

# Intelligent *Transport*

Over the last few decades, land transport developments in Singapore have provided ST Electronics the opportunity to grow its capabilities in the area of integrated Intelligent Transport Systems (ITS).

Emerging from this Singapore experience, ST Electronics has leveraged its engineering capabilities, coupled with excellent system engineering and project management expertise, to build an impeccable track record of providing ITS that spans rail and road, including traffic and fleet management solutions. Customers from Singapore, Southeast Asia, Greater China, the Middle East and South Asia can testify to the continuous innovation and cost effectiveness of ST Electronics' ITS solutions.

Electronics Review looks at the company's various intelligent land transportation solutions.



## Intelligent rail solutions

ST Electronics offers a full suite of rail electronics solutions for urban cities

Rail transportation is one of the most revolutionary advancements in the modern world. In most developed countries, Mass Rapid Transit (MRT) and Light Rail Transit (LRT) systems are integral parts of their public infrastructure that allow the moving of mass volumes of people from one destination to another within minutes.

It was the start of the Mass Rapid Transit System (MRTS) in 1984 that gave ST Electronics the opportunity

to enter the rail electronics industry. The successful Singapore experience provided the company with the expertise and experience to pit its products against more established multi-national corporations and emerging equal, if not better.

ST Electronics has established a proven track record in both individual system projects as well as in Electrical and Mechanical (E&M) turnkey projects. It achieved the latter in partnership with rolling

stock, power, track work, depot and signalling suppliers.

Today, ST Electronics is one of the very few global companies that is able to offer a full suite of rail electronics solutions, including Command, Control and Communications (C3), Automatic Fare Collection (AFC), Platform Screen Doors (PSD), Passenger Information System (PIS) and Maintenance Management System (MMS), with customers in Singapore, Thailand, the Philippines,



[top] ST Electronics' rail solutions. [top right] C3 control centre. [bottom right] Automatic fare gate system

China, Taiwan, the Middle East, Turkey and as far-flung as Brazil.

### Command, Control and Communication System

The C3 system draws from the extensive experience garnered by ST Electronics and its consultants in engineering and implementing Supervisory Control Systems and Communication Systems for major railway clients and operators. Unlike conventional railway Supervisory Control and Data Acquisition Systems, the C3 system allows complete integrated operations and the effective use of Decision Support Systems as an aid for the safe, efficient and effective management of railway operations, especially during emergency situations.

At the heart of the C3 is an integrated suite of modular software systems designed to meet international standards such as the EN50128. Versatile and featuring low life-cycle costs, the C3 integrates different subsystems in trains, tunnels, passenger stations, power substations

and depots to enable fully automated, safe and efficient rail operations. Complementing the C3 is a complete spectrum of system solutions for rail transportation that optimises the consumer and operator needs for convenience, safety, efficiency, automation, reliability and cost effectiveness. These include:

### Automatic Fare Collection System

ST Electronics' AFC system is a contactless smartcard-based end-to-end solution for fare collection and payment. Convenient and easy to use, the AFC system facilitates passenger flow in and out of stations while optimising revenue opportunities for transit operators.

### Platform Screen Door System

PSD system is a turnkey solution designed to provide an effective safety barrier for passengers. ST Electronics' PSD system meets the stringent requirements of the busiest MRT/LRT systems in the world. More than a mechanical door system, the highly reliable PSD system employs state-of-the-art controller technology

and robust structure for maximum safety, efficiency and comfort within the platform environment.

### On-train Communication and Passenger Information System

The On-train Communication and Passenger Information System is an integrated system comprising various ruggedised train-borne products and solutions to provide a wide range of communication and security services on-board a train. This system can be designed to include:

- Radio communication
- Public Address (PA) and intercom
- Cab-to-Cab inter-communication
- Emergency inter-communication
- Passenger information display
- Integrated CCTV Surveillance and Monitoring
- Diagnostics and alarm monitoring

These field-proven systems are deployed internationally to enhance passenger travel experience through the provision of comprehensive realtime audio and multimedia information via computerised public announcement and digital



(left) Platform screen door system. (right) Maintenance management system

display subsystems. The integrated surveillance and alarm subsystems also ensure a safer ride for passengers on-board.

