

INEX / Zamir provide a variety of hardware and software configurations in order to be able to provide the appropriate solution for different applications of ALPR (Automatic License Plate Reader) technology. At the heart of these solutions is the InSignia 4 ALPR system. This system can be broken down into four major components: image collection, image analysis, image and data storage and data transmission. The InSignia 4 Automatic License Plate Reader with respect to these functions operates as follows:

### Image Collection:

A CCD device, directly synchronized with a pulsed infrared light source, is constantly monitoring a target zone for passing vehicles. In this case, the light source is in the near infrared range and is supplied as an integral part of the camera with up to 190 LEDs of a particular wavelength suited to license plate image collection.

The image provided by this camera/illuminator device will be a high contrast black and white image and will appear much like the picture shown below.



Notice how most of the surrounding detail is suppressed when using near infrared, and the retro-reflective plate properties make it the dominant item in the image. This illumination approach makes a very efficient means for finding the license plate within the image, further increasing the accuracy of the ALPR.

Using IR light allows the image to look generally the same day and night. The InSignia 4 System also provides a means to constantly alter the contrast of the plates passing through the field-of-view of the camera/illuminator by altering each field of video. Using fields instead of frames allows the images to be altered at the rate of up to sixty times per second and normally on a cycle of three different brightness levels (low, medium and high). This can be more or less than three levels and is a user definable parameter. The result is excellent plate images for processing regardless of time-of-day, position of the sun, or the condition of the license plate itself. A typical example of images captured at three setting is shown below



Low level setting



Medium level setting



High level setting

Image collection can take place in a triggered or non-triggered environment. A non-triggered installation does not require a detection device, such as a loop. In this mode the Virtual Vehicle Detector software analyzes each image, at a rate of up to 60 images per second, for the presence of a license plate. This image, and a number of additional images containing the vehicle's license plate, is 'captured' and further processed to extract the license plate data.

The InSignia 4 system will also accept an external trigger, such as an in-ground loop or optical trigger to indicate which images need to be analyzed for the location of a plate. An external trigger is sometimes desired if it has to tie several systems together to a single event, or trigger. These other system might be Vehicle Classification systems, Transponder systems, parking lot ticket dispensers, Weigh-in-motion systems and so on.

### Image Analysis:

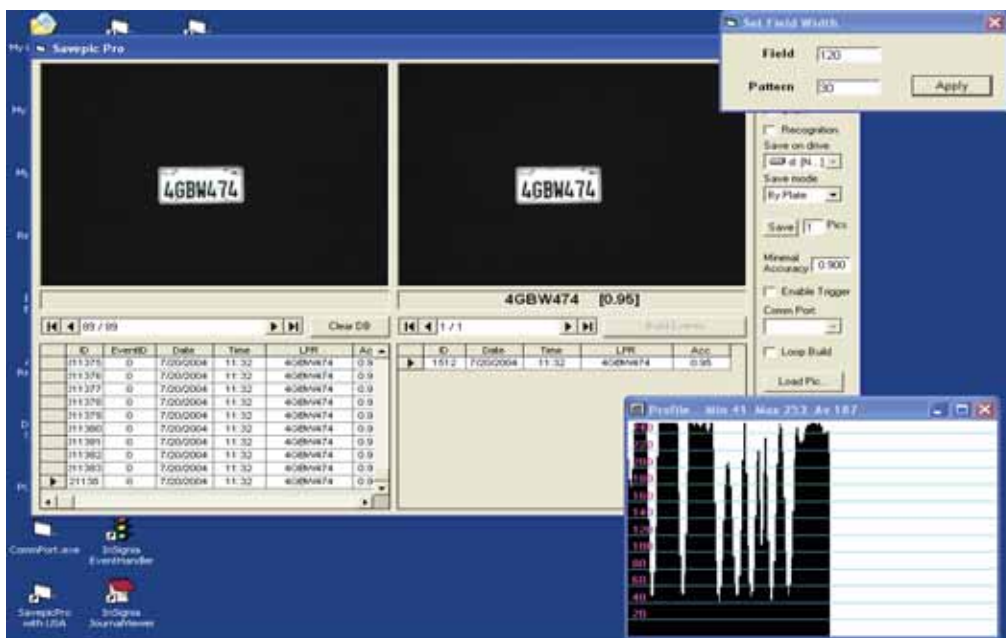
Each of these now captured digitized images containing a license plate within it are processed by another set of

algorithms that extracts the license plate portion of the image and sends it to two different Optical Character Recognition engines for processing.

