Never lose a preset position

MIC cameras

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1 Never lose a preset position with MIC cameras

1.1 Introduction

PTZ cameras are typically deployed in applications which require continuous coverage of wide areas or a detailed view of specific areas of interest. The pan & tilt mechanism in these cameras allows the operator the flexibility to dynamically move the camera to a specific position in scenarios such as the following:

1. Sending a 'move to preset' command from the controller (video management software or keyboard)
2. Pre-configured tours to move between positions automatically
3. In response to an alarm

In such scenarios, it is key that the PTZ camera returns accurately to a preset position repeatedly over the life of the product. With intelligent cameras in particular (e.g. the MIC IP 7000 series & MIC IP fusion 9000i series), which allow operators to configure video analytic rules on preset scenes, it is important that the camera always returns to its desired position for accurate analytics results. It is a known deficiency in the industry that PTZ cameras typically lose their ability to return accurately to a preset position over a period of continuous use. Additionally, these problems mean greater susceptibility to sudden shocks or vibration.

These problems are very commonly seen in applications such as city surveillance and traffic monitoring, where cameras are used for continuous tours and are also exposed to shocks and vibration. These problems present symptoms such as:

1. The camera fails to reach its preset positions
2. Privacy masks move from the desired positions
3. Preset tours are off

1.2 Typical PTZ positioning system

The drivetrain in most PTZ positioning systems relies on a timing belt mechanism which connects the camera carriage to the motors in order to rotate the camera assembly in the pan & tilt axis. These belts have a specific tooth profile designed to transfer the torque generated by the motors to the gears attached to the camera carriage. Since the belt is a critical part of the drivetrain, any damage to the tooth profile - whether due to wear and tear or stress - can lead to a loss of positional accuracy, and potentially to total failure of the drive mechanism. The soft nature of the belt material makes this design particularly susceptible.

These drivetrains also operate in an open loop configuration, which means no feedback is provided as to whether the pan/tilt motors have moved to, or maintained, exactly the desired position as called by the camera control software.
In other words, if the camera carriage moves in relation to the motor position due to degradation of the belt or to vibration/shock, there is no information for the camera control software to recognize this error. The camera will continue to be off from its target position until manually corrected by a homing/reset action, and in some cases indefinitely.

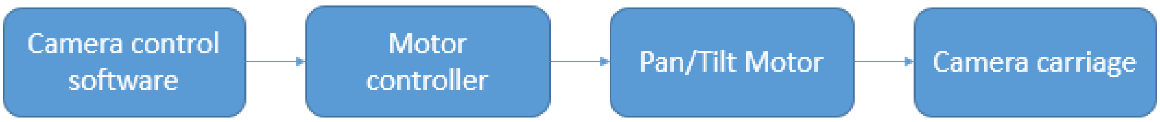

Fig 2: Open loop positioning system

1.3 Bosch MIC cameras positioning system

Bosch addressed these field issues in the MIC camera series' positioning system by implementing a geared drivetrain and a closed loop positioning system. By using ruggedized metal gears to transfer the torque from the pan/tilt motors to the camera carriage, the camera can be used for continuous tours and preset position calls without experiencing significant wear and tear, or losing preset positions.

The MIC camera series' positioning system is closed loop because it uses positional encoders (resolvers) which ensure the pan/tilt accuracy of the camera. Additionally, these encoders (resolvers) tell the software whether the camera moved due to an external force. If the camera loses positional accuracy, the control software is able to correct this offset automatically without requiring any homing or reset actions.

The diagram below explains the control logic used by the positioning system in MIC cameras. The camera control software (A) issues digital pan/tilt commands which are received by the motor controller circuit (B). These commands are then converted into voltage signals to drive the pan/tilt motors (C) accordingly. If the motors fail to stop at the desired position, the resolver (D) sends feedback to the control software to correct the error and bring the camera to its desired position.

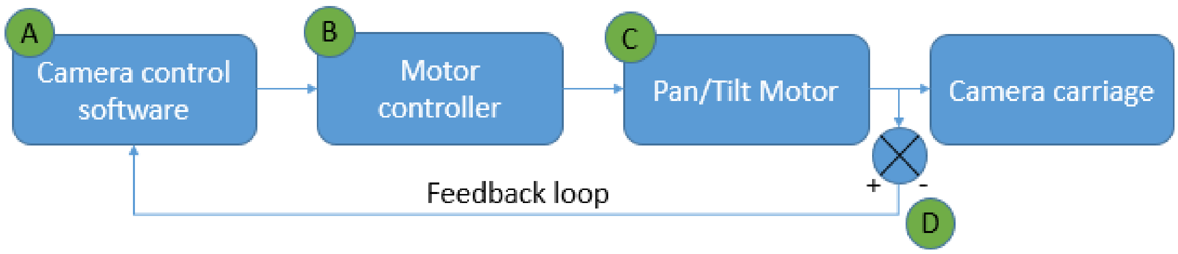

Fig 4: Closed loop positioning system

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