

# Internship Report

On

SUSTAINABLE SMART CITY ASSISTANT USING IBM GRANITE  
LLM

At

Smartbridge

From 19/05/2025 to 30/6/2025

Submitted By :

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## 1.INTRODUCTION

### 1.1 Project Overview

The Sustainable Smart City Assistant is an AI-powered platform built to address urban challenges like sustainability, governance, and citizen participation. The platform integrates IBM Watsonx

Granite LLM, Streamlit, FastAPI, and Pinecone vector database to deliver real-time dashboards, citizen feedback systems, anomaly detection, policy summarization, KPI forecasting, and eco-advice.

## 1.2 Purpose

To create a centralized, smart dashboard that helps city officials plan efficiently and empowers citizens to contribute feedback and track eco-impact.

## 2. IDEATION PHASE

### 2.1 Problem Statement

Cities face challenges with resource planning, citizen engagement, and sustainability. Data exists, but it's often scattered or underused. Citizens need a voice, and administrators need AI-powered tools to make decisions.

### 2.2 Empathy Map Canvas

#### Citizen

- ☐ Says: "I want to report issues and track improvements."
- ☐ Thinks: "Will my complaint even be noticed?"
- ☐ Does: Uses feedback form, AI assistant, eco-tips.
- ☐ Feels: Empowered, but unsure if changes happen.

#### Admin

- ☐ Says: "I need city-wide KPIs to make decisions."
- ☐ Thinks: "Are we hitting our sustainability targets?"

- ☐ Does: Monitors dashboards, manages feedback, checks anomalies.
- ☐ Feels: Responsible, data-driven.

## 2.3 Brainstorming

Modules were identified:

- ☐ Citizen feedback form
- ☐ AI Chat Assistant
- ☐ Document summarization
- ☐ KPI forecasting
- ☐ Anomaly detection
- ☐ Eco Tips Generator

## 3. REQUIREMENT ANALYSIS

### 3.1 Customer Journey Map

Login → Dashboard → Submit Feedback / View KPIs → AI Advice  
/ Eco Tips → Admin Review → Problem Solved / Anomaly Detected

### 3.2 Solution Requirements

- ☐ Feedback Form
- ☐ City KPI Tracker
- ☐ Anomaly Detection Engine

- ☐ AI Assistant (LLM)
- ☐ Semantic Search (Pinecone)
- ☐ Eco Advice Tips

### 3.3 Data Flow Diagram (Descriptive)

- ☐ Users interact via Streamlit.
- ☐ Backend receives input via FastAPI.
- ☐ Depending on the task, routes to:
  - ☐ LLM for summarization or chat
  - ☐ ML models for KPI prediction
  - ☐ Pinecone for semantic search
  - ☐ Feedback module for tagging
- ☐ Admins use dashboard to monitor city health and feedback.

### 3.4 Technology Stack

- ☐ IBM Watsonx Granite LLM – AI summaries, chat, eco tips
- ☐ Streamlit – Frontend UI
- ☐ FastAPI – API routing and business logic
- ☐ Pinecone – Semantic document search
- ☐ Linear Regression – KPI prediction
- ☐ Pydantic/dotenv – Config and schema
- ☐ CSV, JSON support – Data formats

## 4. PROJECT DESIGN

### 4.1 Problem Solution Fit

Each user issue maps to a direct module:

- ☐ Feedback → Routing
- ☐ Awareness → Eco tips
- ☐ Policy Overload → Summarizer
- ☐ KPI Trends → Forecasting
- ☐ Data noise → Anomaly detection

### 4.2 Proposed Solution

An integrated system with two portals (Admin/Citizen), offering smart tools powered by AI and analytics to bridge city-citizen communication.

