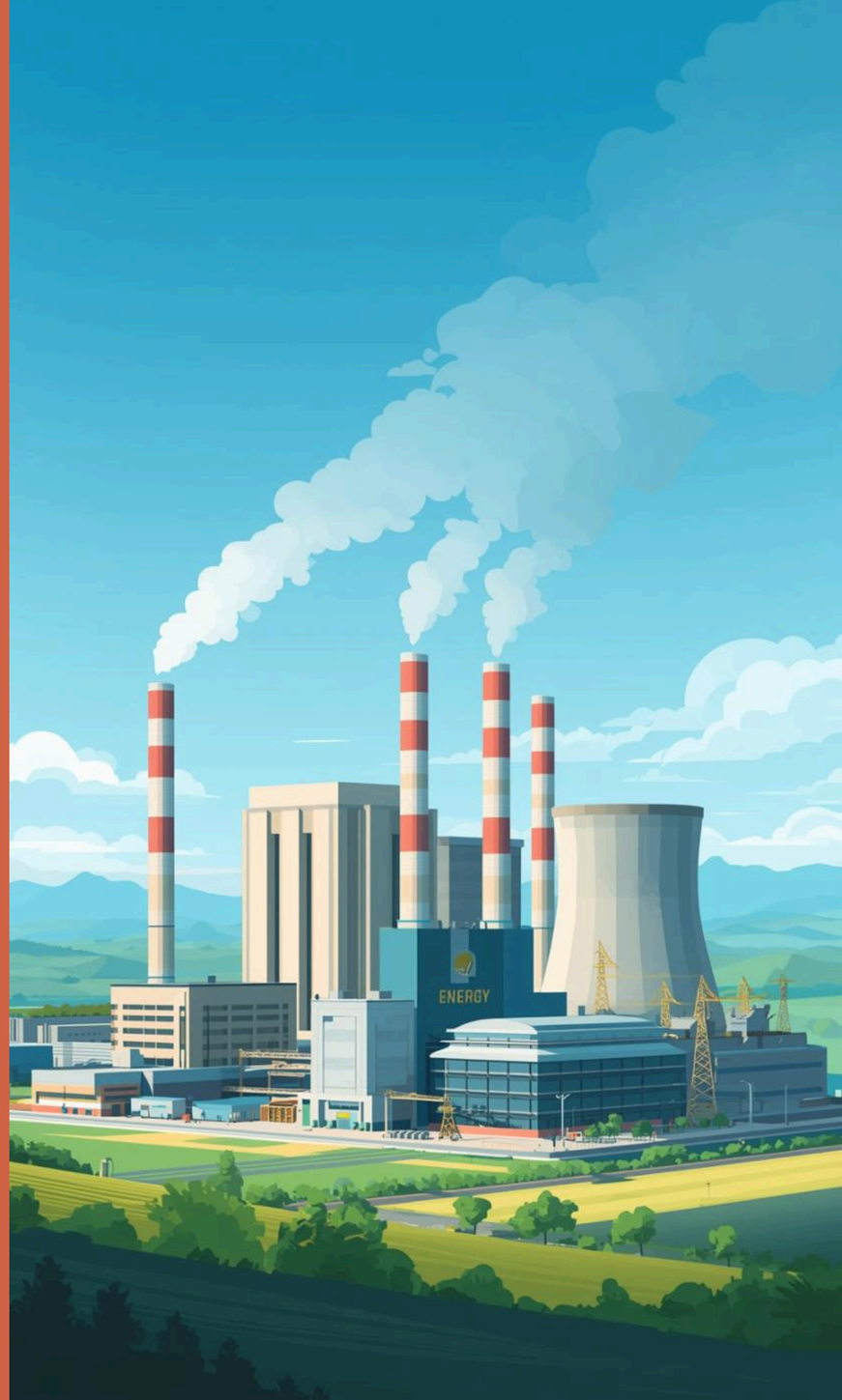
Smart Energy Consumption Analysis

PRESENTER: HIMA SREE

Key Challenges in Energy Consumption

NEED FOR OPTIMIZATION

The increasing demand for energy is leading to inefficiencies and necessitating advanced methods for **optimizing consumption** and forecasting future needs.



Proposed Solution Overview

LSTM MODEL

The system utilizes an LSTM model for accurate predictions, effectively handling sequential data and capturing temporal dependencies in energy consumption.

WEB DASHBOARD

A user-friendly web dashboard provides real-time predictions, enabling users to visualize energy consumption trends and make informed decisions effortlessly.

