

# Project Proposal: Analysis of the Appliances Energy Prediction Dataset

Abdoulfatah Abdillahi

February 2025

## 1 Introduction

Energy consumption in residential buildings is influenced by various environmental factors such as temperature, humidity, and weather conditions. Understanding these relationships is crucial for improving energy efficiency and sustainability. This study explores the **Appliance Energy Prediction** dataset, which was collected to develop regression models for predicting energy consumption in a low-energy residential building.

This dataset was collected using a ZigBee wireless sensor network to monitor temperature and humidity conditions. My motivation for selecting this dataset stems from my prior experience with classification tasks; however, I have not extensively worked on regression problems. This project presents an opportunity to strengthen my skills in regression modeling.

## 2 Objective

The primary objective of this study is to develop regression models to analyze energy consumption in a low-energy residential building. Additionally, this project aims to leverage statistical learning and data mining techniques to extract meaningful insights from the dataset.

## 3 Dataset Description

The dataset used for this study is the **Appliance Energy Prediction** dataset, sourced from the UC-Irvine Machine Learning Repository. The key characteristics of the dataset are:

- **Dataset Characteristics:** Multivariate, Time-Series
- **Type:** Supervised Learning
- **Associated Tasks:** Regression

- **Feature Type:** Real-valued
- **Number of Instances:** 19,735
- **Number of Features:** 28
- **Data Source:** <https://archive.ics.uci.edu/ml/datasets/Appliances+energy+predictionUC>  
Irvine Machine Learning Repository

## 4 Specific Goals

This study focuses on the following key tasks:

- **Analyze relationships** between environmental factors such as temperature, humidity, and weather conditions and their impact on appliance energy usage.
- **Develop regression models** to estimate energy consumption, exploring suitable approaches such as linear regression, decision trees, and neural networks.
- **Identify hidden patterns** in energy usage using clustering techniques to group similar energy consumption behaviors.

## 5 Conclusion

By applying regression and clustering techniques, this study aims to uncover relationships between environmental factors and appliance energy consumption while identifying meaningful usage patterns. The insights gained will contribute to the development of efficient energy management strategies, promoting sustainability and reducing energy waste in residential buildings.