**Maintenance Management System**

The MMS developed by ST Electronics is an automated maintenance system

that integrates operations and organisational processes such as fault reporting to optimise operational and cost effectiveness.

**Constant Innovation**

ST Electronics' consistency in setting standards in technology,

safety, efficiency and innovation has positioned it well at the forefront of both technology and opportunities.

Capability development remains as one of ST Electronics key strategies in the value proposition to its customers. Extension of this development effort

# Green transportation

With global warming looming large, inaction is not an option and business as usual is no longer the norm. ST Electronics has been developing and delivering eco-enabling technologies and solutions long before they were recognised as being "Green".

As a leading Information Communications Technology (ICT) company, ST Electronics leveraged the use of ITS technology to help reduce transport emissions while enhancing traffic flow thus reducing travelling time, gas emission as well as energy consumption.

ST Electronics has demonstrated clear expertise in delivering first class rail transportation systems where the smooth and efficient operations of trains promote public transport as an efficient alternative for motorists, thereby reducing fuel consumption and pollution.

On the roads, ST Electronics' intelligent traffic management



also covers its most important asset – its people. Staff of ST Electronics are not only involved in project delivery, but are also constantly updated on best practices and new technologies.

New technologies are being studied and adapted to products once proven to create value for the customers. For example, due to its modularity and open architecture, ST Electronics' C3 system only requires minimal level of customisation to suit the customers' needs with full integration to their existing systems. Another example of innovation is the introduction of a PSD door controller that has far superior performance compared to some of the existing controllers in the market.

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systems monitor and process road traffic conditions, automatically detecting and reporting incidents, and keep motorists informed. Transport authorities and controllers can effectively regulate the traffic and despatch aid to motorists quickly. This helps to reduce road hazards and expand the capacity of road networks, thus reducing traffic delays, fuel wastage and pollutions caused by traffic snarls.

The development of an effective and efficient public transport system has a direct impact on the economic growth and rate of urbanisation of a country. With expanding populations, the ability to move large numbers of

people quickly and efficiently, both within and across cities, is pivotal for a country's economic development. Traffic congestion is a perennial problem in most cities in the region. Hence, there has been a continuous, if not increasing demand for intelligent transport systems. ST Electronics will remain as a front runner in providing ITS that will not only help alleviate traffic congestion and support economic growth, but also provide solutions that are more integrated and environmentally friendly.

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## Awards and Accolades

Over the years, ST Electronics has won numerous innovations and quality excellence awards for its intelligent rail and land solutions.

This year, the ASEAN Federation of Engineering Organisations (AFEO) presented the ASEAN Outstanding Engineering Achievement Award to ST Electronics for developing an advanced Command Control and Communication (C3) System for MRTs. At the same time, the Institution of Engineers Singapore (IES) also presented ST Electronics the IES Prestigious Engineering Achievement Award 2011 for same system. *(Read more about this awards-winning solution on page 28)*

ST Electronics also won the following awards in the past decade:

- "The Best Managed Infrastructure Project Partner Award" of the Land Transport Excellence Awards 2010 by Land Transport Authority (LTA)
- CIO Awards 2009 for ST Electronics' project for ComfortDelGro's Integrated Taxi Management System
- Land Transport Excellence Award 2008 – Most Innovative Partner (Technology) for i-Transport System
- IES Prestigious Engineering Achievement Awards 2007 for cetrac® iCab solution for "CityNet II – The Next Generation Taxi Booking and Despatch System"
- National Infocomm Award 2006 (Merit) – i-Transport System
- National Infocomm Award 2006 (Merit) – ComfortDelGro's Integrated Taxi Management System
- 7th ASEAN Outstanding Engineering Achievement Award 2000 for cetrac® Traffic Monitoring and Automatic Incident Detection System
- IES Prestigious Engineering Achievement Awards 2000 for cetrac® Traffic Monitoring and Automatic Incident Detection System

# Transforming motoring experience

## Intelligent Transport Systems by ST Electronics

ST Electronics is a leading player in the development of systems and technologies for integrated transport management, intelligent traffic management and fleet management systems.

