

# Junction Eye

Another innovative solution from Cetrac™



CET Technologies Pte Ltd was awarded a contract by the Land Transport Authority

Singapore to design, supply and install the Junction Electronic Eyes along Orchard Road. The System uses innovative image processing techniques and artificial intelligence for real-time detection of congestion and incidents at the junctions such as heavy traffic, vehicle breakdown and road block. It is able to automatically alert the operator in the case of any disruption in the traffic flow so that remedial actions can be taken quickly.

The Junction Electronic Eye consists of three sub-systems:

- i. Detection Sub-system
- ii. Surveillance Sub-system
- iii. Central Control and Monitoring System

## Detection Sub-System (DS)

The DS comprises the Cetrac™ TMS1000 Detection Camera and the Cetrac™ TMS2000 Image Processing Unit. The detection camera serves as the sensor component of the DS. For better resolution, monochrome cameras

are used. The video signal is transmitted to the TMS2000 Unit directly using a video cable. Each TMS2000 Unit on-site can process up to four different detection camera inputs simultaneously.

The DS collects essential traffic data through video image processing of traffic scenes covered by the strategically placed detection cameras at junctions. The processed traffic data which include average speed, occupancy, volume and queue length of each individual lane is then sent via leased lines to the junction control centre computer at the Traffic Centre for optimum monitoring and control of the traffic junction. Hence, the DS acts as a virtual sensor that effectively replaces the conventional inductive loops.

Should direct incidents occur (within field of view of detection cameras), the DS automatically alerts the operator and has the utility to provide playback of pre-incident video as review of cause and effect. With the 'patent-pending Wide Area Incident Detection Algorithm (WAID), the DS is able to predict incidents at closed-loop sections between junctions as well.

WAID uses the artificial neural network approach in incident detection. The neural network is produced by a genetic algorithm for a more efficient and accurate detection of incidents.

## Surveillance Sub-system (SS)

Complementing the DS is the SS which is used to monitor the traffic area that is out of the field of view of the detection camera. When an incident is detected, the nearest PTZ surveillance camera can be selected to zoom into the incident detected area for incident verification and identification.

## Central Control and Monitoring System CCMS)

At the CCMS, all traffic data and images can be generated and reproduced for a myriad of purposes. The user-friendly SmartMove™ Digital Map is employed as the Graphical User Interface, allowing the operator quick access to all the system functions. The Digital map also allows quick location of junctions, addresses and routing information.

The Junction Electronic Eyes is another innovative application from the Cetrac™ family of transport management. The vision-based technology is also used in the Expressway Monitoring and Advisory System (EMAS) to extract real time traffic information for the purpose of optimising traffic flow efficiently and safely.

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