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İstanbul IT and Smart City Technologies Inc.

ADAPTIVE TRAFFIC MANAGEMENT SYSTEM (ATAK)

Adaptive Traffic Management System (ATAK)

Adaptive Traffic Management System (ATAK) is an operating system, where intersection signal durations are optimized on real-time basis, in accordance with the parameters such as; traffic volume, queuing in order to minimize average time of vehicle delays and average number of stops and optimum durations calculated are applied to the signalized intersection.
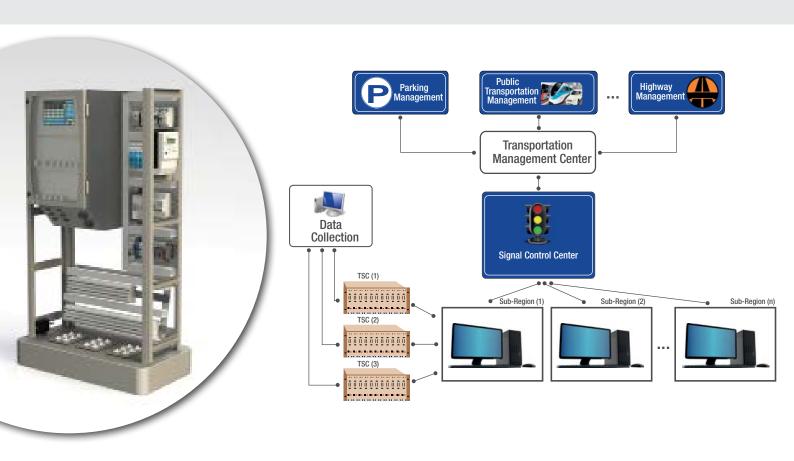
General Features

ATAK, by intervening on real-time basis to the intersections clogged due to increasing traffic volume, speeds up the traffic flow and decreases the duration of delays.

ATAK, by evaluating the data collected from the site at the center, optimizes the duration of intersection signals on real-time basis.

ATAK is capable of adapting the changes occurring in the traffic volume and updating the duration of signals accordingly.

ATAK decreases the duration of travel in the traffic road network as well as the emission values.

The Adaptive Traffic Management System (ATAK), which was established by İSBAK with the support of TUBITAK; in order to ensure the intracity vehicle traffic flow, decreases the duration of vehicle delays on intersections up to 15%-30% at locations where it has been applied.

Parking Management

Public Transportation Management

Highway Management

Transportation Management Center

Data Collection

Signal Control Center

TSC (1)

TSC (2)

TSC (3)

Sub-Region (1)   Sub-Region (2)   Sub-Region (n)

ATAK Concept

Prominent Features

- Real-time based optimization of traffic signal durations in accordance with the parameters such as traffic volume and queuing,

- Being operable in isolated (single intersection) and coordinated (group of intersection) modes,

- Being operable in adaptive mode within the period of time desired or in another control strategy mode within the period of time preferred,

- Web-based online system monitoring interface,

- Capacity to store and report all the data produced in the system,

- System management interface

- User-friendly designing interface to be used for planning an intersection or a group of intersections,

- Statistical data production and reporting,

- Tracking system alerts and results,

- 15%-30% improvement in vehicle waiting durations.

In OracleDuke's Choice Awards, Adaptive Traffic Management System Project Microscopic Traffic Simulation I-SIM (ISBAK Simulation) is listed among the **World's Top 10 Most Innovative Software in the Transportation Field.**

2013 | Duke's Choice Award Winner

ATAK Control Method

ATAK initially checks, filters and analyses the data (number of vehicles and occupancy percentage) obtained from the intersection locations, and then generates a traffic model for the road network selected. The optimization algorithm developed within ATAK, by using the data obtained, prepares a real-time based signal duration chart and applies it to the related site. Genetic algorithms are used for optimization of cycle time, offset values and green light durations. Since the system has a structure open to developments, different optimization algorithms can also be used.

Design parameters

Data collection

Data processing

Traffic modelling

Optimization

Implementation

Data Management

ATAK, by taking into consideration the signal group outputs, evaluates the sensor data.