The company has garnered numerous awards and patents for its home-grown cetrac® brand of Intelligent Traffic and Fleet Management Systems that enable transport authorities and fleet owners to reach new levels of service quality and efficiency.

Some of its key Intelligent Transport Systems (ITS) include:

- cetrac® Traffic Management Systems
- cetrac® Fleet Management Systems

- cetrac® Telematics Suite
- Smart Travel Information System

### cetrac® Traffic Management Systems

The in-house developed cetrac® suite of Intelligent Transport Management solutions enables the integration and enhancement of urban and inter-urban transport systems, allowing users to manage their operations more efficiently, reliably and safely.

### Field-Proven ITS System

Recognising the need to integrate disparate traffic subsystems into a single platform for increased operational efficiency, ST Electronics' wholly owned subsidiary, ST Electronics (Info-Comm Systems) and Singapore's Land Transport Authority (LTA) have jointly developed an intelligent transport management

system – i-Transport. This large-scale and highly scalable intelligent traffic management system centralises the management of various systems including traffic signal control, junction traffic surveillance, tunnel and highway monitoring and advisory, into a unified platform.

ST Electronics' cetrac® Traffic Management System can be deployed for the following applications:

### Highway and Arterial Road Management System

This electronic traffic management solution integrates the detection, surveillance, traffic information and emergency rescue subsystems to facilitate the management of traffic incidents along highways and major arterial roads. The system displays





Transport control centre

realtime traffic information for motorists for better route planning. It also generates response plans for relevant agencies to enhance their incident management efforts and monitors the operational status of all on-site and tunnel equipment for integrated resource management.

#### **Junction Management System**

ST Electronics' Junction Management System captures traffic conditions at road junctions and transmits the traffic data back to a traffic controller at the traffic management centre. The traffic controller exercises planning and control actions to regulate traffic flow at these road junctions. This system comprises Junction Surveillance, Junction Enforcement and Traffic Light Control Systems.

#### **Congestion Management System**

The gantryless Congestion Management System utilises Global Positioning System (GPS), IP-based communication network and advanced telematics to enhance the management of road congestions.

#### **Intelligent Transport Security System (i-TranSec)**

i-TranSec is the ideal solution for full asset and traffic visibility, suitable for transport authorities, homeland

security agencies and commercial fleet owners. i-TranSec provides a common platform to consolidate data from individual traffic and fleet management systems. It also monitors and controls traffic junctions, automates detection and monitors traffic incidents, integrates communication, carries out effective enforcement and sends mass notification to enhance homeland security operations of any city and country.

#### **Traveller Advisory System**

This system provides road users with realtime information on traffic conditions to enhance road safety and improve traffic flow. It is used to enhance incident management by displaying alternate journeys and warning alerts to motorists for better route planning.

#### **cetrac® Fleet Management Systems**

ST Electronics' ability to integrate telecommunications, sensors, computing technology and intelligent software into advanced fleet management systems has benefited the company's customers. Transport authorities, homeland security agencies and commercial fleet owners now automatically locate their vehicles and despatch vital

realtime information to their fleet via GPS tracking, GPRS-enabled vehicle devices and enhanced navigation applications. They can also optimise vehicle booking and despatch, and efficiently manage multiple fleets via a bureau service powered by the award-winning cetrac® Fleet Management Solutions.

ST Electronics' solutions are implemented in over 30,000 vehicles and vessels worldwide, including those of ComfortDelGro – one of the world's largest taxi fleet owners, Taiwan Taxi Company and Sharjah Transport in the United Arab Emirates. The system has also enabled ComfortDelGro's call centre to experience improved call response rates and significantly reduce call processing time.

