

TrackingMaster V1.5 - tender text

Automatic camera tracking system for autonomous detection and tracking of lecturers in lecture halls and similar premises using remotely controllable pan-tilt-zoom (PTZ) cameras.

The system shall have the following features:

The system shall primarily detect one person, which is usually the lecturer, in defined areas of a room. As soon as there are other persons in addition to the lecturer in important areas, such as defined environments at the lectern or blackboard, the system should also detect these persons.

The detection of persons is done by means of laser sensors in the non-visible infrared range. Each laser sensor must be able to scan an area of at least 12 m wide and 6 m deep in the lecture area, so that it is possible to detect people in this area. By installing several laser sensors, a combined scanning area must be formed in order to be able to cover larger areas during tracking. In addition, the combination of several laser sensors must also achieve coverage of complex room shapes, which would not be possible with individual laser sensors due to shadowing and overlapping. The scanning of the environment has to take place below the usual table height between 0.2m and 0.5m. The laser sensors must comply with laser class 1 according to DIN EN 60825-1. The data communication between the laser sensors and the central unit of the system is done via Ethernet using TCP/IP in order to be able to continue using a possibly existing network infrastructure. The power supply to the sensors is ensured via the same connection using PoE.

It must be possible to configure the areas to be monitored in which persons relevant for tracking are located. Areas that are not included in these defined areas are ignored by the system. When defining these areas, it must be possible to distinguish between free tracking of detected targets by the PTZ camera and the use of fixed image positions. Furthermore, it must be possible to prioritise detections in the configured areas in order to be able to exclude targets for camera control in case of simultaneous detections in several areas.

The PTZ camera follows the movements of the lecturer in dynamic and fluid movements. When a single person is detected in the defined area, the system controls the PTZ camera so that this person is constantly shown in a semi-close-up as far as possible. As soon as more than one person is to be imaged, the system enlarges the image section using the camera's zoom so that, as far as possible, all persons relevant for the recording are visible. If the additional persons leave the captured areas, the image section automatically optimises itself to the remaining lecturer. The image section to be used in each case can be individualised via configuration options.

People detection is not dependent on the video images from the PTZ camera to enable reliable tracking even in difficult lighting conditions and independent of projections in the background. Static and moving images of people captured by the PTZ camera cannot lead to false detections. Person recognition is not dependent on a marker or transmitter that the lecturer would need to carry. The lecturer is tracked by the system with high accuracy and autonomously, without the need for manual monitoring. The persons relevant for camera control do not have to be manually deposited or trained. When evaluating the sensor data, the system automatically differentiates between objects and persons with the help of filters and object recognition.

Starting and stopping camera control by the system at the beginning and end of an event can be automated by connecting to an Opencast instance.

The system provides an Ethernet network interface in order to be able to integrate it into media systems. For this purpose, it has a standardised, documented and openly accessible API. The API must be protected from unwanted access by authenticating the requests. Functions such as the following are made available externally via the API: Activating and deactivating tracking, activating and deactivating PTZ camera control, reading out the current system status (functionality and current tracking situation), querying automatic start and stop times stored by the Opencast connection, querying and adjusting system configurations.

For selected sections of the areas of the room to be monitored, it must be possible to make supplementary configurations to support automations depending on the detection of persons. Depending on the positions of the detected persons, the system shall give instructions through these definitions to change the image source to be used or to several active image sources. Furthermore, it shall also be possible to define triggers for further external systems depending on the recognised positions. In conjunction with an additional control unit such as a media control, this makes it easy to realise automations of hardware and software components on site. The instructions for controlling external components are provided via the API.

The system must have an update capability for further developments and security updates in order to be future-proof. It should be possible to carry out updates automatically.

General information

The tracking system enables control of supported network-capable PTZ cameras. Supported PTZ camera models require an API based on the HTTP(S) protocol to be controlled by the tracking system. The detection of persons is achieved using LiDAR sensors. The connection of the hardware system components is exclusively network-based via TCP/IP.

General information

The system provides a device-independent web interface for configuration. The following system settings shall be customisable as a minimum:

- Connection information for each laser sensor
- Connection information for the PTZ camera
- Definition of areas to be analysed for tracking within the graphical representation of current laser sensor measurements
- Assignment of prioritisation information to the configured areas
- Definition of special areas in which fixed camera positions are used
- Definition of frame areas around areas and timeouts for delaying the change between the different modes of camera control
- Manual pan, tilt and zoom control of the PTZ camera
- Definition of upper and lower limits for the movement of the camera during free tracking
- Minimum and maximum zoom position of the PTZ camera during free tracking
- Creation of additional image sources and scenarios for peripheral hardware to automate media technology on site and assignment of these to areas
- Configuration of filters for processing sensor data
- Connection data for Opencast integration

Features Basic system:

People detection	Autonomous
Detection area	12m wide and 6m deep, expandable
Sensor type	2D LiDAR laser sensors
Sensor spectrum	infrared
Number of sensors	2, expandable
Sensor standard	Laser class 1 according to DIN EN 60825-1
Sensor scanning height	Between 0.2m and 0.5m
Power supply Sensor	PoE (802.3af-2003)
Trackable persons	One to several
Tracking scenario	One person as half shot, from two persons auto- matic adjustment of the zoom to capture all tracking targets
Required tracking aids	No markers or transmitters required
Controllable cameras	Supported pan-tilt-zoom (PTZ) cameras as well as fixed-position cameras with automatic cropping; ad- aptation to other camera manufacturers and models possible
Camera control interface	Network-based, supported HTTP control protocols of camera manufacturers
Usable resolutions	All
Camera control	Autonomous, manual control additionally possible
Fixed image capture components	Can be integrated and used in conjunction with a media control system
Automatically switchable media technology	Arbitrary according to existing hardware, which can be switched via a separate media control system
User interface	Yes, web browser-based and device-independent
Configuration opportunities	Various options, see list under "General infor- mation".
Manual monitoring	Not necessary
API connection	Use of all tracking system functions via programming interface, external scheduling and video manage- ment system supported ("OpenCast"), media control connection supported, adaptation to customised so- lution possible if appropriate interfaces are provided
Update capability	Yes
Temperature range (operation)	0°C ~ +50°C

Optional services

Hardware service	Yes, service contract
Software service	Yes, service contract