Aviation White Paper

Why you should be measuring the flow of passengers through your Airport

HUMAN
RECOGNITION SYSTEMS

Think Innovate Deliver

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Introduction

Air travel and the aviation industry are changing. Worldwide passenger numbers are predicted to double to 5.9 billion by 2030 and economic activity supported by aviation is forecast to more than triple to $6.9 trillion[i]. As airports set out their plans for expansion in order to meet rising passenger numbers and to capitalise on the growing retail opportunity this presents, competition within the industry is fierce.

Against this backdrop, passengers are becoming increasingly savvy. As well as looking for the best possible service and deals from airlines, they are looking for a faster, simpler and more personalised service from airports. With over 20 international airports in the UK alone, passengers are able to shop around and make choices about which airport best suits their needs.

This puts greater pressure on Airports to get to know their passengers and how they use their airport. It also puts pressure on Airports to deliver outstanding passenger service and a key part of this is reducing or eliminating queues.

Four often cited key objectives for modern airports are:

- Increase operational efficiencies
- Maximise retail revenues
- Improve passenger experience
- Increase security effectiveness

So, how does measuring passenger flow help an Airport achieve these four key objectives?

Why measure the flow of passengers through your airport?

For the Airport:

After entering the airport, most customers have to wait. This represents the greatest risk of negatively impacting the customer experience. In fact happy passengers spend an average 45 per cent more than unhappy passengers in airport retail areas[ii].

The basic requirements for happy travellers are Speed of baggage delivery, ease of check-in, comfort in airport terminals, and the amount of time required for security check[iii]. These procedures can make or break a passenger's experience with an airport, and determine how much money they spend in the retail areas.

What is more, by ensuring the efficient flow of passengers through your airport, you increase the dwell time of the passengers in the retail areas increasing revenues further and make it more likely that these passengers will choose your airport for their future trips and airlines will maintain their routes at your airport.

Measuring passenger flow has a far reaching impact on your retail operations. Not only does it allow you to increase retail revenues, but you can also track how passengers move through retail areas and use this to optimise signage, locations and products. By using the information gained through tracking the passenger flow through key parts of your retail areas allows you adjust shop rental values.

By measuring the flow of passengers you can optimise your staff by using alerts if set thresholds are exceeded thereby quickly identify potential bottlenecks. This allows the allocation of staff to problem areas to remove queues and creates operational efficiencies.

Staff optimisation is about ensuring that the right amount of staff is in the right place, at the right time in order to achieve the correct staff to customer ratio and prevent bottlenecks from forming.

These efficiencies can be extended further by easily and quickly accessing historical statistically reliable performance data to enable better forward planning decisions creating an improved customer service. This allows you to eliminate bottlenecks through knowledge and forecasting based on predictability.

Tracking the flow of passengers also allow airports to prove adherence to KPIs and SLAs with regulatory authorities, airlines and handling agents.

For the passengers:

Passenger flow systems must provide live automated wait time information for passengers, as it is essential to enable passengers to select their optimum route through the airport. Without such information passengers tend to join the back of queues without checking or even realising that there are alternative routes.

Minimizing queues and optimising a passengers journey, is key to airports in creating a quick, hassle and stress-free journey through the airport. This creates happier passengers with a higher propensity for retail spend and higher propensity to return to the airport for their next journey.

How can you measure passenger flow?

There are a number of ways to measure the flow of passengers through your airport:

Device Tracking

Device tracking via Bluetooth, GSM and/or WiFi tracking can be used to measure passenger flow. It works in the following way:

- Several strategically placed receivers can cover a large area and track the positions of any discoverable device, recording and sending any data back to a single address.
- Each receiver acts like any regular Bluetooth, WiFi or GSM device in that it searches for every device within range.
- As a passenger enters the airport (or area for flow to be measured), the first receiver would track him for the length of the first 20 meters, the second for the next 20 meters, and so on for the length of the area.
- Raw data from multiple or various sensors is collected and transferred to a central server, which stores all aggregated data.

