Phase 3: Implementation of Project

Title: Urban Planning and Designing

Objective

The objective of Phase 3 is to implement core components of the urban planning and design project. This includes development of spatial analysis tools, integration of GIS for planning, initial simulations for traffic flow, and implementation of green zoning strategies.

1. GIS Mapping and Analysis

Overview

The GIS module will serve as a foundational tool for spatial analysis and urban data visualization.

Implementation

- Spatial Database Setup: Creation of a geo-database storing zoning, infrastructure, and demographic data.

- Layer Integration: Integrating land use, transport, and utilities layers.

- Tool: QGIS with Python plugins for customization.

Outcome

By end of this phase, a working GIS model with multiple integrated layers will be available.

2. Zoning and Land Use Design

Overview

Establish zoning types and land use allocations using simulation tools and planning models.

Implementation

- Zoning Map: Create zoning policies (residential, commercial, green spaces).

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- Tools: Python and Shapely for geometric analysis.

Outcome

Functional zoning plans optimized for space usage and accessibility.

3. Smart Transportation Modeling

Overview

Development of an initial model to simulate traffic and pedestrian movement.

Implementation

- Simulations: Use SUMO (Simulation of Urban Mobility) with network data.

- Analysis: Evaluate congestion zones and propose optimization.

Outcome

Basic simulations showing traffic patterns and mobility options.

4. Environmental and Green Planning

Overview

Integrate green infrastructure in urban design.

Implementation

- Tools: GIS and NDVI (Normalized Difference Vegetation Index) analysis.

- Strategy: Allocate green buffers, parks, and tree-lined streets.

Outcome

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Initial layout of green zones across the urban map.

5. Data Visualization and Dashboards

Overview

Interactive dashboards for planning insights.

Implementation

- Tools: Plotly Dash, Tableau.

- Features: Real-time urban metrics dashboard.

Outcome

Visual dashboard displaying zoning, density, traffic, and greenery metrics.

Challenges and Solutions

1. Data Availability

- Challenge: Limited access to real-time urban data.

- Solution: Use open datasets and simulate scenarios.

2. Integration Complexity

- Challenge: Integrating GIS with traffic simulation.

- Solution: Modular system design and testing.

3. Visualization

- Challenge: Ensuring clarity and interactivity in data representation.

- Solution: Use layered dashboards and responsive charts.

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Outcomes of Phase 3

1. GIS system with multiple layers.

2. Zoning and land use plans.

3. Smart transportation simulation.

4. Green infrastructure layout.

5. Interactive urban planning dashboard.

Next Steps for Phase 4

1. Detailed 3D visualization and simulation.

2. Public feedback integration.

3. Expansion to city-wide scale.

4. Integration with IoT for real-time updates.

SCREENSHOTS OF CODE and PROGRESS - MUST BE ADDED HERE FOR PHASE 3