

## ENERGY CONSUMPTION MONITORING AND PREDICTION PLATFORM BASED ON LORA-IOT AND MACHINE LEARNING

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### **Abstract:**

In the present era, the use of non-renewable energy sources has increased and it is a major issue that needs to be addressed. When considering electricity generation, 85% of it is generated from non-renewable sources. Therefore, minimizing energy wastage should be a major concern. This study suggests a method to reduce energy wastage based on the Internet of things and machine learning. In many domestic and small-scale factories, energy is often wasted due to ignorance and inattention. Therefore, minimizing energy wastage can be encouraged through a consumer-level platform that can monitor, predict, and manage energy consumption. This study offers a ubiquitous approach to draw attention to domestic energy usage and convince them to change their negative energy usage habits. LoRa is a spread spectrum modulation technique derived from chirp spread spectrum (CSS) technology and it's a long-range, low power wireless platform that has become the de-facto technology for the Internet of Things (IoT) networks worldwide. The proposed system mainly consists of four subsystems: Smart Energy Meter, LoRa Gateway, Network Server and Application Server. The Smart Energy Meter is based on the Arduino microcontroller, the voltage sensor and the current sensor. It calculates the energy consumption of a specific terminal and transmits the consumption data to the cloud server via the LoRa gateway. The transmitted data is stored in a database and Machine Learning algorithms build a Long-Short-Term-Memory (LSTM) deep learning model based on sample data collected from the power outlets or different sectors, known as "training data", in order to make predictions. In an application server, the analyzed information is presented to the consumer in order to draw attention, and it assists to identify unnecessary and abnormal energy consumptions and power surges on the power grid. The app also provides the ability to implement custom power plans that limit and control the consumption of specific power outlets. This system was tested in the simulated environment and stabilized that the accuracy was at the acceptable level and also this can be further extended to provide intelligent power plan suggestions to reduce wastage of energy consumption.

**Keywords:** Internet of Things (IoT), LoRa IoT, Wireless Energy Consumption Monitoring, LSTM