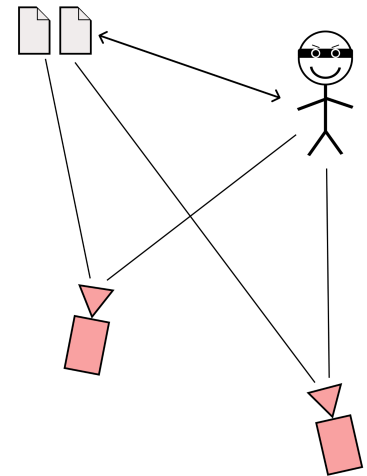


Tracking an object across multiple movable cameras: The handover method

Imagine the situation where a thief enters a forbidden area where there is a system of multiple movable cameras, but how can the cameras communicate and tell each other where the thief is, so that he is always caught on video?

This thesis project presents a solution to this problem, by allowing the cameras to hand over the tracking responsibility between each other, called “the handover method”. This will guarantee that the thief is always tracked in the forbidden area to catch all the troubles he may cause on video. Without this solution, the thief may disappear from a camera’s view and the surveillance system will thus not know his current position in the area.



A movable camera, also called a PTZ camera, uses built-in motors to move around which enables it to see its whole surrounding. The ability to move makes it possible for this kind of camera to follow moving targets in a scene, an action called tracking.

The solution can be divided into a couple of tasks. The first is to figure out the real-world position of the cameras and how they relate to each other. Secondly, the cameras need to be able to tell each other the position of the thief, in this case by using a shared common point in the real world. Lastly, the tracking responsibility can be handed over between cameras, by moving another camera to the position of the thief and then start tracking it.

The method of figuring out the real-world position of the camera is by aiming the cameras at a calibration target, in this case, two A3 papers lying on a table. The cameras can then calculate their position based on the position and orientation of the papers, this will also give them their relation to the other cameras in the system. The papers can then be removed from the area. The cameras can then inform one another of the position of the thief, by remembering the position of the papers and using it as a reference point. As seen in the figure, the cameras can compute the distance between the papers and the thief, thus signaling to each other the location of the thief.

The handover method proved to be great for tracking, as it captured good videos of stealing thieves moving from camera to camera. The calculation of the thief’s position proved to be fairly accurate, enabling multiple cameras to look in the same direction and thus capturing the thief from multiple angles. To further improve this solution several extensions could be made, such as tracking multiple thieves in the area or adding even more camera types for more complex tracking.

The project “PTZ Handover: Tracking an object across multiple surveillance cameras”, written by Alexander Persson, can be found at link¹. A video of a thief making his way through the street with a stolen box can be found at link², where the handover method proved to be handy in capturing the thief on video.

¹ Report:

² Demonstration: <https://youtu.be/SDr-tUWDmlk>