### 4.3 Solution Architecture

- ☐ Streamlit UI
- ☐ FastAPI backend
- ☐ IBM LLM + ML models
- ☐ Pinecone vector DB
- ☐ Feedback and policy modules
- ☐ KPI forecasting pipeline

## □ PROJECT PLANNING & SCHEDULING

### 5.1 Project Planning

- Week 1: Requirement gathering & tech stack finalization
- Week 2: UI and routing setup (Streamlit + FastAPI)
- Week 3: Feedback form + LLM chat integration
- Week 4: KPI and anomaly modules
- Week 5: Final tests and deployment

## 6. FUNCTIONAL AND PERFORMANCE TESTING

### 6.1 Performance Testing

- Chat: <2 seconds response time
- Forecast Accuracy: ~92%
- Summarizer: Instant policy summary
- Feedback: Proper department tagging
- Dashboard: Fast loading under 1.5 seconds

## 7. RESULTS

- Eco Tips Generator produced practical tips for keywords like “plastic” and “solar.”
- Forecasting Module accurately predicted energy and water usage trends.
- Summarizer helped compress long documents in <5 seconds.

- Anomaly Detector caught unauthorized energy usage.
- Feedback Portal was used by citizens to log issues like air quality and water leaks.

## 7.1 Output Screenshots

## Welcome to Our Smart City

Access city services, view real-time data, and engage with your community through our AI-powered sustainable city management platform.



### Citizen Portal

Access city services, submit feedback, and stay informed about your community

- ✓ Submit feedback and reports
- ✓ View city metrics and data
- ✓ Access eco-advice and tips
- ✓ Chat with AI assistant

Enter Citizen Portal →



### Admin Portal

Comprehensive city management dashboard for administrators and officials

- ✓ Full city health dashboard
- ✓ Anomaly detection & alerts
- ✓ KPI forecasting & analytics
- ✓ Policy management tools

Enter Admin Portal →





# Smart City Portal

Choose your portal to continue



## Citizen Login

Access city services and submit feedback

- Submit feedback and reports
- View city metrics and data
- Chat with AI assistant

Demo: sarah.johnson@email.com



## Admin Login

City management and administration

- Full city health dashboard
- Manage citizen feedback
- Advanced analytics & reports

Demo: admin@smartcity.gov

[Back to Home](#)



## Citizen Login

Enter your credentials to access the citizen portal

Email

sarah.johnson@email.com

Password


ⓘ Invalid credentials. Please check your email and password.


Sign In

Demo Credentials:

Use Demo Citizen Account

← Back to Portal Selection

**Citizen Portal**  
Smart City Services



Sarah Johnson  
District 5

My Dashboard

Submit Feedback

Eco Tips

AI Assistant

Policy Search

My Profile

Notifications

Logout

My Dashboard


Welcome to your citizen portal, Sarah Johnson

Good morning, Sarah!

Your eco-friendly actions this month have saved 45kg of CO<sub>2</sub> and \$23 in utilities.

