

---

**Cameras for Capturing License Plate -  
Traffic Monitoring System Deployment**

**Application Notes**



Technical Support Team

## Abstract

Traffic monitoring systems are currently being deployed in many advanced surveillance installations throughout the world, proven to be successful in applications such as security, speed limit enforcement and access control. However, while deploying the system, we cannot always get the clear image and readable plates.

There are a lot of factors that can impact the quality of the captured images. In this application note, we will introduce some insights on how to deploy a monitoring system and focus on the camera installations and deployments.

## What are the difficulties to capture a good license plate video

People may think if they use a high-end camera with high resolution, high FPS, and they can get great and clear images of the license plate whether it is day or night. However, most of the time, things rarely turn out as expected.

We will list some common problems and analyze what can cause a bad image in the following sections.

### Dark environment

When capturing a car plate, good images can be expected in the daytimes. The real problem comes at night, since the light is not enough. In a dark environment, it is very difficult for cameras to get enough light signals. In other words, you will lose most details of the captured image, and the noise of the image will increase greatly as well. The result is you can see very blur or little so that it is almost impossible to read the exact plate.



*Too little light and no compensation light cause bad image quality*

### **Direct lighting from the target**

The second problem is the direct lighting from your target. When a car approaches with two brightly lit headlights, the camera will use an average exposure. Usually the cameras can't truly react in time due to the vast field of darkness; consequently, all you can see is two bright lights and very little evidence of a plate number.



*Cameras can't figure out how to expose the image properly.*

Most cameras are capable of viewing license plates during the day as long as the plate is large enough to read. However, it is not the same at night. You need to consider more, especially the angle and position of the light spot.

### **Motion blur**

The most common problem is motion blur. There are two main causes for the problem. The first one is the shutter speed is too slow. Since the environment is too dark, the camera will try to use larger iris and slow shutter speed to get more lights. But this action might cause blurry images when the car moves too fast.

The other cause is to set up a camera perpendicular to the street. It is hard to read the car plates if you are reading them at a steep angle. Besides, sometimes you will see the side to side motion that creates motion blur. The following figures are typical examples of the side to side motion blur.



*Typical examples of the side to side motion blur.*

Next, we will demonstrate some knowledge of the camera deployment. Check your cameras with the followings to enhance the image quality of your car plate system.

## **Factors to consider for the license plate recognition**

There are a great amount of cameras from various brands to choice from. Which one will be the best? Which one will have the better performance?

There are some key factors you should consider before choosing the cameras.

### **Lens**

You need a lens that can be set to the exact field of view to work. We would suggest a good quality vari-focal lens that is at least 12~50mm for up to 15~25 meters away. If it's farther than 30 meters, consider the lens that goes up to 75~80mm.

### **Housing**

Always use outdoor housings since the cameras by nature require weatherproof. You will need some certifications like IP66/IP67 to ensure the dust and water will not damage your device.

The brackets for wall mount or pole mount are also very important. Since this accessory helps you to install the cameras to proper positions. Sometimes you may even need a sunshield to avoid the direct sunlight.

### **Lights**

Have as much lighting as you can afford on the target. Enough lighting can ensure clear and bright images. Dark environment causes bad effects on the image quality. Though we can adjust the image appearance parameters, the best policy is to have a

good quality from the source.

Good lighting allows the camera to use faster shutter speed. This means the camera can capture high-speed vehicles without motion blur.

### Angle

Never put a camera perpendicular to the street and expect to capture plates. The ideal camera position is right in front of where the car comes or goes, as perpendicular to the plate as possible.



*Try to install the cameras perpendicular to the street and expect to capture plates*

Plates are hard to read if you are reading them at a steep angle. The right plate direction can help to reduce the side to side motion and decrease the motion blur, since no slow shutter will be needed.

### PPI

PPI stands for the "Pixel Per Inch", which means the number of pixels will be drawn in one inch. In general, we strongly recommend that numbers/letters on the plate should be at least 10 PPI or larger. You can always use a higher resolution camera and narrower field of view (Zoom-in) to reach that goal.

### Installation locations and target position of the image

To see the plates at night, you need to have a telephoto lens installed in the nearest possible location where the plates might appear. Try and capture only the front or rear of the car at about the width of a lane, or about 3~4 meters wide.

This means you need to zoom-in to a proper level to have the targeted car plate in the center of the image. When the headlights are on, they will make up the majority of the field of view and the camera can adjust the exposure quicker.



*Have the target plate in the center of your image.*

## Summary

1. A camera dedicated for this purpose.
2. A telephoto lens set for a field of view no more than 4 meters wide of the car
3. Well lit, enough extra or compensation light to
  - a) reduce noise and produce clear images.
  - b) allow a faster shutter speed to avoid the motion blur.
  - c) overcome bright head or brake lights.
4. A camera with good low light sensitivity
5. If you need a wide view, you will need a second camera to have an overview of the area to know the surroundings, for example what the car is and what it is up to.
6. A good angle for capturing the image.
7. Proper resolution for the scenario. The highest is not always the best.

## Successful Story with Surveon products

So far, Surveon has helped several cities in Taiwan to build up the traffic monitoring systems. In southern Taiwan, we deployed over 3000+ cameras at the intersections and 50+ NVR and storage as the backend system.

In this city, the cameras were installed at intersections. The applied model is CAM2321, a 3 megapixel network camera with dual memory card slots and tampering detection for SMB and enterprise users. With 3 megapixel CMOS sensor and WDR (Wide Dynamic Range) functionalities, CAM2321 has a superior performance with enhanced image quality.

When deploying the cameras, we installed about 3~4 cameras in one position. Each camera has their dedicated uses; one for overview, one for car lane monitoring, and the last one for covering the rest of the area. The critical area, for example the center of the intersection, has about 3 cameras to do the surveillance. When needed, images from different angles of the same critical spot can be provided.

Cameras were installed close to the street lights to ensure a well lit environment. As a result, clear and bright images for the traffic monitoring can be received. The camera installation angle was as perpendicular to the car lane as possible. So that car plate and the trajectory of the target car can be much easily recognized by the police department.

With Surveon professional features and design, the system has very high reliability. Surveon 3 megapixel cameras provide the high image quality even under low light situations. With a maximum of 2048x1536 resolution, Full HD real-time video recording, and advanced features such as DC iris and WDR, the cameras are ideal for high-level security applications. Furthermore, Surveon VMS can provide real-time VI detection; the traffic safety can be elevated as well.



***A major city in Southern Taiwan***

## Recommended Model for LPR/Traffic Monitoring



CAM4371



CAM3371



CAM2321



CAM2331 /  
CAM2331P

These cameras are all equipped with Sony high quality sensors and have very good performance even in low light environments, suitable for installations in both outdoors (box type needs extra housing) and indoors.

You can find the detailed SPEC and datasheet from our official website:

<http://www.surveon.com/index.asp>

If you have any question or feedback, please free feel to mail us:

[support@surveon.com](mailto:support@surveon.com)