Technology Helps Combat Covid-19

CrowdVision's Quanergy-based solutions monitor social distancing

Estimation of social distancing suitable for airport, downtown plaza, shopping mall or similar spaces

LIDAR Magazine attended a webinar moderated by the organizers of the Intergeo trade show and noted how various enterprises were exploring the use of UAVs to assist in the fight against covid-19[1]. When we received a release from CrowdVision, who acquired California-based iinside earlier this year, a team that was using lidar with similar intentions, we wanted to learn more. Managing editor Stewart Walker interviewed CrowdVision's President for North America, Sam Kamel (SK).

LM: *LIDAR Magazine* is very familiar with Quanergy Systems, which is active in the geospatial world and whose lidar sensors have been successful and economical when integrated on to UAVs. We don't know so much, however, about CrowdVision. Please tell us something about the company: when, why and by whom it was founded; its leadership team; its location and the reason for it; and its funding.

SK: CrowdVision's North American operation is headquartered in Anaheim, California and is the leader in indoor motion analytics for airports and other large public venues. Its iQueue solution uses precise three-dimensional lidar data to generate business intelligence for analyzing and managing the indoor flow of people. The company's queue management solutions apply machine learning to help smart airports better manage passenger movements, reducing bottlenecks through real-time visibility and predictive analytics. CrowdVision distributes its information through its Travel Data Services API Platform, enabling a range of applications—from

continued on page 76

1 https://lidarmag.com/2020/04/18/abroad-thoughts-from-home/.

BY DR. A. STEWART WALKER

Sam Kamel, CrowdVision's President for North America

CrowdVision, *continued from page 80*
ride-share information services to travel-planning solutions—that can forecast wait times and estimate 'time-to-gate.' Using our data, airports are better serving travelers, improving passenger satisfaction and creating new revenue opportunities.

The company has a unique background. Our core group was founded in 1999 by ex-NASA scientists who were instrumental in the creation of today's GPS framework. As experts in outside and inside positioning technologies, they brought with them patents for motion detection and queuing solutions, which have provided for the foundation of CrowdVision's ability to track, monitor and provide analytical insights into pedestrian movements. After several years of supplying human flow solutions for the tourism and retail segments, CrowdVision entered the airport industry in 2013.

CrowdVision currently serves a number of major airports around the U.S., including Charlotte Douglas International Airport (CLT), Indianapolis International Airport (IND), McCarran International Airport in Las Vegas (LAS), Baltimore-Washington International Airport (BWI), Miami International Airport (MIA), Jackson-Medgar Wiley Evers International Airport in Mississippi and Phoenix Sky Harbor. TripIt, the popular online trip planning and itinerary management app owned by SAP Concur, also utilizes the CrowdVision API to issue wait-time alerts, as well as real-time queuing updates at several major U.S. airports. Based on CrowdVision data, TripIt helps travelers plan their trip and select the best departure time for the airport by letting them know projected wait times at security checkpoints.

CrowdVision North America is led by its CEO, Sam Kamel. Sam has experience as an entrepreneur, Fortune 100 executive, team builder, change agent, innovator, strategist and successful dealmaker. He has been at the center of some of the most disruptive changes in technology at companies such as Netscape, E-LOAN and Microsoft. Over the course of his career, he has raised more than $75 million in funding, overseen multiple acquisitions, and played a pivotal role in two IPO events. He has also served as a decorated officer in the U.S. Navy. He studied electrical engineering at Cornell, earned his MBA from Harvard and started his professional career at McKinsey & Company.

LM: Can you say anything about number of employees, sales, profits, etc? Does CrowdVision generate sufficient revenue from sales, or is there still venture capital involved?
SK: CrowdVision's North America team includes 30 people—a mix of cutting-edge software engineers, IoT experts, airport industry gurus, customer service maestros, data analytics scientists and overall enthusiasts for applying technology to solve real-world complex problems. The company is privately funded and does not disclose its financial information.

LM: Does CrowdVision supply products, services or both?
SK: CrowdVision delivers customers with the right mix of hardware, professional services and software that provides motion data analytics to meet their solution requirements. CrowdVision's iQueue technology utilizes a cloud-based software-as-a-service (SaaS) model to deliver action-

M8 lidar sensor without base from Quanergy Systems—the principal measurement element of CrowdVision's product line

able insights and data to venue and facility managers. Utilizing an intuitive dashboard, these venue and facility managers can monitor, identify and mitigate crowding and congestion.

iQueue utilizes lidar sensors and 3D perception software from Quanergy, a global leader in 3D lidar flow management solutions. Lidar sensors are placed throughout venues and facilities to capture the data necessary for iQueue to assess crowding and people flow.

LM: We know that several suppliers of lidars are working on people-counting and crowd-analytics, but CrowdVision's iQueue SafeDistance product is very focused on covid-19. It's gratifying to

Estimation of social distancing in downtown environment

see high-tech companies leveraging their expertise to make the return to some semblance of normal life less risky. Could you please tell us more about this new product?

SK: We recognize that the world will be a very different place once shelter-at-home mandates are lifted and public venues re-open. We wanted to do our part to help restore the public's confidence in going to the airport, a sports arena, or any other venue. When venue and facility managers have real-time crowd density information and predictive analytics, they can take immediate action to uphold proper social spacing. We also believe that making SafeDistance metrics available to the public will restore confidence in venues where indoor social distancing parameters are being properly maintained.

Built on top of CrowdVision's iQueue technology used for monitoring and analyzing passenger flows at airport security checkpoints, iQueue SafeDistance utilizes precise 3D lidar to help airport, venue and facility managers monitor and mitigate crowding and congestion, and maintain safe distancing within their venues.

