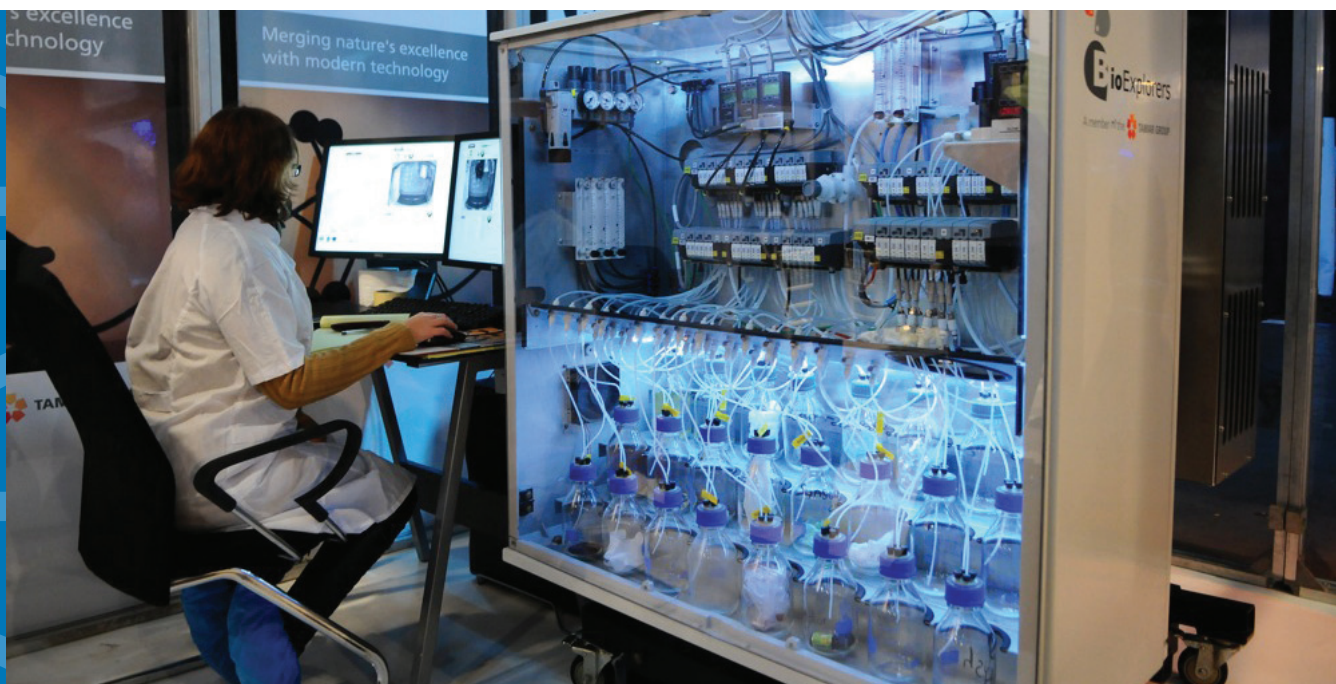# EMERGING TECHNOLOGIES:
it's not all about X-rays

Whilst not wishing to underestimate human factors, there is little doubt that technology proffers many of the solutions to the challenges faced by airports and airlines in their attempts to prevent the next terrorist outrage. Against this backdrop Philip Baum looks at a few of the solutions currently available which, whilst not widely deployed yet, may form part of the aviation security system of the future.

Passenger screening is often perceived as the primary security activity at an airport, so any review of emerging technologies would be incomplete without reference to a few of the solutions available to screen people and their baggage.

Whilst the debate rages on about the deployment (or not) of advanced imaging technology, most states are only considering millimetre wave or backscatter X-ray as a solution, even though the detection capabilities and image quality of transmission X-ray products is far better. Sensationalist media campaigns have been 'successful' in preventing the deployment of the most effective passenger screening technologies, thereby limiting our ability to prevent the next terrorist attack.

Yet there are solutions which do not rely on ionising radiation. Animals have long been regarded as an effective means of sniffing out explosives or narcotics, but many argue that they tire easily and one can never really tell when they are actually working due to an absence of an on/off switch! Canine units are often called in by bomb squads in response to an incident and, in this journal, we have previously reviewed the even greater capabilities of the likes of pigs and African pouched rats. But converting animals into a technology is the real challenge.

Aeroflot have managed to establish the linkage by capturing air samples using a product known as 'The Bee' and presenting it for analysis by their highly trained Sulimov jackal dogs. And, speaking of bees, Inscentinel in the UK has long been researching and testing a hand-held detector laden with individually trained bees who become excited when exposed to a certain scent. Yet, in this vein, one product which hit the headlines in the last year is the BioExplorer.

BioExplorer

BioExplorers Ltd. is an Israeli company, and a member of the Tamar Group, which has developed a revolutionary method for detecting illegal and hazardous materials. The method is based on using mice, which have excellent olfactory abilities and an exceptionally high level of sensitivity – qualities that allow them to detect the vapour of numerous materials and to distinguish between them.

