Urban Innovations

TIA ROBOT

Streamlining Traffic Analysis

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Technical Disclaimer

"Due to proprietary restrictions from my previous employer, the full source code is not publicly available. However, this prototype deck illustrates the logic architecture, data validation framework, and the Python-based automation pipeline I designed and implemented."

Real-World Pain Points

Addressing fragmentation, bottlenecks, and inconsistency

Traditional traffic data collection is plagued by manual bottlenecks and fragmented sources, resulting in significant inefficiencies and quality inconsistencies that delay project outcomes and extend report preparation time.

System Architecture

OVERVIEW OF AUTOMATION PLATFORM FLOW

Input Layer

The **Input Layer** features a user-friendly web interface designed with Python Flask, HTML, and CSS, where users easily input Latitude and Longitude for streamlined data processing.

Automated Engine

The **Automated Engine** harnesses PowerShell scripts and Task Scheduler to automate data harvesting, integrating real-time API calls to TDX for accurate bus routes and schedules.

Output Layer

The **Output Layer** generates automated Word reports and PNG charts, including line charts for bike usage and distribution maps for bus stops, enhancing reporting efficiency and clarity.

Engineering for Accuracy

DATA VALIDATION

Our system employs robust **data validation** techniques to standardize naming conventions between different data sources, ensuring consistency and accuracy in traffic analysis reports.

ERROR HANDLING

An integrated error handling loop continuously **monitors discrepancies**, verifying program logic against source data quality to guarantee reliable outputs and minimize manual interventions.

REGIONAL ADAPTABILITY

By auditing data availability across various cities, our platform ensures **regional adaptability**, allowing accurate traffic assessments tailored to local conditions and infrastructure variations.

Applied Tech Stack

AUTOMATION

The system utilizes **Python and PowerShell** to automate data collection processes efficiently.

DATA MANAGEMENT

SQL-based databases manage and store **API JSON data** for retrieval and analysis.

YOUBIKE SYSTEM

Hourly utilization is visualized through **line charts** to assess bike-sharing performance.

FRONTEND/UI

A user-friendly interface is developed using **Python Flask, HTML, and CSS** for easy access.

BUS SYSTEM

The platform generates **stop distribution maps** and bandwidth charts for bus routes.

PEDESTRIAN/BIKE PATHS

Spatial data visualization provides **distribution tables** for pedestrian and bike path analysis.