The system then provides reporting and analytic information on the flow of passengers through the area being measured.

Only when Wi-Fi and/or Bluetooth is switched on and the device is discoverable, are sensors are able to track the broadcasted unique ID (MAC address), making it possible to measure passenger flow through pre-defined routes

Smartphones and tablets have integrated Wi-Fi and Bluetooth so users are able to connect to Wi-Fi hotspots, hands-free headsets and so on.

Disadvantages of Bluetooth/WiFi:

One of the main disadvantages of using Bluetooth are the lower capture rates when compared to facial recognition as it requires Bluetooth or WiFi to be switched on and for the passengers to be carrying devices. It is also likely to have demographic biases as older passengers are less likely to be carrying such devices and also less likely to have Bluetooth or WiFi switched on than younger passengers.

There have also been recent privacy concerns over WiFI technology. While the collection of anonymous data through MAC addresses is legal in the UK, the practice has been described as a "grey area"[iv]. Whilst in the US, Google lost an appeal [v]of its long-running "Wi-Spy" case, in which its Street View cars slurped up data from open Wi-Fi networks.

The UK and the EU have strict laws about mining personal data using cookies, which involves effectively installing a small monitoring device on people's phones or computers, but the process of tracking MAC codes leaves no trace on individuals' handsets.

Websites or companies wanting to use cookies to tracks users' habits have to ask for permission. By monitoring MAC addresses, which just keeps a log of each time a Wi-Fi enabled device connects to another device, they can work around this requirement; however, this may change in the future.

Finally, there is an issue of delineation. Device trackers can only place a location within +/- 10m. This may not seem like much, but if the difference is between a standard lane and priority lane then it has a massive impact on your passenger flow management.

People Counters

There are a number of different technologies that are used for counting people:

- **Beam Counters:** These compact electronic traffic counters are located at entry points and emit and detect an infrared beam, counting each interruption caused when a person walks through the beam. They're more accurate than a people counting clicker and are great for basic trends retail traffic counting. The units need to be mounted opposite the supplied reflector to count.
- **Thermal Counters:** Thermal counters accurately detect people by their body heat profile and can therefore count bi-directionally even when a number of people are passing simultaneously. The solution is ideal for general people traffic counting, measuring live occupancy, queue management and a range of security applications. They are widely used to monitor footfall in the transport, banking, retail, security and leisure industries.
- **Synthetic intelligence:** Synthetic intelligence uses multiple infra-red transceivers to create a count zone at ankle height. The artificial intelligence counters evaluate the features of each event to determine the correct outcome i.e. count per direction. As a person passes the count zone a pattern is generated and the system extracts the features of the pattern based on what it has learnt to make a decision on the type of event that has occurred.
- **Video analytics:** Algorithms can calculate the number of people in a queue area with a high degree of accuracy. Using the state of art algorithms and intelligent engines video analytics provide estimated wait times to inform passengers of the optimum route through the airport.

Video analytics can also be used to detect an overcrowded environment and abnormal situation and can handle bi-directional counting.

Disadvantages of Counters:

The main issue is that accuracy is greatly reduced by the larger pedestrian flows found in airports and that queue times are derived and not measured leading to further inaccuracies. There are numerous other factors that can negatively affect beam counters, such as:

- the wider entrances typically found in airports
- inward opening doors
- Infra-red beam counters are affected negatively when subject to direct sunlight

Most basic beam sensors are limited to non-directional counts, so they do not know if a person has entered or exited an area and they struggle to discern people walking side-by-side as the beam is broken at the same time. Such counters cannot count high volume, uninterrupted traffic and have a high propensity to be blocked by people standing in an entrance or by merchandise displays. The systems also require larger, more obtrusive design than other types of sensing technology.

Thermal counters have a lower field of view than video based systems and cannot be used with ceiling heights below 2.2 metres.