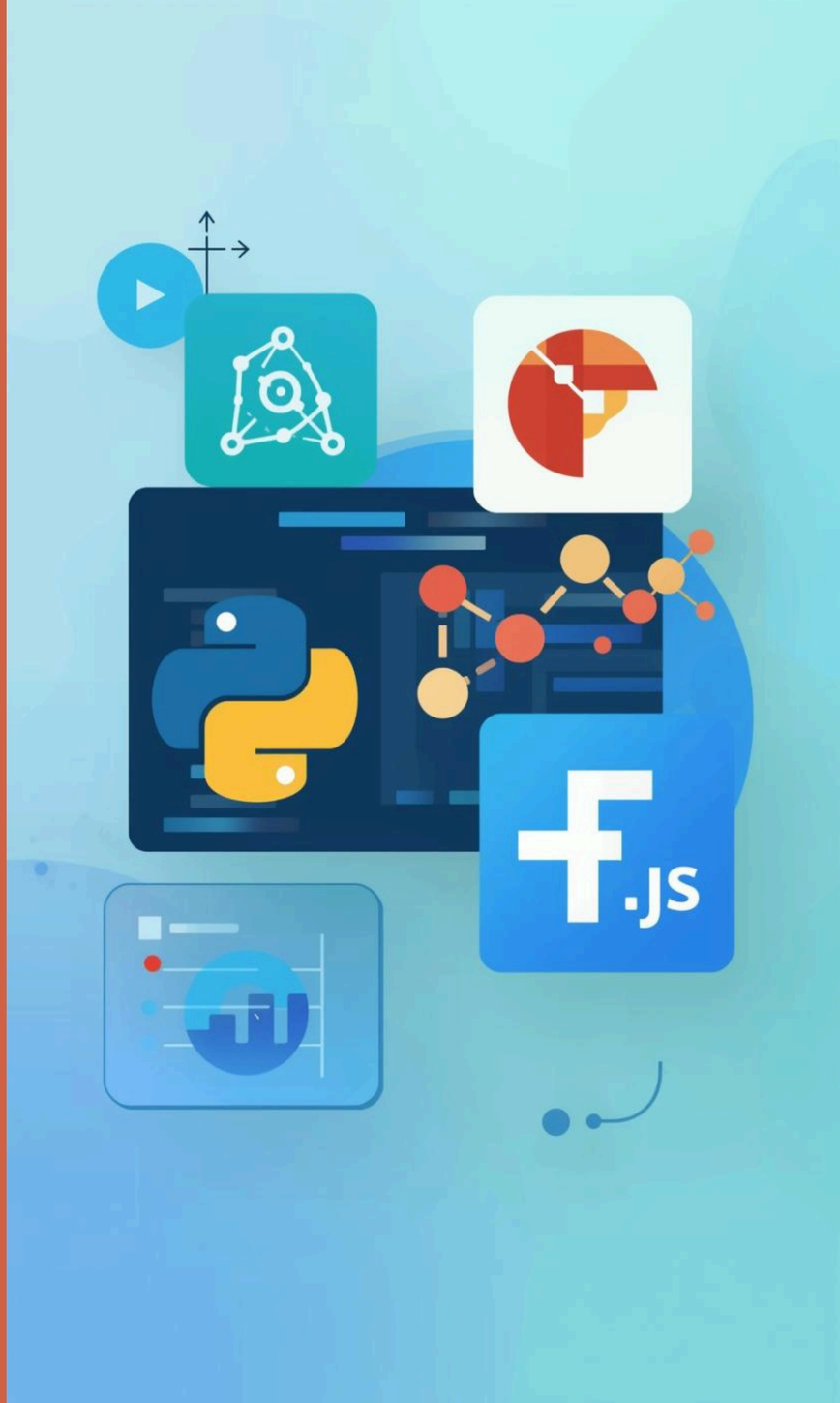
INTERACTIVE VISUALIZATION

Interactive visualizations enhance user engagement, allowing for dynamic exploration of energy data and facilitating deeper insights into consumption patterns.

Technology Stack for Energy Prediction System

COMPONENTS AND FRAMEWORKS

The system leverages a robust technology stack including Python, TensorFlow, Flask, and Chart.js for seamless energy prediction and visualization.



System Architecture Overview

DATA COLLECTION

The initial phase involves importing raw datasets, followed by comprehensive cleaning to ensure data quality and relevance for analysis.

DATA PREPROCESSING

In this stage, data normalization, sequence generation, and train-test splitting are performed to prepare data for the model training process.

MODEL DEVELOPMENT

The model development focuses on constructing LSTM layers, optimizing the dense output layer, and minimizing loss using the Mean Squared Error function.

Model Development Details

INPUT FORMAT

The model utilizes **7-day weekly energy sequences** as input, allowing it to capture and analyze consumption patterns effectively.

MODEL TYPE

This system employs **LSTM (Long Short-Term Memory)** networks, optimized for learning from sequential data, enhancing prediction accuracy over time.

