AI for Good

AI/ML in 5G

Build-a-thon 4.0: AI native networks and applications

50+ UN PARTNERS

ITU

6 February 2026

RETHICK CB

FROM SRMIST

- B.TECH IN CSE WITH DATA SCIENCE
- **2nd YEAR**

Eco-Sync: AI-Native Green Wi-Fi Manager

1. Problem Statement

Wi-Fi routers usually run at full power all the time, even when no users are connected or traffic is very low. This causes unnecessary energy waste and increases carbon emissions. Existing Wi-Fi management systems do not intelligently adjust power based on real-time usage patterns. Hence, there is a need for an **AI-native, energy-aware Wi-Fi management solution** that can reduce power usage without affecting user experience.

Eco-Sync: AI-Native Green Wi-Fi Manager

2. Novelty of the Project

Eco-Sync introduces **AI directly into Wi-Fi network control**.
Unlike traditional systems, it:

- Predicts network usage using machine learning
- Automatically reduces Wi-Fi transmission power during idle or low-usage periods
- Visualizes **real-time energy savings and CO_2 reduction**

This combination of **AI-driven power optimization + sustainability visualization** makes Eco-Sync unique and aligned with AI-native networking principles.

Eco-Sync: AI-Native Green Wi-Fi Manager

3. Abstract

Eco-Sync presents an AI-native Green Wi-Fi management framework aimed at improving energy efficiency in wireless networking environments. Traditional Wi-Fi routers lack awareness of traffic dynamics and typically operate at constant power levels, resulting in inefficient energy utilization. Eco-Sync introduces a closed-loop control architecture that continuously monitors real-time network traffic and employs a time-series machine learning model to predict near-future Wi-Fi usage.

The predicted usage is translated into adaptive power control decisions, allowing the system to reduce router power during anticipated idle periods while ensuring timely restoration during high-demand phases to preserve quality of service. A baseline always-on router model is used for comparative evaluation, and the resulting energy and CO_2 savings are calculated and visualized in real time. This work demonstrates the feasibility of AI-native network control for sustainable networking and highlights the potential of intelligent automation in supporting environmental objectives under the **AI for Good** paradigm.

Implementation Approach

- Collect Wi-Fi usage data (connected users, traffic load)
- Train a machine learning model to predict idle/active periods
- Dynamically adjust Wi-Fi transmission power
- Display energy and CO_2 savings on a dashboard

Test Setup

- Simulated or real Wi-Fi router environment
- Python-based ML model
- Dashboard for visualization

Tools & Technologies

- Python
- Machine Learning (Regression / Time-Series)
- Network simulation or router logs
- Visualization libraries

