

Tenix Solutions

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A Success Story - Secondary Image Speed Verification

• CONSULTING • TECHNOLOGY • OUTSOURCING

CASE STUDY

In 2005, the Victorian State Government and Victoria Police made a public commitment to increase the accuracy of speed detection services. This was in response to a number of incorrect infringements being issued by inaccurate detection devices.

A global search was commissioned to discover the options available to introduce more stringency in speed detection verification accuracy. The search uncovered that secondary image speed verification (SISV) was the best option to validate detected speed, however no commercial solution was available. This meant that a solution needed to be developed from the ground up.

Tenix Solutions, the incumbent provider of Traffic Camera Services to the Victorian Government at the time, was asked to develop, deploy, manage and operate the new verification system, in consultation with Victoria Police and the Department of Justice (DoJ).

The Solution Required

The DoJ required a solution that could be deployed at as many traffic intersections as possible with an accuracy of ± 2 km/h relative to the original speed measurement.

One of the drivers behind selecting SISV was that it required no additional speed detection infrastructure at the site. SISV is a back-office solution, using the evidence already available from the original source.

Identifying the Challenges

Original evidence images were to be used as the source of information for secondary speed verification, posing a mathematical and dimension challenge. The challenge was to plot three dimensional (3D) points accurately onto a two dimensional (2D) screen image, thereby accurately representing distance on the screen image to actual road distance in the intersection.

Mathematically, when using images to determine the distance that a vehicle travels, the relationship between the road coordinates and image coordinates needs to be determined.

Victoria's intersection traffic cameras could take an image of infringing vehicles followed by a second image after a short delay. The challenge was to calculate the speed of the offending vehicle using the two images. A time over distance calculation could then be used to determine the speed of the vehicle independently of the speed measurement that was made by the camera.

Our Approach

Tenix Solutions developed a software application, called NOVA SISV, to measure the speed of a vehicle travelling through an intersection. A sophisticated algorithm was created to calculate the speed, using a time over distance approach. The algorithm took 3D distance information and correlated it accurately over a 2D screen.

Each camera takes two images at different times of the infringing vehicle. By applying the SISV algorithm, a verification operator could determine the distance travelled by the vehicle through the intersection by comparing the first and second images.

To calculate the distance, the operator selects the contact point of one of the vehicle's tyres and the road. The same process is conducted on the second image, and the distance between pixels correlates to the actual distance travelled through the intersection.

The camera determines the right time to take the second image, based on the vehicle travel speed. With this time and distance information, the vehicle's alleged speed is calculated.

Solution Deployment

Once the SISV algorithms and processes had been formulated, the system was rigorously trialed. A number of intersections were selected for trial, and surveyed for distance points. Upon survey completion, the camera systems located at the intersections were reinforced and aligned to ensure evidence image alignment with the SISV intersection survey points.

Upon completion of site set up, each site was performance tested. Performance testing involved quality control for accuracy, and determination of degrees of error.

In testing, it was decided that if three or more SISV image results were outside performance thresholds, the entire batch would be discarded and a retest would be undertaken. This was built-in to SISV as a workflow feature to ensure that no inaccurate images were sent to the infringement processing stage.

The Result

After all the testing, retesting, quality and performance assurance, SISV was put into production in January 2006. A total of 84 traffic intersections were SISV enabled, resulting in higher speed verification accuracy, and a reduction in gross errors.

SISV is still in use today, and providing the service of supplementary speed confirmation and the removal of gross errors.

Tenix Solutions' Key Insights

The project of developing, deploying and operating a secondary speed verification system granted significant experience and expertise to Tenix Solutions. Some of the key insights include:

- Diligence in site surveying accuracy, camera mounting and alignment
- Operator training for measurement accuracy
- Development of training materials for operators
- Quality assurance parameters
- Rigor around camera maintenance to ensure alignment.

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