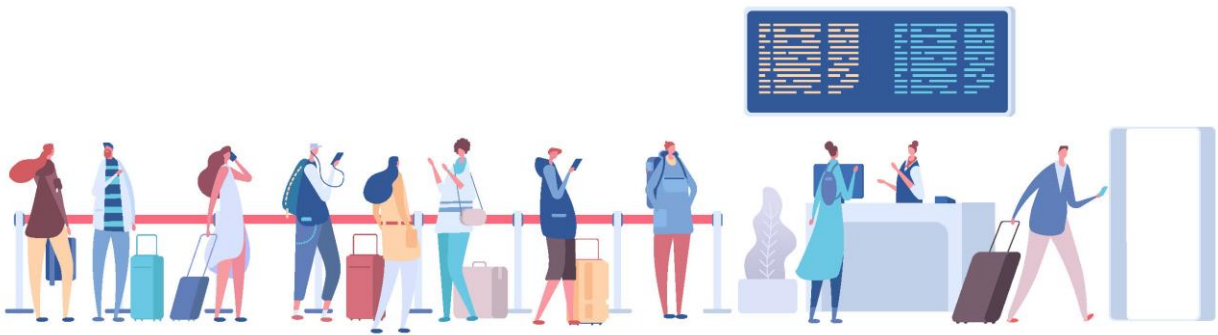# Realtime LiDAR – Based Crowd Management for Airports & Public Places

Overview

Jackson-Medgar Wiley Evers International Airport in Jackson, Mississippi, sought a way to more effectively track crows moving through specific areas of the airport, including TSA security lines and departure and arrival gates. According to Jackson's WLBT News, the airport had reported 942,375 passengers in 2018, a 3.2% increase from the previous year. Give the anticipation of continue growth, it was vital that a fully automated tracking system be installed that could reliably and accurately detect the speed with times and thus reduce passenger frustration, contributing to an overall better traveler experience. Ideally, the desired system would be both cost-effective and relatively easy to install.

Problem

The existing crowd detection system at the airport was a traditional camera-based solution did not meet these requirements. A widely-used alternative first considered by the airport was machine vision, which uses two cameras and an image sensor to process 3D images. However, machine vision still has several disadvantages. One important limitation of stereo camera systems in that they are incapable of accurately tracking individuals within crowds. In addition, the effectiveness of cameras may be negatively impacted by sun-optimal lighting conditions. Cameras also must be mounted on the ceiling, making installation difficult and, hence, significantly more expensive. Finally, the required

ceiling installation necessitates that the cameras be pointed nearly straight down, and because of this, the associated software is unable to reliably determine image depth.

More current Bluetooth Wi-Fi-based technology was also considered by airport authorities but likewise rejected as unable to meet the airport's needs. Although Bluetooth Wi-Fi systems are, unlike camera-based systems, able to track the movements of individuals throughout their journey from start to finish, the positional information accuracy of Bluetooth Wi-Fi data is marginal (i.e., around 30-40% accurate). Bluetooth Wi-Fi systems also come with significant limitations: such systems can only track the movements of individuals whose devices are always on and would count a person with multiple devices more than once. This makes Bluetooth Wi-Fi-based systems an inefficient solution for queue or crowd management. Officials of the Jackson Municipal Airport Authority concluded that they would need newer smart technology to efficiently monitor crowd flow in a manner that is both reliable and cost-effective.

Solution

Airport officials decided that Quanergy's M8™ LiDAR-based technology, used in conjunction with iinside's Motion Analytics Platform, provided far more coverage solution most suited to the airport's specific needs. Unlike stereo cameras, Quanergy's M8 3D LiDAR Sensors with AI-Powered 3D Perception software QORTEX DTC™ (Detect, Tracking, and Classification) utilizes safe, non-visible laser beams to provide real-time 3D detection and tracking of individuals and objects moving within a space.

Overcrowded Foot Traffic at TSA
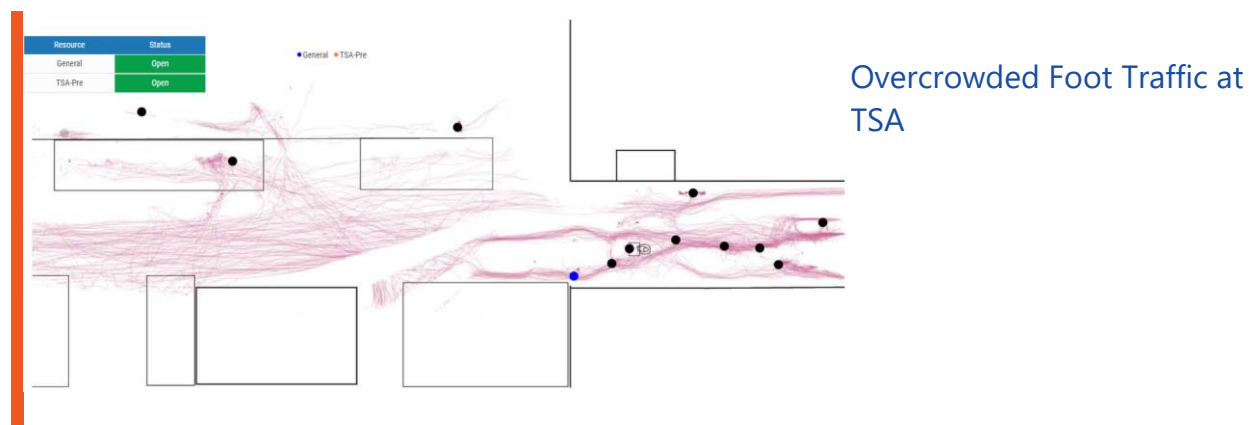
With direct line of sight, the QORTEX DTC software's multi lidar sensor capabilities even allow for tracking and detecting abilities on people around corners, and can accurately measure the traffic flow of large crowds. Moreover, the QORTEX DTC software is able to provide the required information far more accurately than either Bluetooth or Wi-Fi-based alternatives, while