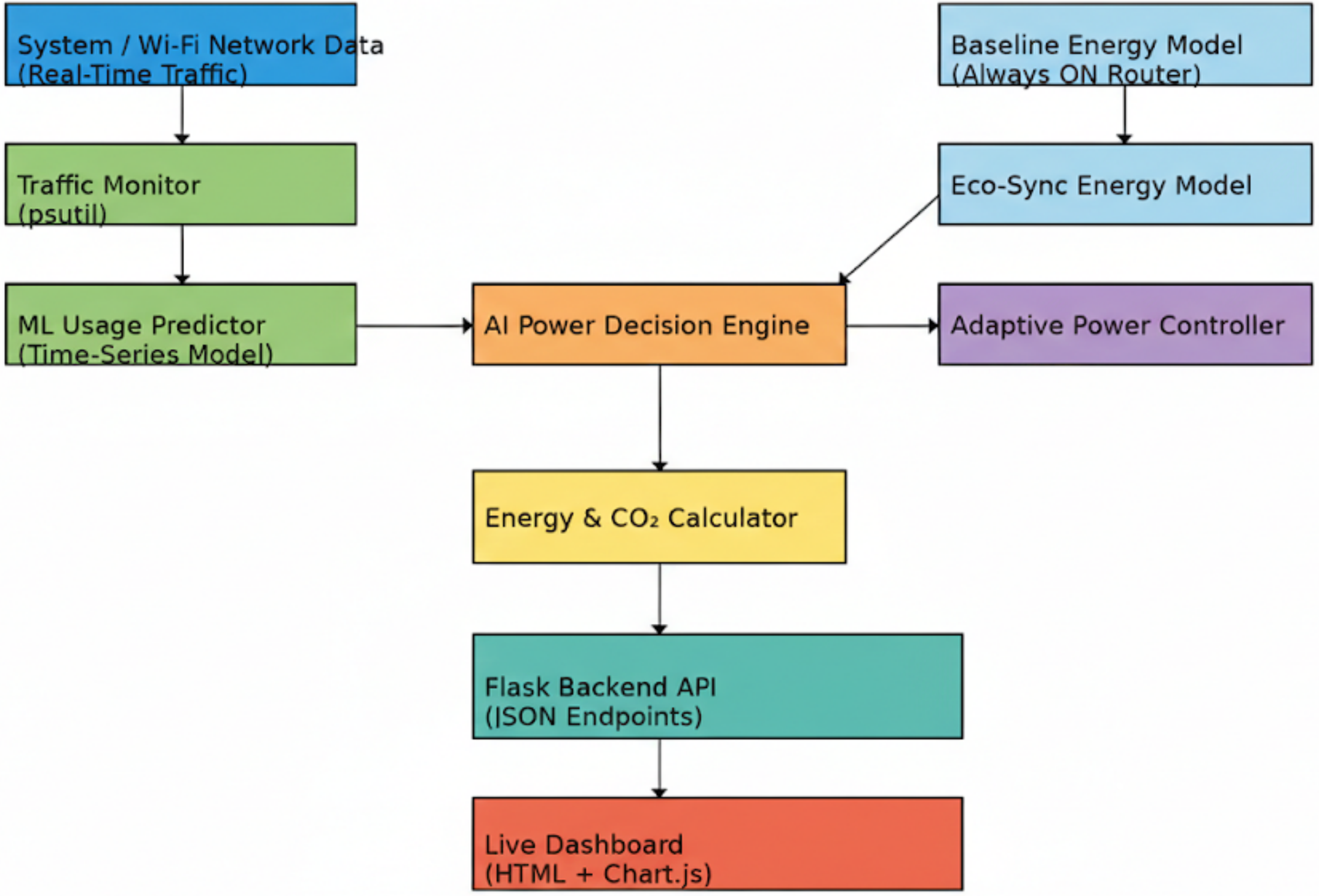
Functional Requirements

- Accurate usage prediction
- Automatic power adjustment
- Real-time visualization

Performance Requirements

- Minimal latency impact
- Noticeable energy savings

Eco-Sync: AI-Native Green Wi-Fi Architecture



Eco-Sync: Smart Green Wi-Fi

AI predicts Wi-Fi usage and reduces power during idle periods to save energy and CO_2

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Baseline assumes a normal Wi-Fi router running at full power all the time. Eco-Sync dynamically reduces power using AI predictions during idle periods.

Total Energy Saved

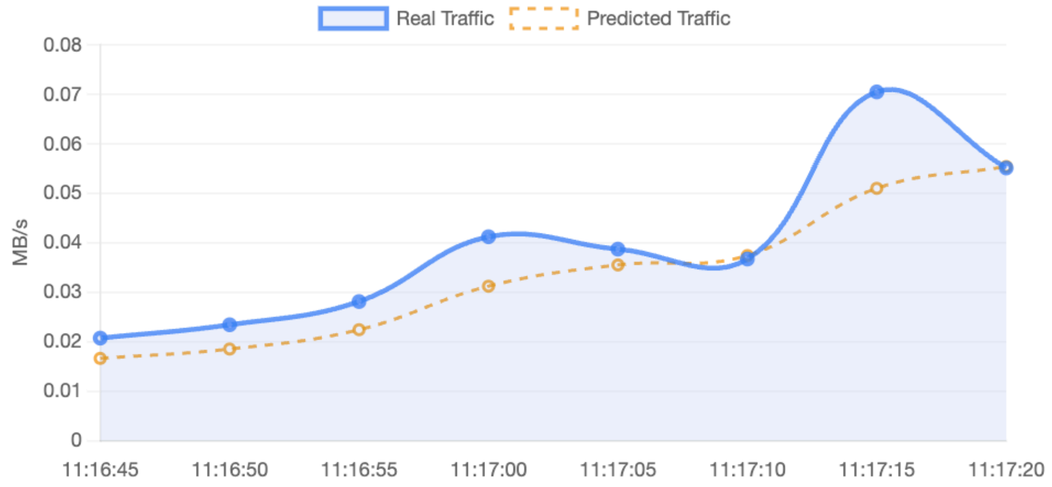
56.0 Wh

Total CO_2 Reduced

0.027 kg

Current Power	Current Traffic	Predicted Traffic	Router Status
30%	0.1 MB/s	0.1 MB/s	Power Saving

Network Activity



Router Power Control