Thus it can be determined the counts received from the sensors belong to flow coming from which direction. Since the sensors are located at the intersection exits; it is possible to determine the queues and measure the intersection performance. Besides, secondary road sensors are placed before the intersection stop line on the secondary roads, which are also involved within the adaptive system but do not have a high traffic demand. These sensors, by taking into consideration the demand obtained from the secondary road, put the related phase into use and if necessary, extend the phase duration in accordance with the vehicle duration.
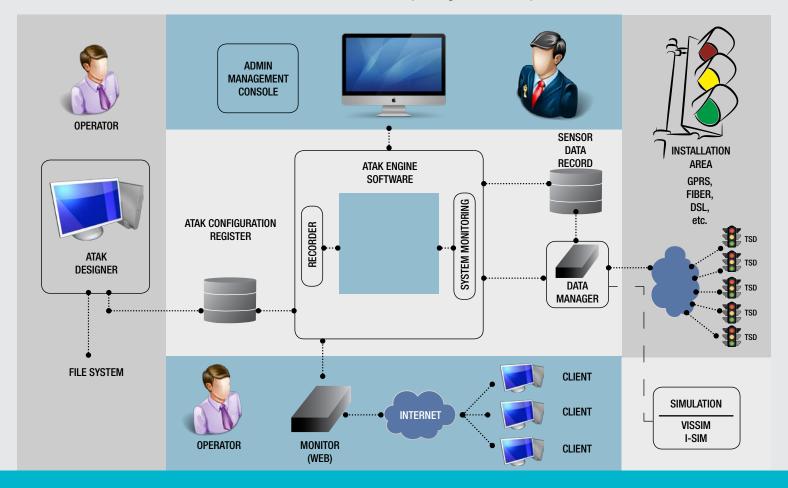
Sensor failure is the most important real-time based signalization implementation difficulties. ATAK Traffic Management System may respond in different ways to the potential break-downs in sensors, in accordance with the user's preference. The system is capable of completing the missing data by using the historical data and the related phase can be operated also in accordance with the previously-set plan durations. In case that a failure occurs on any of the vital sensors, if required, adaptive system can be deactivated and this can be replaced by activation of the weekly plan.
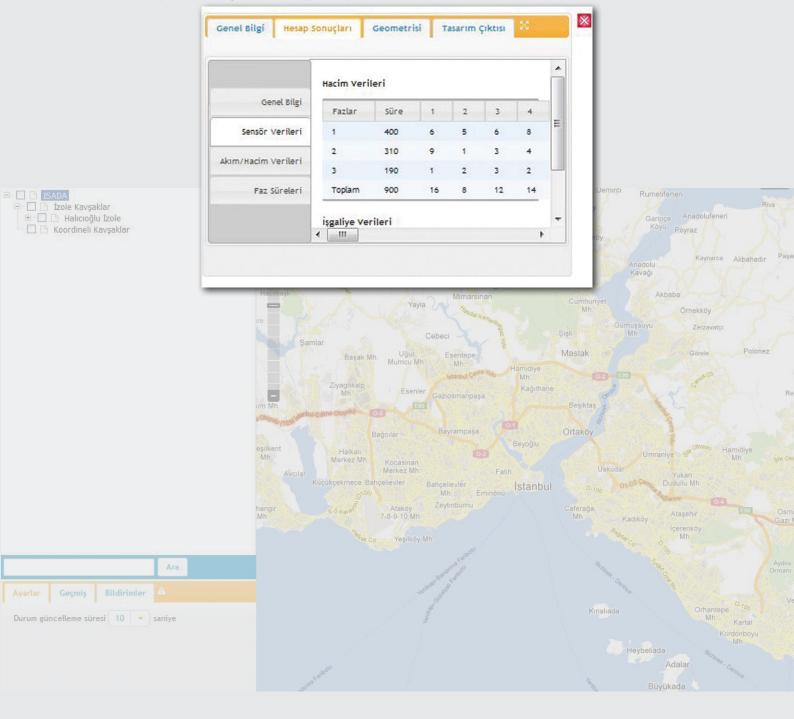
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System Architecture

The Adaptive Traffic Management System (ATAK) can be operated through fiber optic, DSL and 3G/EDGE/GPRS communication infrastructures. The geometrical information of an intersection connected to ATAK management system and other relevant data such as control parameters are entered into the system through a design interface we call ATAK Designer. Configuration parameters (up-to-date and archive), count, speed, occupancy data and plan durations of all intersections connected to ATAK Traffic Management System are saved in an associational database. When fiber optic or DSL communication infrastructure is used, sensor data of a disconnected intersection can be transferred by the neighbor intersection sensors to the center. Besides, in case that a intersection under the network control is disconnected, rest of the intersection sensors can continue operating under the adaptive network control.