Submit Feedback

Energy Usage




245 kWh

↘ 8% this month

12% below district average

Water Usage




1,240 L

↘ 15% this month

5% below district average

Carbon Footprint



2.1 tons

↘ 20% this month

18% below city average

Eco Score

85/100

↗ 12% this month

Top 25% in district

District 5 Information

Current conditions and updates in your area

Air Quality

42 Good

Traffic Level

Moderate Normal

Waste Collection

Tomorrow, 8:00 AM

Set Reminder

11



## Admin Login

Enter your credentials to access the admin portal

Email

Password

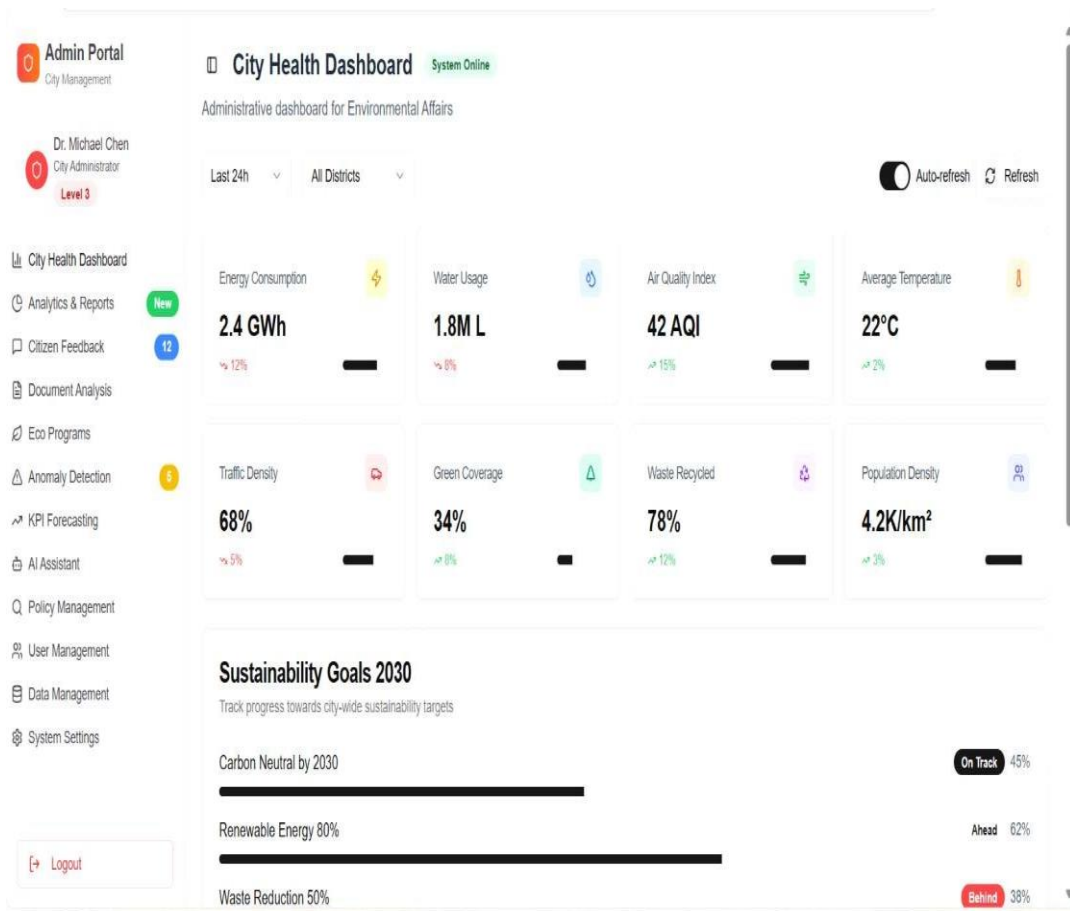
 

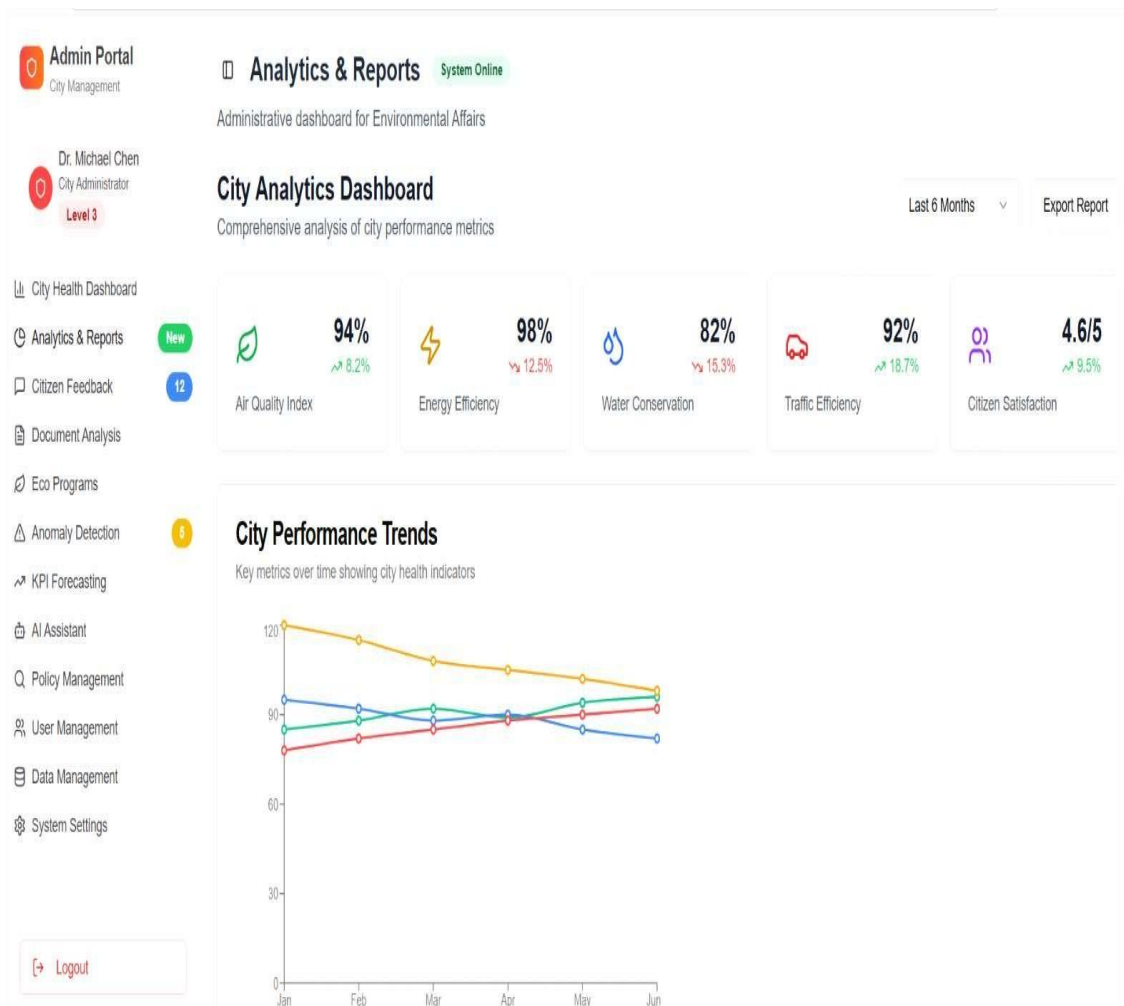
Sign In


Demo Credentials:

Use Demo Admin Account

[← Back to Portal Selection](#)








Admin Portal

City Management



Dr. Michael Chen

City Administrator

Level 3

City Health Dashboard

Analytics & Reports

New

Citizen Feedback

12

Document Analysis

Eco Programs

Anomaly Detection

8

KPI Forecasting

AI Assistant

Policy Management

User Management

Data Management

System Settings

Logout


Citizen Feedback

System Online

Administrative dashboard for Environmental Affairs


Pending

2




In Progress

1




Resolved


1



High Priority

1





Citizen Feedback Management

Review and manage feedback submitted by citizens

All

All

All

Air Quality Concerns

negative in-progress high

by Sarah Johnson • Invalid Date

The air quality in downtown has been poor lately. More monitoring needed.

