

# AVLYTICS INSTALLATION BEST PRACTICES

# GUIDE IN VISION

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LIGHTING, INFRARED, SHUTTER SPEEDS, AND RESOLUTION

# INTRODUCTION

AI-powered surveillance systems rely on various factors to ensure accurate and reliable human detection. Lighting conditions, infrared technology, shutter speed, and resolution play crucial roles in optimizing these systems. This guide will explain how each of these elements impacts AI performance and provide practical recommendations for improving detection accuracy.

## 1. LIGHTING CONDITIONS AND AI DETECTION ACCURACY

### HOW LIGHTING AFFECTS AI

Lighting significantly impacts AI's ability to detect and recognize human figures. Insufficient lighting can cause:

- Reduced contrast between a person and the background
- Motion blur in low-light conditions
- Increased false positives or missed detections
- Ideal Lighting Conditions
- Balanced Illumination: Avoid extreme brightness or complete darkness.
- Use of Artificial Lighting: Install floodlights or LED panels in areas with poor natural light.
- Avoid Backlighting: Position cameras to minimize glare from headlights or streetlights.
- Low-Light Challenges
- Incomplete silhouettes can mislead AI algorithms.
- Shadows may create false shapes resembling human forms.

## 2. INFRARED (IR) TECHNOLOGY IN AI SURVEILLANCE

### ROLE OF INFRARED IN SURVEILLANCE

Infrared cameras capture images in darkness using IR light, which is invisible to the human eye but detected by IR sensors. AI models process these IR images to identify human figures.

### BENEFITS OF INFRARED FOR AI DETECTION

- Allows human detection in complete darkness
- Reduces dependency on visible light
- Works effectively in varying weather conditions

### CHALLENGES AND CONSIDERATIONS

- IR Reflection: Highly reflective surfaces can distort infrared images.
- Limited Range: Most IR illuminators have a limited effective distance.
- Temperature Variability: AI must differentiate between humans and other warm objects (e.g., animals, car engines).

# 3. SHUTTER SPEED

## UNDERSTANDING SHUTTER SPEED

Shutter speed determines how long the camera sensor is exposed to light. Faster speeds reduce motion blur, while slower speeds allow more light in but may introduce blur.

## IMPACT ON AI DETECTION

- Fast Shutter Speed (1/500s or higher): Reduces motion blur, ideal for detecting moving humans.
- Slow Shutter Speed (1/30s or lower): Improves brightness in low-light conditions but increases blur.
- Balanced Approach: Adjusting shutter speed based on lighting and movement levels enhances AI reliability.

## BEST PRACTICES

**For Well-Lit Environments:**

Use faster shutter speeds (1/250s - 1/500s) to minimize blur.

**For Low-Light Conditions:**

Optimize between 1/60s and 1/125s with adequate IR support.

**Motion Detection Areas:**

Use AI-assisted auto-adjusting shutter speeds to balance exposure and clarity.

## THE ROLE OF RESOLUTION IN AI DETECTION

# 4. RESOLUTION

Surveillance cameras often record in high resolution (e.g., 1080p or 4K) for detailed video playback. However, AI-based object detection does not require such high resolutions.

## AI SUBSTREAM PROCESSING

AI algorithms typically process a lower-resolution substream with a reduced frame rate. This reduces the computational burden and allows for real-time processing using cost-effective hardware.

## BENEFITS OF LOWER-QUALITY AI SUBSTREAMS

### Faster Processing:

AI can analyze footage more quickly without excessive GPU/CPU demand.

### Lower Costs:

Enables the use of affordable processors and storage solutions.

### Efficient Bandwidth Use:

- Reduces network congestion by transmitting only essential data for analysis.
- Balancing Quality and Efficiency
  - The recorded stream remains high-quality for playback and evidence collection.
  - AI detection is optimized for efficiency, ensuring smooth real-time surveillance performance.

# 5. PRACTICAL FOR CLIENTS

## Ensure Adequate Lighting: Optimizing Surveillance for

### AI Human Detection

- Install additional lights in dark areas.
- Use IR wherever possible.

### Utilize High-Quality Infrared Cameras:

- Choose cameras with adaptive IR technology.
- Regularly clean IR lenses to prevent image distortion.
- Adjust Camera Settings for Best Performance:
  - Set an appropriate shutter speed based on movement levels.
  - Use AI-enhanced exposure settings for dynamic environments.

## Optimize Resolution and Substreams:

- Configure cameras to use lower-resolution substreams for AI detection.
- Maintain high-quality recording streams for security and evidence purposes.

### Test and Calibrate Regularly:

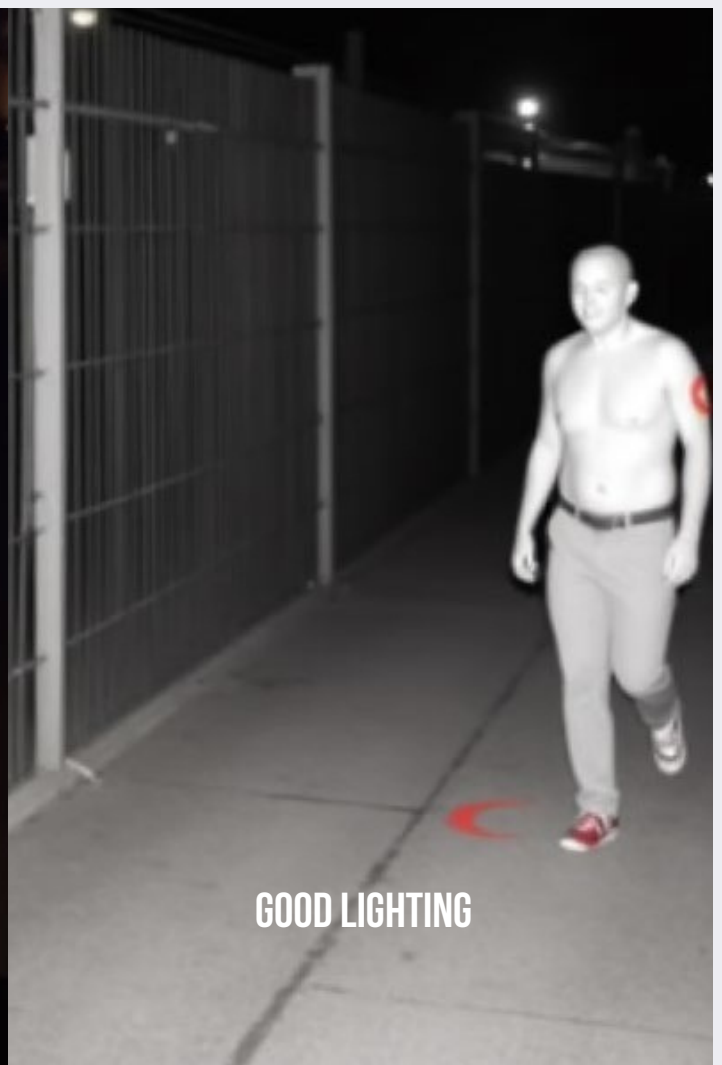
- Conduct routine checks to adjust settings as needed.
- Monitor AI performance and fine-tune parameters accordingly.

## POOR LIGHTING

T- Shirt Blending With The Background



POOR LIGHTING



GOOD LIGHTING

**POOR LIGHTING**



**GOOD LIGHTING**



**POOR LIGHTING**



**POOR LIGHTING**

**POOR LIGHTING**



**POOR LIGHTING**



**POOR LIGHTING**



**THIS IS THE DESIRED LIGHTING**



# US



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