## 

Proposal

**manifetch**

İrem Onaran

Merve İçkilli

Sacide Sena Filiz

Şevval Neva Varol

## **Topic #**

### **1. Project Title**

### **Traffic Congestion Prediction Application**

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### **2. Problem Definition & Objectives**

### **Problem Definition:**

### The rapid increase in urbanization and vehicle ownership has placed immense pressure on transportation infrastructure, leading to frequent and severe traffic congestion. These congestions cause significant time losses, increase fuel consumption, and accelerate environmental pollution, thereby reducing the overall quality of life. Additionally, traffic jams impose notable economic costs such as reduced workforce productivity, delivery delays, and increased logistics expenses.

### Existing traffic monitoring systems primarily focus on real-time visualization, offering limited insight into future traffic conditions. This limitation makes it difficult for city authorities and commuters to take proactive measures. Therefore, there is a growing need for an intelligent system that utilizes historical traffic data and machine learning algorithms to predict congestion patterns and enable informed, data-driven decision-making.

### This project aims to address that gap by building a predictive system capable of forecasting traffic congestion based on historical data trends rather than relying solely on real-time information.

### **Objectives:**

### To predict short-term and medium-term traffic congestion using machine learning algorithms trained on historical datasets.

### To generate interpretable and data-driven insights for city planners, drivers, and logistics companies.

### To provide users with graphical reports, analytical dashboards, and mobile-friendly visualizations for better understanding and accessibility.

### To support urban traffic management and decision-making by delivering actionable forecasts and scenario-based insights.

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### **3. Scope**

### Collecting and preprocessing historical traffic data obtained from public sources and potential private contributions.

### Data cleaning, feature engineering, and selection of optimal machine learning models.

### Implementation and evaluation of predictive models (e.g., regression-based models, random forest, LSTM).

### Visualization of predictions through interactive dashboards, reports, and user-oriented interfaces.

### Integration of data analysis components into a web-based and optionally mobile-compatible platform.

### Collaboration with Ortana Elektronik A.Ş. for potential access to proprietary datasets, data acquisition infrastructure, and domain-specific feedback to enhance the accuracy and applicability of the model.

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### **4. User Profile**

### **Target Users:**

### Urban planners and municipal traffic authorities.

### Transportation and logistics companies seeking route optimization.

### Daily drivers and commuters (end users).

### Technology firms involved in smart city development.

### Academic and research groups studying traffic flow and predictive analytics.

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### **5. Anticipated Challenges & Constraints**

### **Technical Challenges:**

### Handling incomplete or inconsistent historical traffic datasets.

### Maintaining reliable model performance in a dynamic and multifactor environment such as urban traffic.

### Achieving a balance between prediction accuracy and computational efficiency.

### **Time and Resource Constraints:**

### Limited time and resources as a graduation project.

### Possible restrictions on access to extensive or recent historical datasets.

### **Ethical and Regulatory Considerations:**

### Protection of privacy and compliance with data protection regulations in the use of traffic-related datasets.

### Responsible, transparent, and ethical use of open or shared data resources.

### **Risk Mitigation Approach:**

### Even in the case of limited data availability, the system will be designed to demonstrate prediction capability using smaller datasets, leveraging feature engineering and robust model validation techniques. This approach ensures the model’s applicability and reliability despite potential data constraints.

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### **6. Data Sources**

### Istanbul Metropolitan Municipality (IMM) open traffic datasets.

### Ortana Elektronik A.Ş., providing additional traffic sensor data or infrastructure support when available.

### Google Maps or Yandex Maps traffic APIs (for supplementary data).

### Open data from the Ministry of Transport and Infrastructure.