#### **cetrac® Telematics Suite**

Telematics has evolved to become an invaluable part of intelligent transport and fleet management systems. ST Electronics has enhanced its offerings, becoming a one-stop mobility solutions provider by integrating advanced telematics as part of its Intelligent Transport Solutions suite.

#### **oTTo-Go™ Telematic Service Hub**

Making travel experience safer and enjoyable for people on the road is ST Electronics' oTTo-Go Telematics Service Hub. oTTo-Go provides an integrated service platform which enables vehicle owners to receive realtime traffic information and benefit from useful driver-oriented services. The hub facilitates the interconnection between drivers/vehicles and various business services.

Based on open architecture, it creates a commercially viable platform for businesses and industries to cooperate and collaborate, providing value added services to drivers through intelligent vehicle access devices. Leveraging leading infocommunication and telematics

technologies, the hub also provides many opportunities for service/content providers and application developers to benefit from its end-to-end service-based solution.

Besides the oTTo-Go, ST Electronics comprehensive suite of Telematics Solutions also include:

**Smart Wireless Sensor Network** which can be applied in vehicle-to-vehicle communication and vehicle-to-roadside infrastructure communication to allow drivers to receive advanced traffic warnings from roadside sensors.

**Automatic Vehicle Location** that offers realtime vehicle positioning information and management with

traffic updates and other useful information for employees, visitors and the public in common areas such as government, commercial and residential buildings, shopping malls, places of interest and carparks.

This system can be easily deployed in multiple locations within a building and its vicinity. It is designed with user-friendly interfaces for convenient administration. Scheduling capabilities are also included to allow companies to target specific information for their intended audience at any particular time.

**Proven Track Record**

Pioneering land transport solutions, ST Electronics has an impeccable track record of providing intelligent

China, Europe, Hong Kong, Indonesia, Malaysia, the Philippines, Taiwan, Thailand, Turkey and the Middle East. *(see page 15 for list of awards)*

**The Future**

With an emerging global emphasis on Green and sustainable developments, ST Electronics' solutions and technologies have also taken on an emphasis on eco-sustainability through Green Transportation. Leveraging its domain expertise in ITS and innovative smart products, solutions and services for land transport, ST Electronics helps to transform cities, enabling them to meet environmental challenges and to achieve a low-carbon economy and a greener lifestyle *(read page 14)*.



(left) EMAS for major arterial roads. (right) Intelligent taxi despatch system

two-way messaging. It is suitable for commercial, emergency and security applications involving fleet management, asset tracking, remote data collection, vehicle recovery and emergency assistance.

**Smart Travel Information System**

The Smart Travel Information System is a dynamic and highly customisable electronic platform suitable for disseminating and displaying realtime

transport systems that constantly set standards in technology, safety and efficiency. Its efforts at harnessing ITS technologies in the areas of command, control and communications, fleet management, congestion management, sensors integration and telematics, have contributed significantly to Singapore's efficient land transport system. Beyond Singapore, ST Electronics' ITS solutions are deployed in Australia,

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# Keeping traffic speed within limits

ST Electronics' PX168 Radar Speed Display enhances road safety



Radar Speed Display on Singapore Road

Improving road safety and minimising road accidents are important in ensuring smooth traffic flow.

Applying proprietary microwave sensor technologies, ST Electronics (Satcom & Sensor Systems) developed the PX168 Radar Speed Display to improve road safety in Singapore. This "made-in-Singapore" product displays the fastest detected speed of approaching vehicles within 30 to 120 metres. The LED speed display flashes to alert drivers when speeds exceed pre-determined limits. A specially designed "Speed Lock" feature caps the highest display speed to discourage speedsters from using the units for "speed test".

Energy conservation is one of the key design considerations of the Radar Speed Display. With an energy efficient planar radar sensor, the automatic display brightness control reduces power consumption of the radar speed sign and it is also solar power ready. Speed data statistics and fault report through 3G wireless network are optional.

The GS60 Radar Speed Detector, a

spin-off from the core radar module of the Radar Speed Display, is a stand-alone device that detects speeds of vehicles or other moving objects. The speed information is delivered via the output RS232 interface for OEM or system applications.

