LIMITED TRAFFIC ZONE

CITIESltz (Limited Traffic Zone) is a traffic control system utilising electronic gates to identify the numberplates of passing vehicles. It then checks whether a vehicle is authorised for transit in controlled access areas such as priority lanes, historic city centres, docks and car parks.

Nowadays government agencies often grapple with the problem of traffic congestion in urban areas, with the aim of improving the quality of public transport and reducing air pollution. The issue is often resolved by regulating vehicle access and creating limited traffic zones (LTZ), to which only certain types of public vehicles (public transport, emergency and police vehicles, etc) and those with proper authorisation (e.g. residents) can have access.

CITIESltz is a traffic control system using electronic gates, which identifies number-plates and checks whether a vehicle is authorised for transit in controlled access areas such as priority lanes, historic city centres, docks and car parks.

ARCHITECTURE

The system has a distributed, flexible and robust architecture, with the following components.

Broadcast Unit
The Broadcast Unit captures the images, identifies the number-plate of the vehicle in transit and transmits this information to the local processing system. It consists of a black & white television camera, a colour television camera for the context image and an infra-red lighting device.

Local Processing System
This checks whether the number-plate identified by the television camera is on the white list (authorised vehicles) or on the black list (flagged vehicles) and communicates with the control centre.

Control Centre
The Control Centre monitors and manages the peripheral installations and the communications system.

CITIESLTZ

THE BROADCAST UNIT

The black and white television camera takes images at up to 25fps and sends them to a Digital Signal Processor (DSP), installed in the broadcast unit. This analyses them, identifies the character strings and checks their syntax to make sure that they are actually numberplate characters. The system automatically filters out vehicle number-plates from objects which do not have a minimum (configurable) level of resemblance or do not meet the syntactic requirements.

THE LOCAL PROCESSING SYSTEM

The peripheral gate unit operates a local database of various types of information, such as the lists of number- plates authorised for transit (white list) and of flagged vehicles (black list).

The unit also stores all the information sent in by the broadcast unit (number-plate image, context image, date, time and transit-type: authorised, unauthorised, suspect, etc.) and produces a recognition reliability index, which is a number between 0 and 100 and rates the correctness of the recognition result, worked out using templates of the characters on the number-plate. The local processing unit also has diagnostic functions and can be shared by several broadcast units.

THE CONTROL CENTRE

The control centre configures the peripheral systems, compiles the white and black lists, and sends them to the peripheral installations, shoots the transit images and administers any penalties, interfaces with the authorization issuing system, receives diagnostic data from the periphery and compiles statistics.

ENVIRONMENTAL IMPACT

When operated in the “free running” mode, CITIESltz does not require external sensors to record transits and has a very low environmental impact. This keeps installation and maintenance costs down and saves opening up the road surface (in the case of induction loops) or installing bulky above-ground brackets (in the case of laser sensors).

RELIABILITY AND APPLICATIONS

CITIESltz can recognize number-plates on cars, lorries, buses, motorbikes and scooters, and can also be configured to identify the number-plates of vehicles transporting hazardous goods. The system can be configured to read number-plates from the European Union, the USA and Arab countries. Other types of number-plates can be added on request, after a configuration period and training the system to recognize the characters.

In heavy traffic the image acquisition and processing algorithm also allows the system to read several numberplates from the same image, with a throughput of up to 16 number-plates per second.

CITIESltz is able to distinguish between moving and stationary vehicles, and records the direction of travel. It also functions in difficult weather and lighting conditions since it is fitted with an infra-red light. To protect the gathered information from malicious or unintentional tampering and so as to be able to use it for legal purposes, the system runs standard technology for image encoding and encryption, using a secure hash algorithm (SHA) and a Rivest Shamir Adleman (RSA) encryption algorithm with an asymmetric key.

HOMOLOGATION

The number-plate recognition software (O2CR AD3-FG) has Class A certification under standard UNI 10772, and the system is type-approved by decree no. 57764 from the Italian Ministry of Infrastructure and Transport. The type of lighting used is eye-safe: the identification techniques comply with IEC EN 60825-1 (2003-02), meaning the device has Class 1 AEL (acceptable exposure limits) classification (not dangerous in any operating conditions).

LEONARDO
SECURITY & INFORMATION SYSTEMS

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