

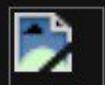
1. Project Overview: Smart Urban Green Placement System (SUPGS)

Urban highways and signals suffer from high CO₂ intensity. Traditional planting often fails due to infrastructure damage (deep roots) or safety risks (visibility). My system, **SUPGS**, uses a data-driven approach to optimize urban greenery.

- **Problem:** High traffic idling CO₂ and infrastructure damage by unscientific tree placement.
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- **Solution:** A GPS-based recommendation engine that selects plants based on road type, traffic load, and safety filters.
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- **Safety Integration:** Automatically excludes deep-rooted species like Banyan for city roads to protect underground utilities.

2. Quantitative Impact Analysis (Per 1 KM Stretch)

Based on my cross-checked calculations, the model estimates the following sequestration:



Species/Component	Quantity/km	Est. CO ₂ Absorption (Yearly)
Areca Palm	1000	~20.0 Tons
Snake Plant	2000	~10.0 Tons
Ashoka Tree	667	~16.7 Tons
Teak Tree (Highways)	667	~26.7 Tons
Total mitigation	-----	73.4 tones CO₂/year

Effectiveness: This model can reduce CO₂ exposure by **10% to 15.9%** per kilometer, significantly improving pedestrian air quality.
(73.4/460×100)

3. Software Prototype (Python)

I have developed a Python prototype to automate these calculations. While I used AI tools for code synthesis and data collection, the logic, safety parameters, and mathematical verification are my original work.

Code is in last sir

SUPGS: Smart Urban Green Placement System

Developer: Kishan & AI Assistant

```
def calculate_green_plan(road_length_km, road_type,  
traffic_density):
```

....

road_type: 'highway', 'city_main', 'flyover_pillar'

traffic_density: 'high', 'medium', 'low'

....

1. CO₂ Emission Factors (Approx. kg/km/year
based on density)

emissions = {

'high': 500000, # 500 Tons/km/year

'medium': 300000, # 300 Tons/km/year

'low': 150000 # 150 Tons/km/year

}

```
total_emission = emissions[traffic_density] *  
road_length_km
```

```
# 2. Plant Database: (CO2 absorption in kg/unit/year, min_spacing_meters)
```

```
# Safety Check: Deep root trees excluded for city_main
```

```
plants = {  
    'Areca Palm': {'co2': 20, 'spacing': 1.0, 'safe_for':  
        ['highway', 'city_main']},  
  
    'Snake Plant': {'co2': 5, 'spacing': 0.5, 'safe_for':  
        ['city_main', 'flyover_pillar']},  
  
    'Ashoka Tree': {'co2': 25, 'spacing': 3.0, 'safe_for':  
        ['highway', 'city_main']},  
  
    'Moss Panel': {'co2': 100, 'spacing': 10.0, 'safe_for':  
        ['flyover_pillar']} } # per panel  
}
```

```
print(f"--- SUPGS Analysis Report for  
{road_length_km} km ({road_type}) ---")
```

```
print(f"Estimated Local CO2 Load: {total_emission/  
1000} Tons/year\n")
```

```
print("Recommended Planting Strategy:")
```

```
total_absorbed = 0
```

```
for plant, data in plants.items():

    if road_type in data['safe_for']:

        # Calculate quantity based on spacing

        qty = int((road_length_km * 1000) / data['spacing'])

        absorption = (qty * data['co2']) / 1000 # convert

        to tons

        total_absorbed += absorption

        print(f"- {plant}: {qty} units (Spacing:
{data['spacing']}m) | Impact: {absorption:.2f} Tons CO2/
yr")

    impact_percent = (total_absorbed / total_emission) *

100

    print("-" * 50)

    print(f"TOTAL CO2 MITIGATION:
{total_absorbed:.2f} Tons/year")

    print(f"SYSTEM EFFECTIVENESS:
{impact_percent:.2f}% reduction in local exposure")

    print("-" * 50)

    print("SAFETY GUIDELINE: Ensure 2m distance
from road edge & 5m visibility at turns.")
```

```
# --- Testing the System ---
```

```
# Example: 2 km Highway with High Traffic
```

```
calculate_green_plan(road_length_km=2,  
                     road_type='highway', traffic_density='high')
```

```
# Example: 1 km City Road with Medium Traffic
```

```
# calculate_green_plan(road_length_km=1,  
                     road_type='city_main', traffic_density='medium')
```