According to a United States nationwide survey of police officers, engineers and corporate safety officials, *"the (radar speed) displays were identified as the single most effective traffic calming solution near schools, playgrounds and neighborhood streets. More than speed bumps, stop signs or even police with radar guns, radar speed displays were ranked as the preferred means of slowing speeders and keeping average driving speeds down in the long run"* \*

Similar speed detection and display systems are already widely deployed in Europe and North America. The basic function of these systems is to display the fastest speed of approaching vehicles and flashing it on the LED display to alert speeding drivers.

Many studies have shown that this

"gentle reminder" wakes up distracted or tired drivers to higher alertness and concentration. It effectively calms traffic speeds down to the posted speed limit, but at lower cost and is more acceptable to motorists compared to speed enforcement cameras. It is especially suitable for roads where physical traffic calming devices such as speed humps are not appropriate due to traffic or road conditions.

Other than vehicles on public roads, the Radar Speed Display detects speeds of trucks, forklifts or other work vehicles in factories, as well as speed calming for railways, waterways, airports, work sites, hospitals, campuses, school zones, neighbourhoods, military bases, industrial parks, national parks and recreational areas where unintended speeding is a concern.



GS60 Radar Speed Detector

*NOTE: Radar Speed Display is also known as Your Speed Sign, Radar Speed Sign, Driver Feedback Sign, Vehicle Activated Sign, Traffic Calming Sign, Speed Display Board in other countries*

\* *SOURCE: <http://www.officer.com/article/10248572/choosing-the-right-radar-speed-display-for-your-community>*

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# SUEvi enhances intelligent transport system

STELOP's scalable, upgradable and expandable video surveillance solution

An intelligent transport system leverages sensor, information and communication technologies to make transportation more efficient, safe and environment friendly.

As the "eye" of the intelligent transport system, STELOP's vision-based surveillance system has an edge over other sensor technologies in that it provides wide area surveillance and supports video analytics which enables smart detection and alert under varying transport situations.

In view of the various types of camera systems deployed in the transportation network as well as a multitude of video analytics required for different scenarios, all of which require instant detection and prompt response to situation, STELOP is providing a cutting edge, seamless, realtime video surveillance solution called "SUEvi".

SUEvi, meaning "Scalable, Upgradable, Expandable Video Intelligence", consists of a comprehensive framework, supporting implementation of advanced video analytics solutions. These video analytics include motion detection, panoramic view, image enhancement and application specific analytics via SUEvi embedded module to provide realtime surveillance intelligence for homeland security and defence applications.

SUEvi, with its scalability, supports multiple surveillance sensors. This allows expansion of video surveillance networks and its applications. The embedded platform allows modular upgrade of different video analytics applications to suit different operational requirements.

As illustrated in the diagram (opposite page), the SUEvi module is capable of acquiring video data streams from



SUEvi baseline module

different types of EO sensors and transmits the processed video data to users via its integrated wired or wireless video transmission interface. This front-end video analytics solution reduces latency over the network and alleviates data storage requirements.

SUEvi hardware architecture is designed with the flexibility to

allow multiple SUEvi modules to be cascaded in series or parallel-docking to increase the number of input video channels or for multiple levels of video analytics applications. It can be easily configured as a receiving gateway for transmitted video to be managed for distribution, storage or for post video analytics functions. The module comes with common video interfaces supporting both analog and digital IP video streaming and has a scalable video compression feature which optimises transmission over channels with limited bandwidth. In addition, all video streams will be watermarked to enhance video and data security.

