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**White paper**

# PTZ Auto Tracking

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# Contents

# 1. Preface

PTZ camera refers to surveillance camera devices with electric motor mechanisms capable of moving optical zoom lenses horizontally (Pan) and vertically (Tilt). Freely control the camera's zoom magnification, horizontal position and vertical position while monitoring from a remote location via remote control communication signals.

With PTZ camera, the camera can adjust its position according to the subject's movement resulting in minimized blind spots across the monitoring area. While a PTZ camera relatively more expensive than a fixed CCTV camera, due to the various advantages, the demand for PTZ camera is continuously increasing.

Conventional PTZ cameras have a wide detection range but because they have to be manually controlled to track subjects, they have difficulty with stability when tracking a subject. Also, if multiple cameras are installed, all cameras cannot be controlled simultaneously which results in occasionally missing moving subjects. However, detecting movement and tracking such movement can be critical even for movement with low frequency. For example, environments such as the interior of a safe, museums after closing, schools after school hours, or parking lots at night may have little or no movement. However, thieves breaking into a museum after closing or a crime at a desolated parking lot may have minimal movement, but capturing these movements can be extremely important from a security perspective.

Hanwha Techwin's PTZ auto tracking function, when enabled, can perform real-time image analysis technology which will reduce noise elements from the image, compare current images and previous images to detect significant movement and automatically select tracking subjects even if the operator fails to detect the moving objects on the screen. Once the tracking subject is selected, it automatically controls the zoom magnification as well as horizontal (Pan) and vertical (Tile) camera positions according to the subject's movement.

## 2.1. Introduction

Auto tracking is composed of Pan/Tilt/Zoom control to detect and select subjects to track and control the camera position to keep tracking subjects on screen.

The tracking stage includes a subject re-selecting stage to determine tracking failures and to maintain tracking.
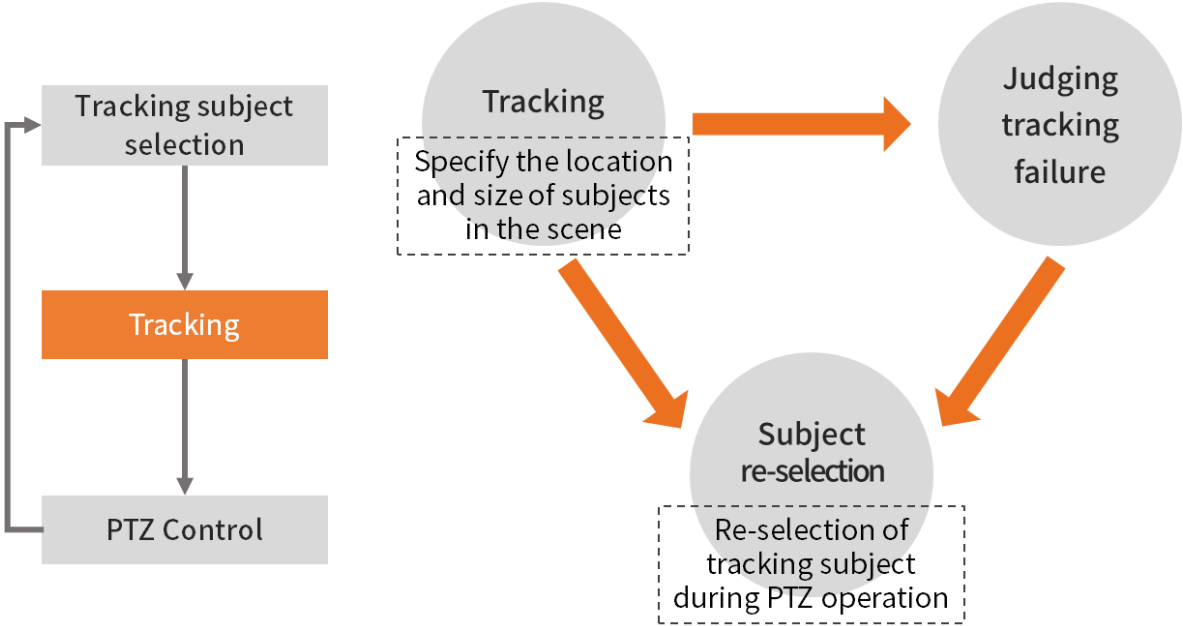
Figure 1. Module Details for Tracking

