



THE ALL SEEING EYE

Karen Kingham reports on how screening is giving airport security operatives the edge

Air travel is part of the lifeblood of the global economy, facilitating access to international markets through business and tourist travel bringing in trade, revenue and investment. If air travel is the lifeblood, then airports are the nodes through which all that international traffic and revenue are directly injected into our national systems. But for all the positive things that air travel and an airport can do for a city, region and nation, all that international traffic also creates a point of

weakness in our national security systems. Daily, bad actors are looking for ways of exploiting those weaknesses, whether they are terrorists, drug dealers or smugglers.

In the eternal struggle between the forces of good and bad, technology is a key advantage that the forces of law and order have at their disposal, so in this article we will look at some of the threats and key technologies that are currently being developed and deployed to tackle them.

Since the 9/11 atrocity world-wide there have been numerous, well-publicised attempts by terrorists to

bring down aircraft, including Richard Reid, the 'shoe bomber', the 2006, plot to detonate liquid explosives carried on board and the so called 'underpants bomber' in 2009.

These attempts forced authorities to ban liquids and gels over 100ml and adding the scanning of laptops and electronic devices. These reactive measures were adopted because at the time there was no technology, other than trace, capable of detecting explosives. The authorities were also forced to adopt other passenger screening methods, introducing, sometimes controversial new technology like Advanced Imaging Technology (AIT) units or full body scanners to detect non-metallic weapons, explosives and other threats which could be concealed under layers of clothing. This increased security screening has resulted in much longer times in clearing security at our airports.

But of course, none of these increased security methods has stopped people from trying. Since then, IEDs have been intercepted concealed in baggage, printer cartridges, electronics, cargo, clothing and cosmetics. To counter this threat many countries, including the USA, are planning to replace obsolete 2D baggage scanners with 3D CTX (Computed Tomography) scanners. This new generation of scanners can produce highly detailed 3D images of the contents of carry-on baggage by applying sophisticated algorithms, which produce cross-sectional images, that when stacked form an image that can be rotated 360° and viewed, easily identifying any threat or prohibited items.

In the UK, the Government says all airports are to have the new 3D CTX scanners operational by June 2024. Major airports, London Gatwick, Heathrow and Manchester, however, are unlikely to meet this deadline.

It is estimated that through-traffic using 3D CTX scanners will halve the time passengers spend going through security without compromising on safety – as liquids and electronics can be left in passenger's hand baggage.

In April 2023 the TSA announced the award of three orders for a combined total value of up to \$1.3-billion for Computed Tomography (CT) scanners to include up to 426 base, 359 mid-size and 429 full-size units for deployment across TSA checkpoints starting Summer 2023.

Analogic Corporation will provide base-size units. IDSS Holdings will provide mid-size units. Smiths Detection Incorporated will provide full-size CT X-ray systems.

CT Scanners are not just used for carry-on baggage – checked luggage is also scanned using similar algorithms. In Australia, following a successful trial of the Smith's Detection CT-based cabin bag screening system HI-SCAN 6040 CTiX, at one checkpoint at Sydney airport they became prime contractor for an HBS (hold baggage screening) solution, including a custom-built mezzanine platform for the HI-SCAN 10080 XCT.

LEIDOS produces the eXaminer 3DX Checked Luggage Scanner – developed with the TSA and currently there are more than 1,000 units in 26 countries. Its 3-D continuous flow technology means that bags are scanned with helical CT at speeds precisely synchronised to the speed of the conveyor belt.

In December 2023, an operation that took place at 61 airports, involving Frontex, Europol, INTERPOL and law enforcement authorities from 36 countries, saw 46 arrests and a seizure of 850kg of drugs, including cannabis, cocaine, synthetic and other drugs. Intensive checks were carried out on passengers and air cargo traffic on both direct and connecting flights covering 29 European airports, as well as 32 airports in Africa and across the Americas.

In February 2024 US Customs and Border Protection officers discovered nearly 88 pounds of Hashish in checked baggage destined to Brazil at Washington Dulles International Airport.

In December 2023 Spanish Civil Guard agents arrested three people at Seville airport. Pretending

USING AI, DRUGS ARE NOT SEEN AS PART OF THE BODY AND ARE HIGHLIGHTED FOR REVIEW

to be a family travelling with a minor, the adults were all carrying drugs; One was wearing a plastic belt with about 3,000 grams of hashish acorns. Inside the suitcase a further 380 grams of acorns, purportedly extracted from a vaginal cavity once they had passed the security filter. About 300 grams of hashish acorns were hidden in a shoe. All adults were taken to hospital and scanned; each adult had ingested approximately 1kg of hashish acorns. Each acorn was about 4m in size and weighed about 10 grams.

