Ambient Computing Based Approach to Help in Device Diagnostics, Create Opportunities to Reduce Power Consumption and Carbon Footprint

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This project uses Machine Learning, NLP and Multilingual named entity transliteration approach to identify devices, help in device diagnostics and create effective communication between the Owner of the house, stakeholders and its devices by creating an Ambient Computing environment. The aim is to learn whether various low-cost IoT based power monitors forming a wireless sensor network can be used to collect data that can be analyzed to educate people and give them opportunities to save energy. The initial target is a domestic scenario though the same techniques may be applicable to energy use in offices and small businesses. A low-cost setup was used to capture the device signatures as voltage and current. Around 4 million data samples have been collected for 30 types of appliances. The data was used to create interactive visualizations and build machine learning models for device classification, time series forecasting, and anomaly detection. The project demonstrates an appliance’s ability to communicate its status from the signatures with higher power consumption and carbon footprint. The appliance also asks for self-help through notifications/SMS if it identifies a problem. Since we speak many languages in India, multilingual communication with the devices using the named entity transliteration features are created and it is demonstrated in English, Hindi, Marathi, and Gujarati. It was personalized at the device level for the household scenario. The devices themselves present their contribution of power consumption, carbon footprint and with the help of edge intelligence help in reducing the same.

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