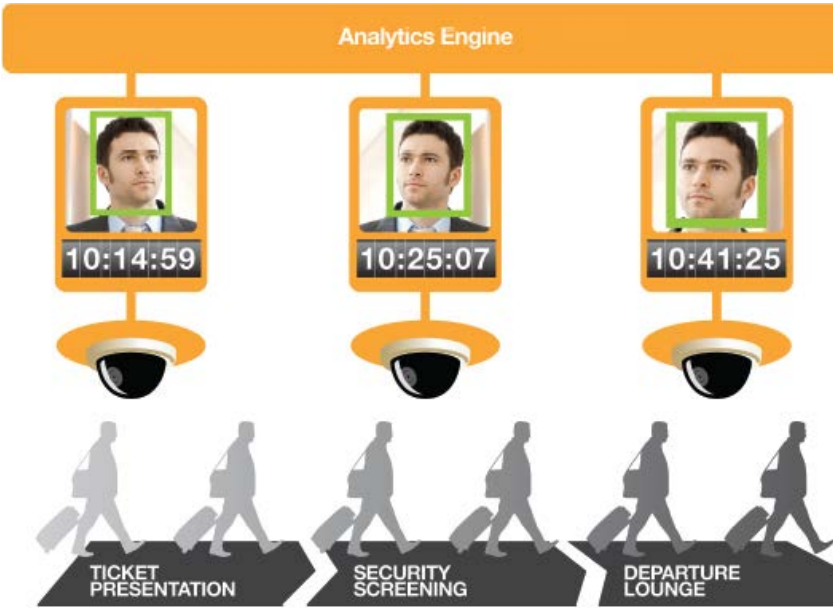
Video analytics only estimate queue times rather than giving definitive information. It also only gives number of people in an area not the travel times between key points and has a limited coverage

area, but requires continuous coverage of these areas meaning a large number of cameras is required.

Facial Recognition

How it works:

- Anonymous facial images of passengers entering a designated area are captured. Using facial recognition technology ensures the capture of the maximum number of faces.
- The anonymous images are used to track passengers through agreed way-points including check-in, security and passport control.
- The accurate time taken between way-points gives split and cumulative timings. Minimum, Maximum and statistical averages are all available
- Alerts are created if journey times are outside set goals to easily identify emerging operational issues before they impact the operation.



Why choose Facial Recognition?

Benefits of Facial Recognition

- Completely passive systems - no conscious interaction required from passengers.
- No impact on passenger journey - ensures passengers are processed quickly, enabling the maximum level of retail time, a positive customer experience, and improved customer service.
- An anonymous facial image of passengers entering a designated area is captured.
- Using facial recognition technology ensures the capture of the maximum number of faces.
- Facial photographs do not disclose information that the person does not routinely disclose to the general public.
- The photograph (facial image) is already socially and culturally accepted internationally.
- The facial image is already collected and verified routinely as part of the MRTD application form process in order to produce a passport to ICAO Document 9303 standards.
- The public are already aware of its capture and use for identity verification purposes.
- It is non-intrusive – the user does not have to touch or interact with a physical device for a substantial timeframe for the system to function.
- States can exploit a number of security benefits should they wish to do so.
- It allows capture of children's biometrics without any physical intrusion.
- For watch lists, face (photograph) is generally the only biometric available for comparison.

Our Solution - MFlow Journey

MFlow Journey enables you to maximise non-aeronautical revenues, improve customer service through reduced passenger queue times and ensure efficient staffing levels by giving you the tools to measure and manage the movement of passengers through your airport.

MFlow Journey was developed for and with airport operators to measure, manage and ultimately remove bottlenecks to optimise passenger flow.

Why choose MFlow Journey?

