Virtual weighstations with image-capture systems

As the volume of commercial vehicles using highway infrastructure increases worldwide, the capacity of existing conventional weighing and inspection stations is being surpassed. Some enforcement agencies are forced to allow vehicles with violations to bypass inspection stations when over capacity or temporarily closed, while trucks can avoid stations by using secondary highways. Expanding the capacity of existing stations or building more stations is costly in terms of land requirement, construction costs, and personnel, and also increases environmental impact. A viable and complementary solution is the use of virtual weighstations (VWS).

VWS are weigh-in-motion (WIM) systems that provide vehicle records for enforcement, traffic surveillance and/or data collection in real-time over a computer network connection to a laptop, mobile device or workstation computer.

IRD's VWS system automatically weighs vehicles as they travel at normal speeds along a road, classifies them based on weight and axle spacings, determines when vehicles are in violation of regulations, produces records of commercial vehicles, and provides a display of the records on a computer with a network connection to the system. The system consists of WIM sensors, a signal processor, image capture and/or automatic vehicle identification (AVI).

Single-site and multi-site

The single-site system collects vehicle records on a server located at the site of the VWS and allows authorized users to connect to the server via a web browser to view the records.

Need to know?

Responding to the trend for moving WIM systems from the physical to the virtual

- How virtual weighstations can contribute to the need for sustainable, efficient weigh-in-motion
- Real-time information is sent to operators for enforcement, surveillance and data collection
- The intelligent system interface and network controller collects, interprets and processes signals from WIM sensors
- How images of the vehicle are captured and used for identification or classification purposes

LPR is often used within WIM systems

A weatherproof cabinet houses the iSINC

READER ENQUIRY NO. 505

Authorized users can access vehicle records via the internet

A multi-site system collects vehicle records from any number of VWS and stores them on a central database server. The records are stored for a specified period, and can be searched by a number of criteria including date/time, partial vehicle identity (if available), vehicle class, and percentage overweight.

System hardware

The heart of IRD's VWS is the iSINC (Intelligent System Interface and Network Controller), a standalone controller with the ability to collect and interpret the signals from the WIM sensors, process these inputs into a vehicle record, and act as the VWS network server. The iSINC has an integrated modular design capable of processing signals from multiple types of WIM sensors.

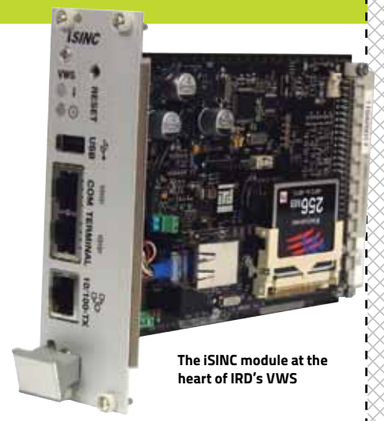
Image capture and filtering is performed by the iSINC, which then inserts sequence numbers for vehicle records to correspond to the sequence of arrivals at the WIM location. The iSINC will interface with industry-standard vehicle imaging, license plate imaging, or USDOT number imaging subsystems.

Based on the rugged industry-standard CANbus design, iSINC has a modular design to aid in system maintenance, troubleshooting and in-field servicing. All components' input/output lines contain electrical protection to prevent damage from electrical surges, spikes and lightning.

The iSINC is housed in a rugged roadside cabinet, which contains a standard rack for the iSINC system controller, video controller, network electronics, power supply and cabling terminations.

Camera systems and vehicle identification

Images of the entire vehicle are used to assist in vehicle identification or classification. Cameras used for capturing whole vehicle images are typically mounted at the roadside and shoot at an angle that will allow the entire vehicle to fit in the image frame. License plate recognition (LPR) systems capture a high-resolution image of the front of vehicles for the purpose of recording the license plates. These systems may include optical character recognition (OCR) technology to automatically convert the image of the plate to digital characters. The digitized number provides the vehicle identification, which may then be used to look up information on the vehicle or carrier in a system database.



