

Fresh approach

Gatsometer has developed an ALPR system for the enforcement of Amsterdam's environmental zone, resulting in a 95% hit rate and only a 0.02% margin of error

Words | **Rudi van Dijk**

Hundreds of thousands of vehicles drive through Amsterdam's environmental zone (Milieu Zone) every day. Goods vehicles that cause too much air pollution aren't welcome there, and if any of these drivers venture into the area they are penalized.

In recent years, it became obvious that the air quality in the city was in urgent need of attention. In the inner city area, for example, measurements indicated that NO₂ and particulate pollution exceeded European standards. As a result, Amsterdam has officially had an environmental zone since October 2008, when the area enclosed by the A10 ring road and the River IJ was declared out of bounds to goods vehicles with Euro0 or Euro1 diesel engines. Goods vehicles with Euro2 or Euro3 engines are allowed in only if they have a soot filter. Until September 1, 2009, special council wardens supervised compliance with the ban, but this approach was labour-intensive, expensive, and unreliable so Amsterdam City Council decided to automate supervision.

Low margin of error

Following a tendering process, the automation contract was awarded to Gatsometer. One of the requirements stipulated by the council was that the system had to be capable of recording at least 80% of passing vehicles. With a 95%

Installation with flash (left side) and camera



Trends in the market

Gatsometer has noted that there is growing demand in the industry for total solutions involving a complete automation of data-traffic management. The highest reliability in obtaining, processing, and transmitting data is essential, and there is a continuing rise in popularity of wireless data transmission. This will further increase the need for quick installation.

Attention to security is also on the increase. For Gatsometer, this has been a focus for some time and it is one reason why the company has been paying greater attention to cryptology.

There must be little or no disruption to traffic during installation and maintenance. Visual pollution must also be kept to a minimum, which is best achieved by making increasing use of existing street furniture.



The solution is installed on existing street furniture

hit rate, the solution selected has considerably better performance. And because it is very infuriating when fines are sent to the wrong driver, the maximum margin of error of the system was set at 0.02%. The system also meets this strict requirement.

Gatsometer's system works through cameras installed on the access routes to the environmental zone, with one camera per lane. There are 38 locations in all. The cameras use loopless trigger radar (LTR) technology, which projects a virtual loop onto the highway. The camera is triggered when a vehicle passes a precisely determined position in the loop. The advantage of this is that the camera always takes a photo at the ideal moment from a photographic point of view, based on detection of a vehicle that is actually passing.

The photographs are of excellent quality, whether daytime or night-time, and under all weather conditions. An innovative feature is that the light entering the lens is measured, rendering external sensors for light measurement unnecessary. This information is used to determine the correct aperture. An integral infrared flash in the housing ensures that there is always sufficient light. The cameras have high-quality 35mm and 50mm lenses and fixed, short shutter time. But the trick of the trade is a 12bit chip that records even the most subtle shades of color. This makes the license plate number and the surroundings clearly visible – essential to achieving a 95% hit rate.

The cameras have an embedded computer with ALPR software. This automatically recognizes the license plate number on the uncompressed images and creates a file containing alphanumeric data such as the date, time, location, GPS coordinates, license plate number, and other relevant information. Only then are the original photos compressed, except for the area where the license plate number appears.



Wireless VPN link

After compression, the images are stored on a local PC. This computer, at each monitoring site, is integrated into one of the cameras. In the first instance, the local PC transmits text files only to a central server. This is an essential system choice. ALPR takes place on site so a relatively small number of megabytes need to be transmitted. Gatsometer had a choice of several types of connection but chose wireless technology whereby a 3G modem sends the data to the central server via the UMTS network. A VPN with a secure connection was created for this purpose, so the only thing needed to install the systems was electricity, and there was no need to install data cabling. With just six months between contract and delivery, the time saved was not a luxury.

The central server collects the data from all the locations and exchanges it with the client via an RSS feed. The license plate numbers are used to establish automatically which vehicles have committed an offence. The central server requests only the photos of those vehicles. All photos that are not requested within 48 hours are automatically deleted. The system therefore meets the legal requirements relating to the protection of privacy.

High-quality solution

The contract was awarded to Gatsometer in February 2009. The system needed to be fully operational, tested and working well by September 1, 2009, and Gatsometer met this deadline with time to spare. After factory-acceptance tests and (integral) site-acceptance tests it was clear that the system achieved the performance targets promised.



Bottom left: Screen shot of 'Site Manager', a real time view of equipment status

“The disruption to traffic during installation was minimized”

Recording and number plate recognition are not the only exceptionally reliable elements of the system; the high-quality hardware, with excellent industrial components that are resistant to all weather conditions, guarantee maximum availability. Gatsometer has been developing its solutions for decades, and its expertise in the field of traffic management and enforcement has now produced an innovative solution for the new challenge of monitoring Amsterdam's environmental zone.

Minimum disruption

Gatsometer also took account of Amsterdam City Council's wish that the impact on public spaces should be kept to a minimum. As far as possible, the cameras and LTRs are mounted on existing structures and masts.

The disruption to traffic during installation was minimized. The LTRs meant that there was no need to install detection loops in the asphalt, and the only cabling to be installed was for the power supply (where it was not already available at the site).

Gatsometer will be responsible for maintenance and management in the coming seven years. The SiteManager application, a web-based interface that gives a real-time view of equipment status, plays an important role here. The program also collects statistical information about the camera observations. Both the client and Gatsometer have access to this. Amsterdam City Council also asked for a solution that was capable of recording one million vehicles per day. Gatsometer has developed an innovative, tailor-made solution, using a combination of the best technologies. Good news for everyone who wants Amsterdam to have fresh air! ■