- Successfully deployed, proven and operational in small, medium and large airports.
- Completely passive systems - no conscious interaction required from passengers.
- No impact on passenger journey - ensures passengers are processed quickly, enabling the maximum level of retail time, a positive customer experience and improved customer service.
- Increase dwell time in retail areas by efficiently processing passengers through the airport.
- Alerts if set thresholds are exceeded. For example, email alerts if an expected queue time is exceeded, enabling a swift response to bottleneck situations.
- Advanced business rules maintain data accuracy.
- Easily and quickly accessed historical performance data to enable better forward planning decisions
- Everyone travels with their face

Graeme Agnew, Head of IT at Edinburgh Airport, explains why Scotland's busiest airport turned to passive facial recognition technology to help address growing passenger numbers and improve the passenger experience:

> At Edinburgh Airport we are always looking at how we can use cutting-edge technology to assist our operational planning and improve the customer experience; the introduction of a facial recognition solution, namely MFlow Journey[vi], will help us do both. As the system doesn't rely on people carrying Bluetooth or WiFi technology, we are able to collate highly accurate data on the movement of passengers through security screening and then make informed decisions about how we manage this area of the airport in the long term.
>
> Without doubt, biometrics is playing an ever more important role within the aviation industry. Advanced new systems are helping to improve airport safety and security as well as support new products and services which will make air travel a faster, simpler and more enjoyable experience. Following the successful implementation of MFlow Journey, we look forward to working with Human Recognition Systems to explore how biometric technology can also benefit passengers in other areas of the airport.

Summary

Technology will have a key role to play in helping industry to meet these operational challenges and increasingly it is proven biometric technologies that are providing the solutions. Identity management platforms, powered by biometrics, not only have the potential to easily handle large numbers and deliver a personalised passenger experience, but also to improve security and operational efficiency through self-service automation and introduce new lines of revenue from non-aeronautical sources. Forward-thinking airports are already using these technologies to set themselves apart and be future ready.

It's clear to see that the industry is moving towards a biometric end-to-end enabled airport – something that has the potential to make the passenger journey much simpler and more secure while also delivering huge operational efficiencies and non-aeronautical revenue opportunities for airports.

The key to success lays in collaboration between airports, their business partners and trusted technology providers so that proven solutions with commercial return through a focus on the passenger experience and differentiation at its heart. Through the increased adoption of such technologies airports will be in the best possible position to tackle the challenges of operational efficiency, growing passenger numbers and an increasingly service-conscious travelling and shopping passenger with confidence.

Returning to four most cited objectives that we outlined at the beginning of this paper, measuring passenger flow by using facial recognition technology can help your airport achieve these by:

- Improve passenger experience through a speedier and easier journey through the airport.
- Increase operational efficiencies by allowing improved staff optimisation, ensuring the correct number of staff to passenger ratios in key areas.
- Maximise retail revenues as happier passengers spend more!
- Increase security effectiveness through a smoother transition from landside to airside.

The HRS Vision for the Future of Airports

Our vision has always been to enable a fully biometric airport for passengers and workers. An airport where ID cards, tickets and even one day, passports are a thing of the past, where the processing of passengers is quick and secure through automated eGates, and operations are tracked through real-time dashboards and the personalised passenger experience returns.

This vision is well on track to be reality. Built on our existing platform of successful implementations, we provide proven technology solutions specific to the aviation sector enabling a single, seamless passenger identity across the airport footprint. This ability to know who is who will enable airports to scale in size and aspirations significantly and be the real game changer in the industry.

As a passenger, it means having your own personal journey through the airport. It means reducing time at the airport to fast track certain business travellers and providing access to additional facilities for others. This is all achieved with the comfort of knowing that security is not compromised but indeed enhanced to meet or exceed regulatory compliance and queues are minimised to ensure a great passenger experience.

This vision puts the passenger, the customer, at the heart of the operation and makes them a shared customer to be focused on and cared for by all parties at the airport – be that airlines, the airport, handlers or control authorities. We believe it is the realisation of this vision which will define the airports of the future.

References:

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