Our Project leverages a combination of hardware, cloud services, machine learning, and data visualization technologies:

Hardware: ESP32 microcontroller and DHT22 sensor collect real-time temperature and humidity data from appliances.

Cloud: AWS IoT Core or Blynk Cloud is used for secure data storage and access.

Data Preprocessing: Pandas and NumPy clean and transform the raw data, making it ready for analysis.

Data Processing: Apache Spark Components and PySpark are employed to process large volumes of data, while Scikit-learn's Linear Regression model helps predict energy and water consumption of appliance and Threshold comparison of Temperature and Humidity values for efficiency.

Optimization Engine: A rule-based system generates suggestions based on the appliance's inefficiencies.

User Interface: The web/mobile interface is built using Flask/Django, providing users with insights and suggestions.

Reports: Pandas, Matplotlib, and Seaborn are used to generate and visualize reports showing trends in energy consumption and appliance performance.

Feedback Loop: User feedback helps the system continuously improve suggestions and refine machine learning predictions.

This combination of technologies ensures efficient data processing, real-time optimization, and ongoing system improvement based on user interactions.