

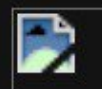
## 1. Project Overview: Smart Urban Green Placement System (SUPGS)

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.
- 
- **Solution:** A GPS-based recommendation engine that selects plants based on road type, traffic load, and safety filters.
- 
- **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. CO2 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	-----	<b>73.4 tones CO2/year</b>

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

### **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')
```