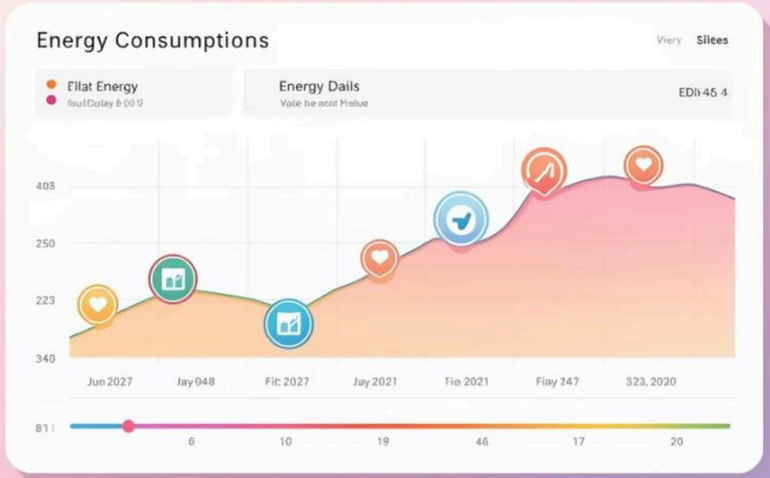
LOSS FUNCTION

The Mean Squared Error (MSE) is used as the **loss function**, facilitating effective training by measuring prediction accuracy during model development.

Weekly Energy Consumption Prediction Dashboard

USER INTERFACE AND OUTPUTS

The dashboard allows users to input their energy values while displaying predicted next-day consumption through **interactive visualizations** and trends.



Challenges and Solutions in Forecasting

DATA HANDLING

Handling sequential data is a significant challenge. The LSTM architecture provides an effective solution, enabling accurate predictions from historical energy consumption data.

INTEGRATION ISSUES

Integrating the model with the web platform is complex. Deploying a Flask API streamlines this process, ensuring seamless communication between the model and user interface.

Measurable Outcomes of the Energy Prediction System

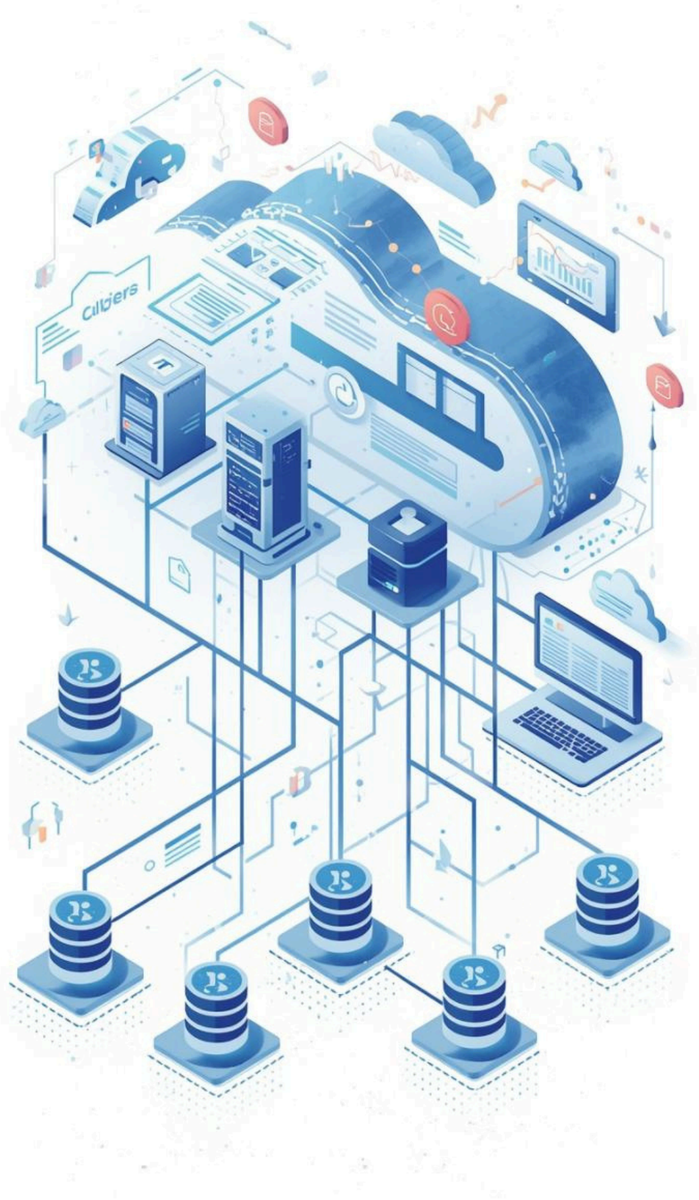
IMPACT AND BENEFITS

The system significantly enhances forecast **accuracy**, enabling better energy management and **faster decision-making** for sustainable consumption practices.

Future Enhancements for Energy Prediction System

PLANNED IMPROVEMENTS AHEAD

We aim to integrate **AI-based optimization** and enhance the dashboard for a more comprehensive analysis of energy consumption trends.



Thank You!