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## 2.2. Detection & Tracking

As mentioned above, auto tracking technology consists of detection and tracking. Detection technology compares the current image and the previous image to differentiate the background and moving objects, and then it selects a subject to track.
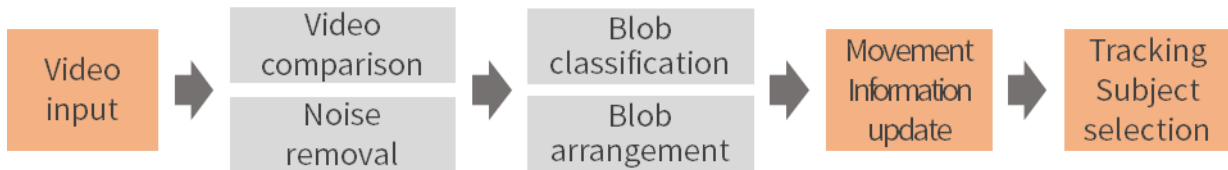


Figure 2. Detection Process

Tracking technology utilizes a model which includes the characteristics of moving objects and their surrounding background. It extracts the unique characteristics of moving objects, searches candidate areas with the highest similarity, and utilizes Pan/Tile/Zoom to track.



Figure 3. Tracking Process

## 2.3. Setup

Tracking operations using a camera web viewer are executed as following: By utilizing methods 1 and 2, moving objects to track are automatically selected. By using method 3, operators can manually select the moving object to track, and the system initiates tracking by right-clicking the area to search.

1) PTZ camera 'Live' web page → Enable 'Auto Tracking'

2) Setup page → PTZ → Preset setup → After action → Tracking

3) Right-click on video window of the 'Live' web page

In addition, the camera's web viewer provides an auto tracking setup page for efficient auto tracking.

In addition, the camera's web viewer provides an auto tracking setup page for efficient auto tracking.

< Table 1. Auto Tracking Setup Items >

| No | Setup Item | Function |
|---|---|---|
| 1 | Zoom | Set the zoom linkage status. The system can be set to monitor a moving object in a partial area or full area. The system performs a zoom-in/zoom-out taking the size of the moving object into consideration to monitor in advance. |
| 2 | Size Retention | Set the size of the monitoring subject. The system can set the size of the tracking subject as "small", "medium" or "large." By adjusting the camera height value, the size of the tracking subject can be fine-adjusted. |
| 3 | Indicator Display | Set whether an indicator for the tracking subject is displayed on screen. Setting an indicator display will allow for easy detection of the moving object being tracked or any movement being made. |
| 4 | Area Movement | Set whether a non-detection area is used. Objects making insignificant movements such as a shaking tree branch or flags can be set as non-detection objects. |

## 2. 4. Precautions

The auto tracking function is designed for the purpose of detecting and tracking moving objects. However, depending on the installation environment and its surroundings, it may detect and track moving objects the operator did not intend to track. The following are situations in which major malfunctions may occur:

• The shaking of tree branches and flags

In case of such movement, setting certain areas as non-detection areas can reduce the likelihood of malfunctions. Initial movements within non-detection areas are not detected.

- Changes in light before the camera due to light reflections or lighting conditions
- Severe weather conditions including strong wind, snow, rain, etc.
- When the camera is recording an image of an area other than the targeted monitoring area

In case of the above, the system detects frequent movement not including the desired tracking subject. When setting presets, setting [Tracking] and [Tracking Period] at [Operation Mode] will automatically return the camera to the set position after the [Tracking Period] expires even due to malfunctioning during auto tracking.



Figure 4. Malfunction Sample

# 3. Conclusion

This white paper described the environment, operation and precautions for PTZ auto tracking. Observing the above conditions during installation will improve monitoring efficiency. In addition, once set up, auto tracking is implemented automatically which can lead to cost reductions in labor.

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