Nobody really knows the scale of the drug traffic through airports worldwide, but investigations later discovered that this one "family" alone had made 75 flights to different European airports in one year!

Of course, the great strides made in baggage scanners have not just been beneficial in the fight against terrorism, along with established technologies like materials discrimination, that can identify organic materials, and new developments like 3D CTX scanners, Artificial Intelligence and Machine Learning technologies are set to revolutionise screening both baggage and passenger.

Currently at Schiphol Airport, the Royal Schiphol Group and security technology company Pangiam are collaborating to develop a new way to screen hand baggage safely and effectively using AI and algorithms to analyse images of hand baggage and identify prohibited items or risks. If successful, and meets all EU regulations, it could enable travellers to go through security checks faster without compromising on safety.

Schiphol is the first major European airport to support Project DARTMOUTH, a collaboration between Pangiam and Google. At its heart it is a technology platform with detection algorithms to apply state-of-the-art pattern analysis decision support tools to deliver enhanced security, and identify potential prohibited items in carry-on, checked baggage, airline cargo and shipments.

Smiths Detection manufacture iCMORE uses AI and advanced detection algorithms to reduce the burden on operators, and possible errors, by automating the detection process for suspicious items

3D CTX scanners, Artificial Intelligence and Machine Learning are set to revolutionise both baggage and passenger screening

within inspected cargo, baggage or palletted goods. It identifies potential threats and helps combat the movement of unsafe, undeclared or illegal items. iCMORE delivers a high probability of detection and low false alarm rate.

When it comes to drug mules or cavity smugglers OD Security produces the Soter RS full body scanner,

AI AND ADVANCED DETECTION ALGORITHMS REDUCE ERRORS AND THE BURDEN ON OPERATORS

already operational in several airports. Soter RS combines ultra-low radiation with maximum visibility is now equipped with the latest AI technologies in automatic contraband detection. THEIA uses complex AI software to automatically identify anomalies in scan images. It is driven by machine learning algorithms; THEIA has been trained extensively on large collections of full-body scan images, which are totally free of contraband. These scans have taught THEIA what a normal human body looks like, and what a negative scan should look like.

The contraband free images form datasets, and each dataset teaches the AI technology to immediately recognise anything that deviates from a contraband free full body scan. These deviations, also referred to as anomalies, will be found by THEIA and highlighted to the human operator. THEIA makes no distinction between the detected contraband material, its size, or the location of where it may be hidden. Not only on the human body, but also within it.

Stefan van de Veen of OD Security said: “An enormous benefit to using the machine learning and

AI algorithms that make up THEIA, is the software will continuously improve. The more data THEIA is exposed to, the more it learns, optimises and grows in accuracy – this in many ways, ‘future proofs’ contraband detection as unusual or contraband that hasn’t yet been attempted, discovered or indeed created will be found by the simple exclusion of anomalies.”

WAR ON DRUGS

Narcotics comes in many shapes, forms, and substances. Some are relatively easy to detect, others harder to distinguish from the human body, as their organic nature disguises them, for example, large quantities of drug balloons in intestines, are relatively easy for operators to detect through normal scanning, due to the density of the package and the shape, although smaller quantities can be more difficult to find. Also, organic materials like cannabis, and pills in a body cavity can be a real challenge for operators, as they too can blend in with the human body. However, with the use of AI, these items are not perceived as being naturally part of the human body and are then highlighted for an operator to review.

Among other AI technology uses in airport security is Scylla AI powered proprietary object selection and classification engine. Among its uses, detecting unattended baggage. The AI enables real-time detection of unattended baggage, a potential threat which could contain explosives or other hazards. Scylla’s AI solutions can detect objects that have not moved for a period and notify security personnel. It is even possible to trace back the person who’s left the baggage lingering.

As security threats emerge and evolve in complexity, AI will be an invaluable tool in keeping the sector on the front foot in addressing the security challenges of the future, for as fast as we develop ways to keep us safe, bad actors are searching for new ways to defeat it ●

Karen Kingham is a journalist and PR specialist who has been working in the Security and Defence sectors for over 25 years.

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