Improving Situational Awareness in camera surveillance by combining top-view maps with camera images

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Abstract

The goal of the experiment described is to improve today's camera surveillance in public spaces. Three designs with the camera images combined on a top-view map were compared to each other and to the current situation in camera surveillance. The goal was to test which design makes spatial relationships between camera images most intuitively apparent to the viewer. The results showed that all three designs create a better understanding of these spatial relationships as indicated by faster response times.

Introduction

Current technology

Contemporary camera surveillance in public spaces relies on a video wall with various video screens. The simultaneous overview of many cameras improves surveillance. The situation awareness of the operator is now limited by the ability to correctly *integrate* the individual images to a consistent whole. Various approaches try to aid the (mental) integration of numerous images. The "Flashlight" system projects camera imagery over a 3D model. It is related to the projection of video image in 3D models (Sawhney et al., 2002; Sidenbladh & Ahlberg, 2005). The camera images appear as flashlights, but instead of light, the images are projected; people and other objects appear as textured shadows. The main disadvantage of this system is the increasing distortion of the images as the camera is mounted lower to the ground; analogous to the long shadows at sunset. Fleck et al. (2006) have developed a distributed network of cameras that allows for tracking and handover of multiple persons in real time. The inter-camera tracking results are embedded as live textures in an integrated 3D world model. This enables the user to fly through a virtual 3D world which is a live representation of the real world being monitored. The disadvantages are that all cameras need to be smart or combined with a PC and the inability to deal with occlusions which cause incomplete textures for projection. This complicates the tracking, handover and 3D positioning of individuals. The system is therefore not (yet) suitable for crowded areas such as a busy city square.