

# Holistic Monitoring of Complex Environments

Technology can now provide holistic monitoring for the most complex operational environments

The Icons Incident Recognition for surveillance and Security project (2000-2003) developed algorithms to address the processing, interpretation and management of vast volumes of diverse quantities of visual information captured by live CCTV cameras through the novel techniques of Zero-Motion Incident Detection and Abnormal Behaviour Detection.

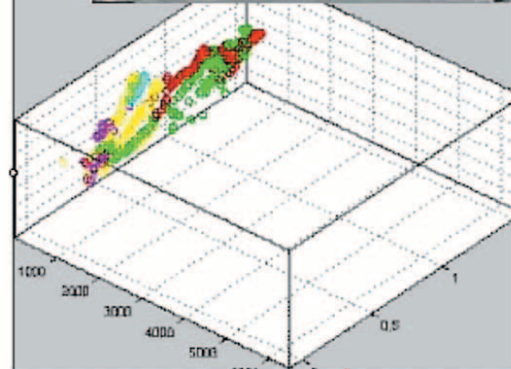
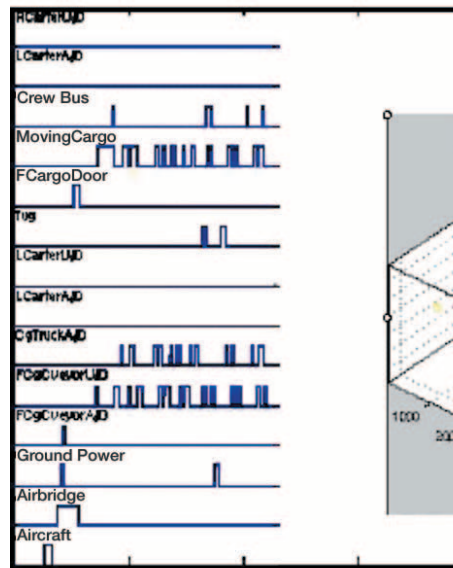
## Applications

This innovative work sponsored by the DTI and EPSRC has obvious applications within the areas of security surveillance and theft monitoring. Current CCTV surveillance is mostly a manual and repetitive time consuming task that is often reliant on human operators being able to spot a momentary incident on their monitors and then take the appropriate actions. Today the wide range of computer vision techniques developed by Safehouse, the principal industrial partner in the Icons project, can now be used to automate traditional monitoring tasks both within and outside the standard surveillance and security applications. This versatile technology can also transform the management modus operandi for any complex operational environment characterised by reasonably well defined organized activity of people, vehicles and goods that are moving within very tight timescales and discrete locations, such as airport terminal gates, ferry ports, railway hubs and bus terminals.

## Operational Context and Measurable Benefits

Traditionally all these areas have been plagued by complex issues concerning managerial ownership and multi-agency responsibility

that are often reinforced by discrete paper based control systems and separate communications systems. Even when computer systems exist they are often isolated from other related systems and tend to present supervisors with 'islands of data' rather than an integrated source of management information and intelligence. An intelligent, digital based computer vision management system can often supply a truly holistic and expedient management toolkit for handling complex operational situations. The Safehouse suite of Intelligent Engines provides such a future proof solution by "visually enabling" IT systems. These products are a series of 'middleware'



Aircraft Gate Monitoring

**ALARM**

No. of Cars:	167	No. of Cars Stopped:	01
Max. Speed:	31km/h	No. of Cars Stopped>2min:	01
Ave. Speed:	15 km/h	Ave. Stop Time:	1 min 28sec

Terminal Forecourt Monitoring

solutions fully utilising the existing investments made by the client which can then be harnessed and transformed in their operational usefulness. Huw Farmer IT Corporate Manager at BAA states that "we are constantly striving to ensure a free flowing experience for airport passengers. With these technologies we are now able to integrate various systems that will enable BAA to facilitate the free flow of aircraft, the necessary logistical support and, of course, all our customers". Safehouse in conjunction with BAA have been working to develop a gate operations system that will visually integrate a number of currently separate systems that monitor various servicing and replenishment activities. It is possible using intelligent video management techniques to automatically detect the arrival and identity of an aircraft at the gate, the parking position and provide a real time audit of the essential gate activities including:

- Aircraft arrival and identification
- Aircraft positioning and Aero-bridge operations
- Power connection
- Service vehicle arrival & activities
- Baggage unloading and loading
- Catering replenishment
- Waste clearance
- Refuelling
- Aircraft push back

For the future, when a fully integrated gate operations monitoring and management system is coupled with an automated people counting and identity verification capability then the management of all aspects of passenger flow and security can be transformed.

Specific Safehouse solutions being developed for people monitoring & security control include:

- Forecourt monitoring & passenger arrivals
- Check-in and boarding validation
- Visual crew and servicing personnel verification
- Visual manifest of the passengers who boarded each flight
- Traveller Segregation management and control

- Streamlining of Customs and Immigration screening processes so that it is less 'resource rich' yet more effective
- Increased levels of security from the 'freed up resources', proactive spot checks etc.

When one reassesses the challenge of how today's complex operations might be better managed with the deployment of 'best in class' vision management systems, a wide range of benefits can be seen to be attainable including:

- Replacement of paper trails
- Overlaying disparate computer systems with an effective decision making mechanism
- Immediate spotting of potential 'showstoppers' to 'mission critical' action sequences
- Creation of an effective problem management with automatic escalation or resolution
- Automatic detection of security breaches
- Greater levels of productivity
- Improved throughput of transport (aircraft, ferries, trains, buses, drop off vehicles)
- More efficient turnarounds of transiting passengers
- Higher levels of sustainable customer service
- Lower average operation costs with improved overall security

Now it is possible to appreciate how businesses can truly enter the digital age and harness a broad range of compelling benefits that transform levels of security and customer service performance whilst driving down costs and related overheads.



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