Using two different approaches to ascertain the actual data of the license plate is unique to the InSignia 4 design, and both are also an integral part of the system.

Within 200 milliseconds or less, InSignia will have completed the analysis and determined an ALPR result. At this point, the system will report the read that provides either the highest score confidence level of all the images captured and read for that license plate or the read that met a minimum confidence level entered into the system by the user at the time the system was set up (example – tell the system to stop trying to get a better read once it has found a read with 95% confidence).

As can be seen in the system setup window below, means for determining correct focus, image size and contrast are provided. Continuous reads are shown on the left side and on the right is the image that provided the highest overall score.



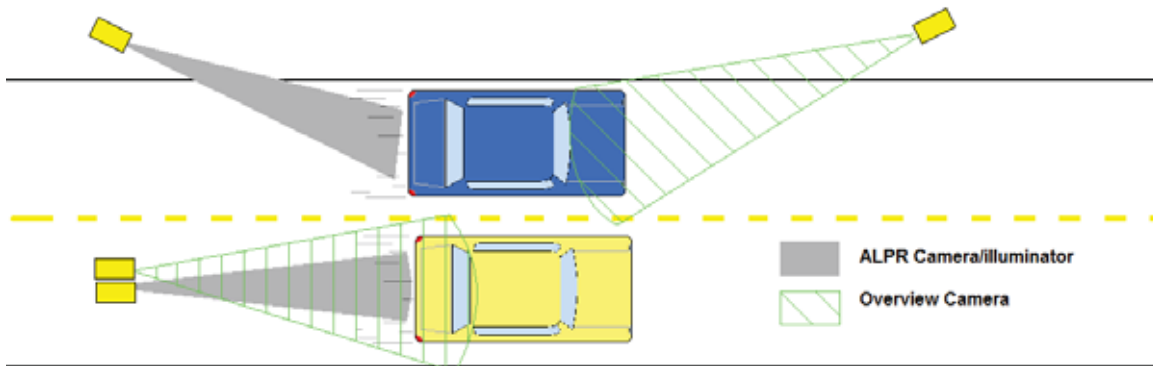
### Data Storage:

The image providing the highest confidence read is now saved and linked with the results data. This data would be, as an example, the license plate number, the lane number, the date and time and other fields as the user may require. **A second camera may be employed to provide a "scene overview" and this can be a color or monochrome camera.**

The overview camera will capture and save an image showing a wider view of the vehicle which can also be linked to the plate image and the plate data. All of this information can be stored and made available upon a query to the database of a particular license plate number, transaction number or time-of-day event.



An image from the License Plate Capture Camera and an Overview Image (below – typical deployments).



### Data and Image Transmission:

The data storage can take place right at the lane on the InSignia 4 device. In addition, this device can act as a lane controller and host a database that will grant or deny vehicle access into or out of a parking facility, gated community or other limited access compound. This can be done via the UIC (Universal Interface Controller), offered as an integral part of the InSignia 4 system which can also provide contact closure outputs to allow for the opening and closing of barriers against queries to that database.

Alternatively, where it is more desirable to have a central database serving many points of entry, the data and images can be forwarded to a central server. This transmission of data to a central server can be via wireless modem, or more commonly via a standard TCP/IP connection. Other means of transmission are available as well.

InSignia has several different protocols that can be utilized to send the data to back-end systems via TCP/IP or Serial connections. The data can be sent in XML, fixed field length or an agreed upon proprietary format. Additionally, InSignia can be configured to supply a Wiegand interface for connection to most data access systems.

An InSgnia installation can be deployed with a centralized management console, which is shown in the following figure. The centralized console provides user tools to bring up ALPR events based on license plate number, date, time, lane and other characteristics stored in the ALPR database. This tool is also used to configure vehicle information when the system is used as a lane controller.



### Key Features of INEX Technologies systems:

- All product provided by INEX Technologies is, with the exception of the LED board used in the camera/illuminator, commercially available off-the-shelf (COTS) product.
- This technology can be used in all weather conditions, for front or rear plates twenty-four hours a day without the use of supplemental illumination.
- The high speed and high accuracy of the INEX/Zamir ALPR system makes it ideal for integration with tolling, law enforcement or access control applications.
- An INEX/Zamir ALPR system will allow for an image from the users file to be displayed at an entry gate showing the driver and vehicle associated with the license plate of an approaching vehicle.
- The INEX/Zamir approach is suitable for high-speed open road use as well as parking, covert surveillance, police and a variety of other applications
- The ALPR results can be integrated into most known database types (stolen vehicle, BOLO, etc.).