



## Fraunhofer

Institute  
for Information and  
Data Processing

## NEST – Network Enabled Surveillance and Tracking

A Concept For Next Generation  
Surveillance Systems

Video surveillance and monitoring is one of the most recent fields of work in research and development. Due to the increasing public crime, industrial espionage and terrorism the need for advanced surveillance technology for prevention and criminal investigation becomes more and more important.

The NEST Surveillance System developed by the Fraunhofer IITB presents the next generation of advanced surveillance systems.



Figure 1: Typical CCTV control room.

### State-Of-The-Art

Today's video surveillance systems have one thing in common: They are still relatively unintelligent. In the present stage of development, many systems are mainly based on CCTV technology linked to a control unit. In most cases this technology is only used for passive monitoring. In security environments, human operators (security staff) face a large number of monitors, over a long period of time and try to detect suspicious situations.

In practice, this method is quite ineffective, because of the decreasing level of attention of human beings after a short time. Additionally, in large surveillance systems the number of monitors is too large for an accurate observation. These conditions consequently limit the surveillance capabilities of a human operator.

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### The Solution

The NEST Surveillance System provides automatic approaches for video analysis and surveillance assistance. NEST is able to manage a large number of sensors with constant performance, all around the clock. The integrated automatic algorithms and functionalities provide processed data and information. This enables the operator to focus on more complex tasks, like reaction management, situation analysis and awareness. Typical tasks like »Detection of Abnormal Behaviour« or »Tracking of Suspicious Persons« are performed autonomously by NEST. Thus, the operator is on demand if and only if suspicious and critical situations occur.

### The NEST Architecture

NEST is designed to manage and control a large number of objects (e. g. humans or vehicles), tasks and events. Thereby, NEST is scalable concerning the number and specific type of sensors involved. The decentralized sensor-independent system architecture allows to run NEST in very large video networks (e. g. outdoor surveillance in cities).

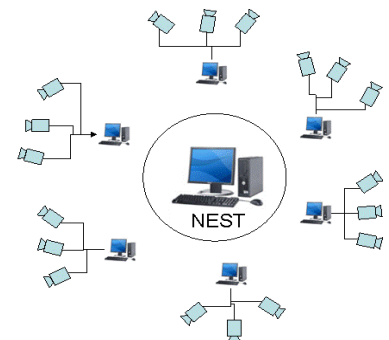


Figure 2: Decentralized sensor-independent architecture.

Furthermore, due to the sensor independent concept, a high expandability and upgradability of the system functionalities is given.

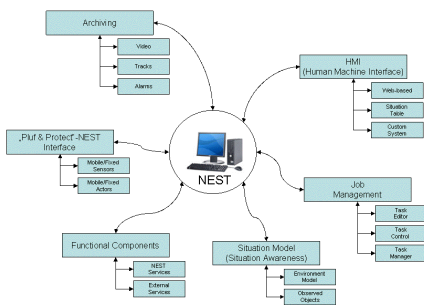
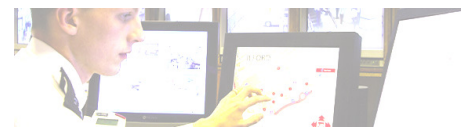


Figure 3: NEST-System overview.

### Basic Features / Functionalities

- Object- and task-oriented automatic surveillance system.
- Sensor independent data and task processing.
- Generic system architecture.
- Unlimited upgradeability of functionalities.
- Unlimited expandability (number of sensor nodes).
- Task management for objects under observation.
- Sensor independent motion detection and tracking.
- Visualization of tracked objects and situation mapping.
- Object-related automatic video live-streaming.
- Object-related information management.
- Abandoned bag detection.
- Recording/archiving of relevant data (video, images, object attributes, alarms).



Keywords: Object- and task-oriented  
advanced surveillance system,  
automatic video analysis.