Using iQueue SafeDistance, building and facility managers can access historical heat maps that highlight zones where crowd spacing falls below configurable parameters, or track real-time spacing between passengers, customers, employees or sports fans to help manage safe social distancing.

LM: You say in your press release that iQueue SafeDistance is being tried out at several large airports. How is this going?

SK: The solution is operating as a beta test in MIA, BWI, IND and CLT. It has become available only recently, so it's still too early to arrive at any conclusions worthy of sharing—but I can tell you the preliminary results are showing accurate data and good social distancing insights. Additionally, the airports and other venues are genuinely interested in the offering. They are concerned about operating their facilities safely when crowds return—and are giving careful consideration as to how to manage it all.

LM: iQueue SafeDistance is your latest offering, but it is by no means your only one. Could you please say more about your iQueue and iFlow product families and how they have evolved? How mature would you say they are?

SK: iFlow, introduced in September 2019, is a comprehensive motion analytics platform that provides airport operators valuable insights into passenger movement for improving service levels, increasing operational efficiencies and enhancing revenue. iFlow utilizes different sensor types in addition to lidar, such as Bluetooth, WiFi, infrared and other technologies.

My colleague Steve Moody, VP of Business Development for CrowdVision, put this well. "iFlow gives airports new insights they've never had before. For instance, the airport concessions director could compare a typical Delta passenger's travel habits to that of a typical Southwest or JetBlue passenger. iFlow will also offer aggregated insights into passenger dwell times, such as how long passengers spend in ticketing versus baggage claim, or versus the gate lounge—all without compromising individual passenger identities."

Initially, iFlow provides general insights into passenger movement. As CrowdVision continues to add new data sets, such as retail spending, and applies increasingly advanced analytics, the capability of iFlow scales quickly. As iFlow evolves, airport operators will be able to explore trends such as average spending habits of passengers flying to various locations or during different days of the week. For example, iFlow could help airports understand how much time passengers flying to Las Vegas spend in retail versus those flying to Des Moines or Shanghai.

LM: Please talk about Quanergy's relationship to CrowdVision and how Quanergy technology is used in iQueue SafeDistance and other CrowdVision products. How did your relationship with Quanergy begin? Is it a two-way street, i.e. your requirements influence their product development, while their new sensors and software give you ideas for new products and product improvements?
SK: CrowdVision and Quanergy have had a strong partnership for a number of years. CrowdVision started testing Quanergy's lidar technology in 2016 for the purpose of monitoring passenger movements and wait times in airport security checkpoints. We installed our first permanent solution in 2018 at LAS. We have since installed Quanergy lidar in seven additional airports. Quanergy's 3D AI-powered perception software Qortex provides the foundation for many of our analytics and applications. Our proprietary software then modifies and enhances Qortex's data to provide airport operational insights. Our software development teams work very closely in this regard.

LM: Are your products typically purchased and operated by the facilities themselves, for example airports? Or do they use sub-contractors? I'm looking for opportunities for geospatial service companies!
SK: Yes. Typically, airports purchase our solutions, which are then most frequently used by the airport and TSA. The solution can be procured either directly by the airport or through a third party. Purchasing policies differ from airport to airport, so there's no one consistent model. We welcome the chance to work with sub-contractors, value-added resellers and/or systems integrators in order to increase the speed and scope of our go-to-market plans and more rapidly bring the value of SafeDistance to more airports and other venue operators as well.

LM: Further to the role of geospatial service companies, do your products depend for their success on high-quality building models of the facilities where they are installed? Are these models usually available or are new or better ones required?
SK: No, our solution can be deployed independently of the building model.

LM: Over recent weeks I've seen a number of products, services or R&D directed at detection of covid-19 infections. For example, I recently attended a webinar where one of the speakers was from Draganfly, a UAV supplier, talking about flying drones over people to try to detect infections using a mixture of sensors and analysis to acquire heart and respiratory rates and temperature as well as body micromotions. In a recent issue of the *Photonics Media* newsletter, there is an article about how Amorph Systems and VANTIQ are working with hardware and development partners, including several camera vendors such as HikVision, to develop solutions for continuous detection and monitoring of infectious disease outbreaks inside buildings and facilities, including airports. Do you think that future products from CrowdVision could incorporate optical sensors as well as lidar?
SK: Video technology is advancing quickly and we've seen new capabilities that could potentially be brought into our product development cycle. While we are primarily focused on maximizing the utilization of lidar technology, future products could include the use of optical sensors. The potential is there, so it's something we're considering in order to better serve our customers.

LM: When the economy does restart, what do you see in the future for CrowdVision? What are you working on for 2021 and beyond?
SK: The introduction of iQueue SafeDistance opens up a range of applications outside of airports and our ability to measure and generate key performance indicators such as passenger counts, flow rates and wait times. With SafeDistance, there is an opportunity to serve stadiums, concert venues, warehouse facilities, and many more applications—in addition to airports. When the economy restarts, we expect building and facility operators to invest in technology that keeps people safe and gives them the confidence to return to work, go on vacation, go to a concert or cheer on their favorite football or soccer team. We expect that we're solving a problem that will address a global need and potentially deliver value and safety across the world.

LM: Sam, thank you very much for your time and your detailed answers to our questions. We wish you well with your short-term efforts with the pandemic, and your other solutions beyond that. As we travel through airports, we now understand the efforts being made to make the experience more pleasant.

Stewart Walker is the Managing Editor of the magazine. He holds MA, MScE and PhD degrees in geography and geomatics from the universities of Glasgow, New Brunswick and Bristol, and an MBA from Heriot-Watt. He is an ASPRS-certified photogrammetrist.