The performance of the mice, which serve as biological detectors, has been evaluated in multiple objective tests which, the manufacturers claim, prove that the level of sensitivity in mice trained to detect a diverse range of materials exceeds the detection rates of technologies presently in use, and is even higher than that of trained canines. While existing detection methods are based on recognising particle level traces

> "…the level of sensitivity in mice trained to detect a diverse range of materials exceeds the detection rates of technologies presently in use…"

of illegal substances (solids and liquids), BioExplorers' biological detectors can detect these substances in even smaller concentrations (vapour/gas).

The first product developed by BioExplorers is a walk-through portal that detects explosives concealed on a person's body. The system has succeeded in detecting explosive materials that other technological systems were unable to – even when they came into direct contact with the materials. BioExplorers' system allows passenger screening at a significantly greater throughput than systems currently in use. The screening method is user-friendly: passengers

Facing page and above: The BioExplorer

are not required to remove their shoes or empty their pockets; they are not exposed to radiation; and their privacy is protected throughout the process. Furthermore, this system reduces the number of security personnel needed and thus lowers screening costs, as it eliminates the need for personnel to sample articles of clothing and other items. And where are the mice? Hidden away out of sight!

BioExplorers is presently developing additional security screening systems for commercial cargo and freight, as well as for vehicles.

Qylatron

One of the most exciting products we have seen in action in the last year is the Qylatron™, manufactured by Qylur Security Systems in California.

> "…with the Qylatron™, 5,800 ft^2 of screening space can be reduced to 200 ft^2…"

Reviewed extensively in ASI last October, the Qylatron™ is the first fully automated self-service security checkpoint. The system scans bags in several seconds, but scans five bags at a time as there are five chambers in which passengers can place their own bags. The doors to each chamber are colour coded – a green door means it is open and the passenger can place their bag inside, whilst a red door shows the chamber to be occupied. The passenger scans their boarding pass, or other token, and the door of their choice (usually at their preferred height) opens. Whilst the passenger walks around the Qylatron, presumably via an archway

The Qylatron

metal detector, the bag is scanned and, at the far end of the machine, if the bag is cleared, the door turns green. If an alarm is generated, it turns purple and remains locked until a screener resolves the cause of the alarm. With the Qylatron™, 5,800 ft^2 of screening space can be reduced to 200 ft^2!

But screening passengers and their baggage is not the be all and end all of aviation security. We also need to know that those people who wish to gain access to our airside areas through staff checkpoints are who they claim to be.

Broadway 3D

Artec ID is a Russian company, with offices in Luxembourg, the US and, naturally, Russia. It consists of a team of high-calibre specialists who have been working together for more than ten years, capturing and processing 3D surfaces. Artec ID has recently unveiled a next generation biometric 3D facial recognition technology for high-traffic walk-through identification systems.

Their Broadway 3D system identifies up to 60 persons per minute using 3D facial recognition sensors, offering high-speed access and contactless technology. It offers better recognition accuracy and convenience-in-use, as well as a high-speed spoof protection.

> "…Broadway 3D system identifies up to 60 persons per minute using 3D facial recognition sensors…"

Anna Stebleva, Vice President of Business Development at Artec Group says that, "Broadway 3D can recognise differences up to a fraction of a millimetre."

The company's recognition technology is installed in Russia at Moscow's Kremlin, Sberbank - the largest bank in Russia – the storage at the Hermitage Museum in St. Petersburg, and Norilsk airport security. The company also has installed technology overseas, including at a museum in Qatar, an electronics manufacturing plant in Japan, and a commercial bank in Spain.

Vanderlande

Airports are legally bound to provide a safe and secure environment in terminal buildings for both operators and passengers. That means identifying and addressing all the possible security threats. One of these could potentially be the baggage handling system, which directly links the landside and airside areas. Despite all the security measures, there have been a few media reports of

> "…a reliable, space and cost effective way to detect human activity between bags, is using two complementary detection techniques: human body temperature and non-baggage shape…"

people – mainly children – accidentally travelling on a conveyor belt from the check-in area to the baggage hall where they were discovered, fortunately unharmed, by operators.

Vanderlande Industries has investigated the market for possible techniques to solve this potential safety and security issue. Traditional detection systems are not always able to identify security threats in real time. CCTV systems provide only passive recording capabilities, with little if any active monitoring. Motion and heat detection systems such as simple infra-red sensors are even less effective. They can easily be triggered by a suitcase that is still warm after being sealed in foil, for example, which makes them

Credit: Vanderlande

virtually useless in identifying real security threats. Even worse, the false alarms they generate consume scarce resources and divert attention. And in a world of heightened security, false alarms are worse than none at all because they can make security personnel ignore all potential threats.

Research, also based on practical experience, shows that a reliable, space and cost effective way to detect human activity between bags, is using two complementary detection techniques: human body temperature and non-baggage shape.

In practice this is achieved by a vision system comprised of an infrared and an RGB camera and special classification software. This technology results in real-time alerts with low false alarm rates. The vision system and CCTV cameras are installed over each check-in collector line, just before the landside/airside boundary. In case a possible intrusion is detected by the vision system, the baggage handling system is locally stopped, and where necessary security doors can be closed automatically to prevent further intrusion.