ATAK Web Interface

The intersections connected to ATAK can be monitored online, through the map, via web-based interface. Isolated intersections can be displayed on the map with a graphical symbol while the coordinated intersections are indicated by colouring their subsequent road segments. It is possible to perform active/passive spontaneous monitoring on the intersections, which can also be listed by a tree-structure. Through web-interface; traffic control parameters such as phase durations, occupancy, flow/volume data generated by ATAK center, as well as critical information such as connection status of the relevant intersection with the center can be followed up. Moreover, with the research area function, it is possible to use the system numbers registered in ATAK center and focus on any intersection. This web-based interface is operable through different map base providers.

ATAK Simulation Interface

Adaptive Traffic Management System (ATAK) offers the traffic engineer the opportunity of building a connection to VISSIM and I-SIM software in order to have the adaptive system tested in office environment.
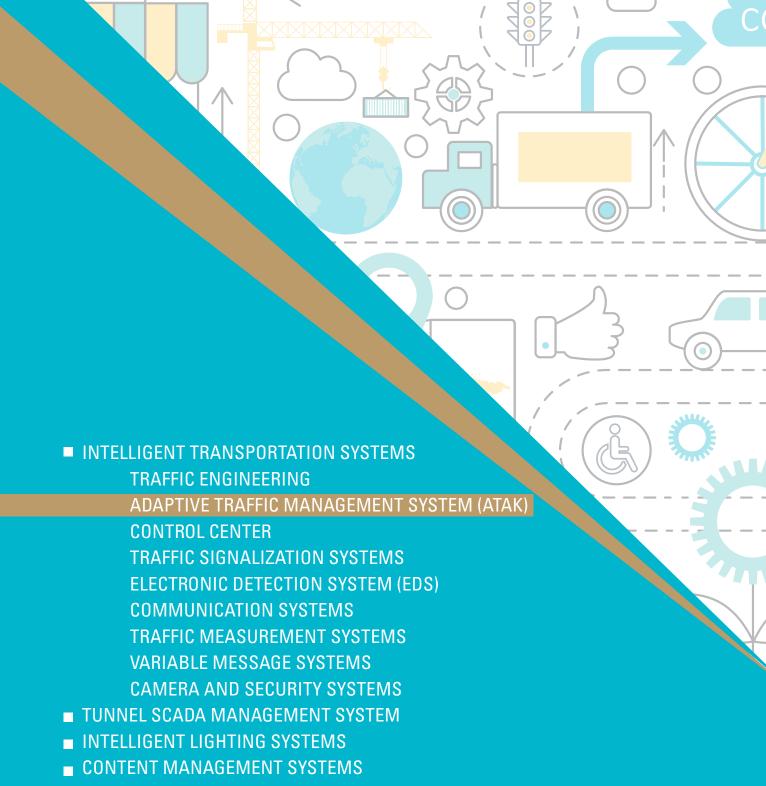
I-SIM Traffic Simulation

I-SIM, a microscopic traffic simulation developed by ISBAK within the framework of adaptive traffic management project, uses Intelligent Driving Model (IDM) as the vehicle tracking model and it may be calibrated in accordance with the local driver behaviors.

I-SIM, with its additional features listed below, has been presented to the use of traffic engineers both as a part of the adaptive system and a tool for traffic analysis to be performed in the office environment.

• Creation of different traffic networks in virtual environment,

• Uploading the desired traffic volumes into the traffic networks,

• Integration with different optimization interfaces,

• Generating outputs such as delay per vehicle, average number of stops, average duration of travel and number of active vehicle in the network, in accordance with different performance parameters,

• Development, implementation of traffic control strategies and tracking their results,

• Monitoring the behavior of any selected vehicle in the system.

- **INTELLIGENT TRANSPORTATION SYSTEMS**
  - TRAFFIC ENGINEERING
  - ADAPTIVE TRAFFIC MANAGEMENT SYSTEM (ATAK)
  - CONTROL CENTER
  - TRAFFIC SIGNALIZATION SYSTEMS
  - ELECTRONIC DETECTION SYSTEM (EDS)
  - COMMUNICATION SYSTEMS
  - TRAFFIC MEASUREMENT SYSTEMS
  - VARIABLE MESSAGE SYSTEMS
  - CAMERA AND SECURITY SYSTEMS
- **TUNNEL SCADA MANAGEMENT SYSTEM**
- **INTELLIGENT LIGHTING SYSTEMS**
- **CONTENT MANAGEMENT SYSTEMS**
- **VEHICLE TRACKING AND FLEET MANAGEMENT**
- **SYSTEM (ISMOBIL)**

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