safeguarding passenger identities in ways non possible with cameras. Quanergy's technology also comes at a reduced cost: Not only can M8™ LiDAR sensors be mounted in easier-to-reach locations than stereo camera (i.e., LiDAR sensors can be mounted on walls), each LiDAR sensor has a 360-degree field of view, far more coverage than a standard camera. For this reason, camera-based systems require three or ten times as many cameras as the number of M8 LiDAR sensors needed for a QORTEX DTC™ software, making installation and cabling significantly easier (and less expensive) with a LiDAR-based system.

Queue Time Status
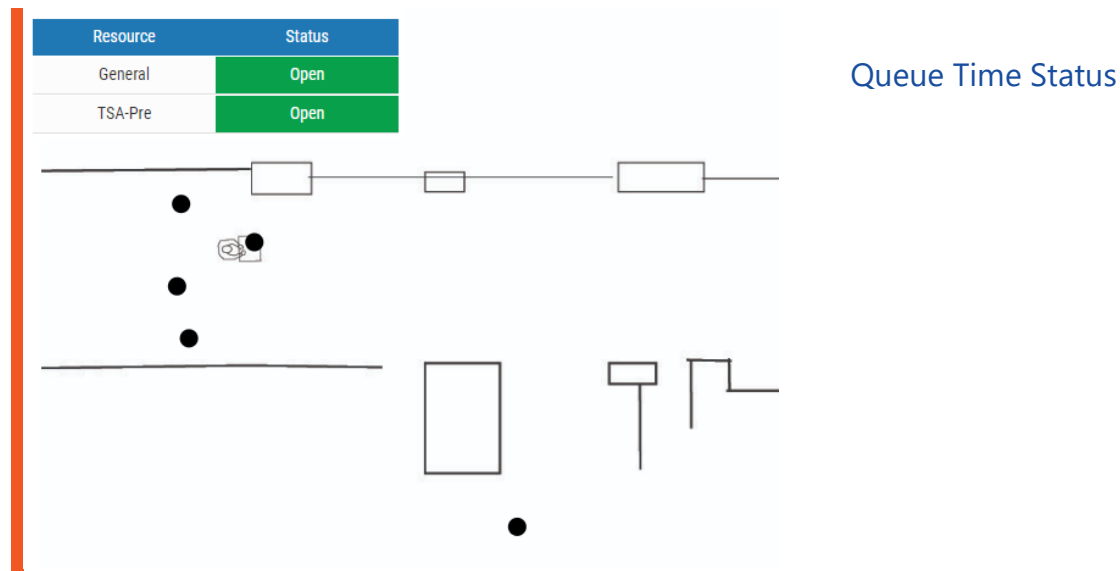
Data from the QORTEX DTC™ perception tracking software serves as input to the iinside iQueue analytics service, which then communicates wait times to travelers, allowing travelers to be continuously informed in real time of expected wait time through the airport's website and via digital on-site signage.   This information both allows travelers to plan ahead more effectively when travelling and economizes the flow of foot traffic within the airport itself, leading to shorter queue times and more satisfying passenger experience. Before installing the iQueue solution using LiDAR, it was common for the wait times reported on signage at the airport to take 15 minutes to adjust to changing crowd conditions at the security checkpoints. For example, an empty queue all at once. A person waiting in this crowd for 20+ minutes would see airport signage indicating a short wait, before entering the queue and finding a long wait instead, causing large amount of frustration and anxiety. iinside's use of Quanergy M8 sensors in the iQueue solution has corrected this ongoing issue, and now the wait times adjust to changing crowd conditions after just one minute, instead of 15.

Conclusion

The adoption of a LiDAR-based Quanergy's AI-Powered QORTEX DTC™ perception technology allowed the Jackson-Medgar Wiley Evers International Airport to utilize the most up-to-date crowd management technology available to solve the challenges posed by an increased volume of passenger traffic in the airport. The LiDAR system's relative ease of installation and reduced required number of sensors (due to grater field of coverage) made it a cost-effective alternative to stereo camera systems while also voiding some of the functional limitations of the latter systems (e.g., interference from lighting). As Perry Miller, Interim CEO of the Jackson Municipal Authority states, "Travelers will now have up-to-the-minute security wait times made available through the airport's website and on digital signage throughout the airport. It is by investing in these types of passenger enhancements that Jackson-Medgar Wiley Evers International Airport has become the airport of choice for travelers."

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