The iSINC module at the heart of IRD's VWS

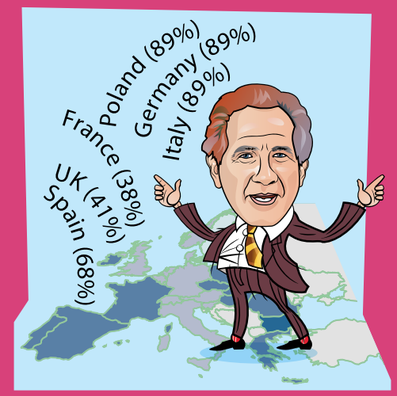
Side images are used to capture a picture for vehicle identification, usually of the side of the truck cab. The identification may include DOT numbers, carrier names or logos, or fleet numbers. Side-imaging cameras may also make use of OCR to translate DOT numbers into digital format so the numbers can be referenced against a system database.

VWS systems that incorporate vehicle identification, such as LPR or AVI – and have a system database connected to a credentialing program such as CVISN/PRISM – will allow the user to display the credential record for a selected vehicle, driver or carrier.

IRD's VWS is an efficient, cost-effective method for both enforcement and data collection, and provides an unobtrusive way to monitor traffic in real-time on a 24/7 basis, requiring significantly less infrastructure for installation and operation than conventional commercial vehicle inspection stations. ○

Contact

IRD Inc
+1 306 653 6600
info@irdinc.com
www.irdinc.com



Adrian **Walsh**

awalsh@roadsafe.com

Electronic stability control (ESC) has been hailed as the most important safety advance since the seatbelt and is already in use on many new vehicles in Europe. It is welcome news that a recent survey by the European consortium, eSafety Aware, reveals that when it comes to selecting a new car, safety is the number one purchasing criterion.

It is perhaps surprising, though, that the survey also shows that the two criteria considered next most important are fuel consumption and running costs. This perhaps indicates that car buyers are also relatively cost-conscious when it comes to buying a new car, with surprisingly the vehicle brand scoring relatively poorly, coming behind running costs, size, fuel type and emissions.

The survey – which looked at levels of awareness of six important safety technologies (speed alert, ESC, adaptive headlights, advanced emergency braking, blind-spot monitoring and lane-support systems) – followed one carried out in 2009 that was conducted in five European countries (France, Germany, Italy, Poland, UK) to support the eSafetyChallenge event in Vallelunga (Italy). The 2011 survey was on a much larger scale but has provided comparable data with a focus on personal ratings of car selection criteria and awareness of life-saving technologies.

Another surprise was that marked differences exist in awareness levels between systems and between countries. For instance, 68% of Spanish respondents are aware of the advanced emergency braking system, while in France awareness is lowest of all countries at only 38%. In the case of the most significant life-saving technology, ESC, 89% of those interviewed in Germany were aware of the technology although in the UK it was only 41%.

It also showed that the internet was the most used source of information when buying a new car, followed by car dealers. Interestingly, men search for information from dealers and the internet more often than women. Compared with male car buyers, women rely more often on advice from family and friends.

ESC, advanced emergency braking and adaptive headlight systems are equally important for men and women, while respondents who had been involved in a critical situation rate the importance of safety systems higher.

ESC helps avoid a crash by reducing the risk of skidding during a sudden emergency maneuver by stabilizing the car by braking individual wheels. Advanced emergency braking uses sensor technology to monitor the road ahead and will – if a potential collision is detected – warn the driver of the danger. If there is no reaction to the warning, the technologies activate the brakes together with systems such as seatbelt pretensioners to avoid an accident or mitigate the impact of a crash. ESC is set to become a legal requirement for newly introduced vehicles in November this year and all new car registrations from November 2014. Let's hope that, by then, public awareness levels will be such that car buyers at least have some idea of what they are getting!

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>
> **Adrian Walsh, director, Roadsafe, UK**