At the same time, the images from both the CCTV cameras are presented to an operator in the baggage control room. Based on the images, the operator can decide whether a real intrusion has actually taken place. The operator can then activate the emergency circuit of the baggage handling system to prevent persons from being injured and dispatch a search team, or, in case of a false alarm, reactivate the baggage handling system.

IntelliDAR™

Baggage systems are not the only way to access airside areas of airports. Preventing perimeter intrusion detection is still of fundamental importance and, granted the length of most airport perimeters, the ability to automate the detection of human and vehicle activity in controlled zones is essential.

Aspen-Pitkin County Airport in the US was faced with this very challenge. "Vehicle/Pedestrian deviations into the movement area by unauthorised persons has caused the FAA to require that the Aspen-Pitkin County Airport actively take steps to curtail these incursions or face regulatory action", said Jim Elwood, Airport Director, Aspen-Pitkin County Airport. They needed an intrusion detection solution for the perimeter adjoining the movement and non-movement areas of the airport and Searidge came up with the solution.
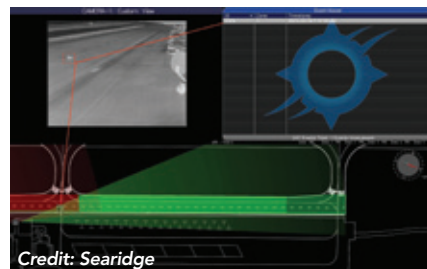
Credit: Searidge

The area adjoining the movement and non-movement areas had been identified as a hot spot for vehicle and pedestrian deviations; when a human or vehicle crosses from the non-movement area to the movement area without Air Traffic Control clearance the incident is documented as a vehicle/pedestrian deviation by the controllers in the tower. Searidge's intelligent video platform IntelliDAR™ will then automatically alert airport operations and security personnel of an intrusion or impending intrusion.

The Searidge intrusion detection solution is a scalable system that provides the security operator with features such as intrusion detection and tracking, audible and visual alerts, real-time video feeds of the target(s) detected and video archiving for incident review, investigations and training.

Panomera®

Huge areas can now be monitored with just a single camera system. One such innovative development that allows a completely 'new view' goes by the name of Panomera®, manufactured by the German company Dallmeier.

Whether on the airfield or in the hangar, the terminal buildings, car parks or access roads, a wide variety of premises must be monitored around the clock. In particular, expansive areas such as airfields are especially challenging for video surveillance. In the past, in order to adequately monitor the entire area, it was necessary to use a number of cameras installed in a whole range of locations. Lots of cameras and lots of installation sites, meaning high requirements for the infrastructure. That is one of the disadvantages. The other disadvantage is the fact that despite oodles of cameras, in most cases, a 'grand overview' is still not provided. This is because even top-notch wide-angle cameras reach their limits when they have to capture an entire airfield. And especially in situations that require zooming into the picture and recognising details at a substantial distance, even with a 12-megapixel camera the image very quickly becomes pixelly and blurry.

Panomera®, a multifocal sensor system, was specifically developed for

"…despite oodles of cameras, in most cases, a 'grand overview' is still not provided…"

Nuremberg-based Aero-Dienst is protecting its hangars with Dallmeier's Panomera® video surveillance system

the all-encompassing video surveillance of expansive areas. A huge area can be surveyed from a single location, and depending on the customer's needs, the resolution can be scaled nearly limitlessly. With Panomera®, huge widths, as well as areas with large distances, can be displayed with a completely new resolution quality. This can be done in real time and with high frame rates of up to 30 fps. In so doing, Panomera® far surpasses the conventional HD 1080p standard.

Since fewer camera installation locations are needed, the requirements for the infrastructure are lower, along with expenditures for servicing and maintenance. In any case, and in contrast to PTZ cameras, Panomera® has no movable mechanical parts, which means there is no wear, extending the camera's lifetime.

Regardless of the part of the surveillance area the operator focuses on at a particular moment, with Panomera®, the overall action is recorded at all times – with maximum resolution of detail. As a result, an incident can also be reconstructed in detail after the fact, no matter where it occurred.

Quantum Secure's SAFE for Aviation

Managing data is as important as acquiring it. Quantum Secure has released a software suite, named 'SAFE for Aviation', which is an airport physical identity and access management solution that streamlines the complete lifecycle of personnel (from recruitment to terminations) and automates related processes. SAFE for Aviation comes with pre-defined policies, workflows and procedures for issuing badge credentials and granting/revoking access to airport facilities while simplifying adherence to local regulations, audits and security directives, thus minimising insider threats and promoting greater operational security.

Quantum's solution automates processes for conducting background checks for new airport workers, obtaining security clearances for access to secured locations from the governing bodies (like the TSA in the US), creating flexible self-service access rights to allow approved parties to enrol their own employees and subcontractors and grant them physical access rights.

Quantum Secure's aviation customer base in the US includes large Category X airports, as well as mid-tier to smaller airports. Some of the recent airports taking advantage of SAFE for Aviation include Seattle/Tacoma Airport, Phoenix Sky Harbor Airport, Friedman Memorial, Atlantic City and Elmira-Corning Airports. ■