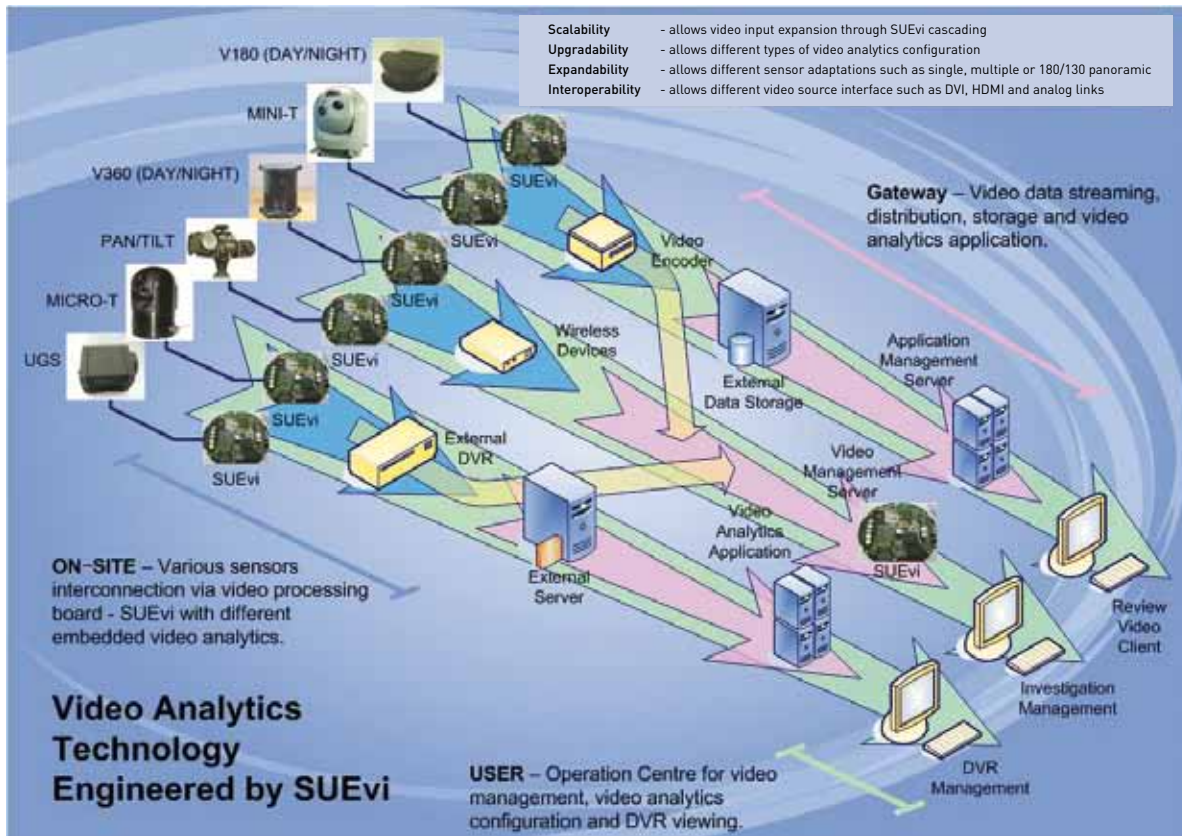
Below are some examples of how SUEvi can enhance the intelligence of transport systems in the area of vehicle safety, where realtime detection and reactions are essential:

### Collision Warning and Avoidance

Day and night sensors with SUEvi installed on the trailing vehicle can be used to capture the image of leading vehicles and road information. The combination of vision perception and fuzzy decision-making provides the collision warning and avoidance capability.

### Lane Detection and Lane Change Warning

The position of the vehicle in the lane and the lane edge markings ahead and to the side of the vehicle are



Scalable, Upgradable, Expandable Video Surveillance

monitored by LIDAR or vision system. With detection and recognition residing in SUEvi, a warning can be issued or there will be alteration to the course of the vehicle if its position deviates from the lane.

**Monitoring Driver Vigilance**

When a driver’s state of alertness is lowered due to fatigue, drowsiness or distractions, SUEvi-based vision system is able to detect this through recognising changes in the driver’s facial expression.

With all its flexibility in terms of scalability, upgradability and expandability, SUEvi provides additional video analytics functionalities to existing and new EO systems. It is cost-effective as it is built on a common video processing platform. SUEvi’s interoperability allows various sensory systems to be linked and to communicate with each other, involving only minimum changes and cost of implementation to both existing operational and maintenance infrastructures.

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