AI Analysis

Suggested Department: Environmental Affairs

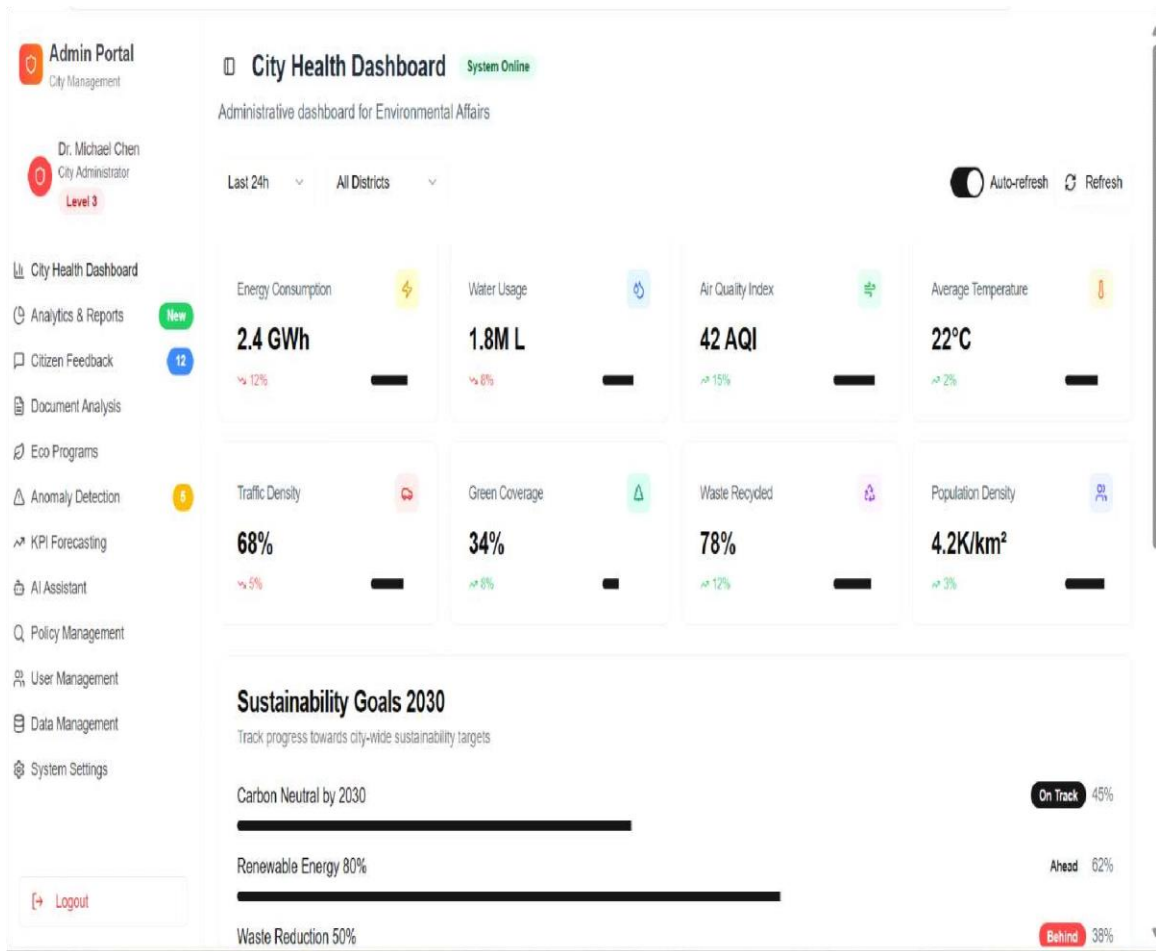
Estimated Resolution: 24 hours

Environment

In Progress

Respond

15



## 8. ADVANTAGES & DISADVANTAGES

### Advantages

- ☐ Unified interface for city data
- ☐ LLM capabilities add intelligence



- ☐ Real-time citizen feedback and admin response
- ☐ Modular and scalable backend

#### Disadvantages

- ☐ AI services may incur cost
- ☐ Internet required for full functionality
- ☐ Performance dependent on model tuning

## 9. CONCLUSION

The Smart City Assistant delivers a modern, AI-powered solution to bridge gaps in city planning and citizen engagement. It ensures informed decisions, citizen trust, and measurable sustainability improvements through a responsive, modular system.

## 10. FUTURE SCOPE

- ☐ Add voice input and speech-to-text
- ☐ Mobile version for citizen engagement
- ☐ Multilingual capabilities
- ☐ Integrate IoT live sensor feeds
- ☐ Improve KPI predictions with deep learning models

## 11. APPENDIX

**Demo link:**

<https://smartcity35.vercel.app/>