Intelligent Intersection Management System

Intelligent Intersection Management System analyzes traffic flow to optimize traffic signal cycles and dynamically adjusts signal timing based on traffic conditions using intelligent traffic control technology.

Smart intersections automatically detect varying traffic volumes throughout the day and assess congestion levels to ensure optimized signal operations, enabling smooth and efficient traffic flow.

▲ The Intelligent Intersection Management System identifies vehicles using the intersection and analyzes traffic volume.

Issues to Tackle

☑ Instead of fixed signal cycles, adaptive traffic signals are needed to respond to intersection traffic volume and queue lengths.

☑ Signal optimization is required in high-congestion areas to reduce traffic violations such as signal violations and sudden lane changes, helping prevent accidents.

Expected Benefits ☑

☑ Reduced signal wait times per vehicle and increased vehicle throughput per signal, leading to improved intersection efficiency.
  * Average delay reduced by 41%, signal violations reduced by 36%.

☑ Utilizing collected data to analyze various traffic operation indicators (vehicle type, lane-based traffic volume, service levels, etc.), enabling policy improvements and real-time monitoring for enhanced intersection management.

☀ Key Services

· Optimization of traffic signals through vehicle detection by lane and direction, traffic volume measurement, and queue length analysis.

  * Integrated with an incident detection system, utilizing AI-based video analysis to monitor and respond to real-time traffic changes within intersections.

· Integration with emergency vehicle priority systems, enabling automatic signal adjustments to ensure priority passage for police, fire trucks, and other emergency vehicles at intersections.
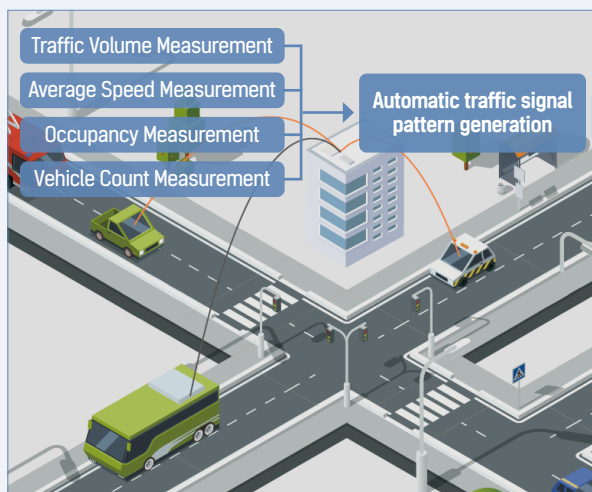
⚙ Use Cases

· Seoul: In June 2023, Seoul introduced Smart Intersection Systems in areas such as Taereung Station and Hwarangdae Station, incorporating AI CCTV and LiDAR to dynamically adjust signals based on real-time traffic conditions.

· Suwon: In 2024, Suwon launched an Intelligent Transport System (ITS) project, implementing AI-powered Smart Intersection Systems, Actuated Signal Systems, and Smart Crosswalk Systems.

· Easy Traffic: Deployed Smart Intersection-based real-time signal control systems in Manila, Philippines (2019), Baku, Azerbaijan (2021), and Asunción, Paraguay (2024).

Key Components

📦 Configuration

- Traffic Volume Measurement
- Average Speed Measurement
- Occupancy Measurement
- Vehicle Count Measurement

→ Automatic traffic signal pattern generation

⚙️ Key Technologies

1. Vehicle Detection and Tracking by Lane at Intersections
· Detects all objects larger than 12×12, including straight-moving, right-turning, left-turning, and U-turning vehicles within the detection area, assigns a unique ID, and tracks movement.

2. Vehicle Classification
· Categorizes small vehicles (sedans, SUVs, vans, trucks under 2.5 tons), large vehicles (trucks over 2.5 tons), and buses.

3. Pedestrian Detection
· Detects and tracks pedestrians on roads and crosswalks, including pedestrian counting.

4. Occupancy and Queue Length Calculation
· Measures lane occupancy rates every 5 minutes and calculates queue length based on detected vehicles within the lane detection area.

5. Real-Time Traffic Volume Estimation
· Stores raw data (pedestrians, traffic volume) every 5 minutes, integrates with signal detection devices, and records and calculates traffic volume per signal phase.

Application Service **Emergency Vehicle Priority Signal System**

Non-stop operation to the destination

1. Emergency Vehicle Driver App
· A dedicated app installed on a smartphone or tablet inside emergency vehicles that provides navigation, traffic signal information, and location-based guidance, allowing drivers to reach their destination quickly and efficiently.

2. Vehicle Location Tracking
· Tracks the real-time location, destination, and route information of emergency vehicles using the installed app on a smartphone or tablet inside the vehicle.

3. Intersection Arrival Time Prediction Technology
· Implements an algorithm that predicts arrival times at all intersections along the route based on the vehicle's current speed and location data.

4. Remote Signal Control
· Changes traffic signals to green in the expected direction of the emergency vehicle's arrival and automatically reverts to normal mode after passage.

5. Signal Compensation Recovery
· Compensates for increased wait times in other directions by providing additional green time to facilitate emergency vehicle movement.

6. Wide-Area Information Integration
· Supports regional emergency vehicle priority signal control through inter-municipal data integration.

Technology Companies

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