto the collected dataset to provide insights into energy consumption patterns of each household.