Real-Time Crowd Intelligence Elevates Operations and Experiences at the NEC

AI technology from WaitTime and Intel enhances real-time occupancy monitoring, visitor analytics and operational efficiency at the U.K.'s National Exhibition Centre.

At a glance

AI computer vision system built with WaitTime and Intel® technology empowers the National Exhibition Centre (NEC) in Birmingham, U.K., to:

- Accurately monitor real-time occupancy at large and varied events

- Automatically alert staff of capacity breaches

- Flexibly adapt the system for different event-space configurations and crowd conditions

- Provide detailed crowd analytics reports

Executive summary

The National Exhibition Centre (NEC), a premier U.K. event venue in Birmingham, collaborated with Intel and WaitTime to address the challenge of real-time occupancy monitoring across its large and dynamic event spaces. Using advanced AI technology and Intel® Xeon® Scalable processors, the NEC Group implemented a flexible crowd intelligence solution that delivers real-time occupancy data and capacity alerts, significantly improving operational efficiency and decision-making while also laying the AI-powered foundation for improving guest experiences and enhancing offerings for exhibitioners.

Challenge

As one of the U.K.'s largest event venues, the National Exhibition Centre (NEC) in Birmingham, England, hosts a wide variety of conferences, performances and exhibitions. The NEC Group operates two arenas and two conference centers with 190,000 m² (2 million sq. ft.) of floor space spanning 18 interconnected halls and 32 conference suites — plus several outdoor event spaces.

"What makes us unique is our ability to diversify so we can host many different profiles of events — from trade events to public events to arena shows to sporting events," explained Robert Bowell, IT PMO Manager at NEC Group.

NEC has always been able to track overall attendance at events. During the pandemic, the team recognized they also needed the ability to accurately monitor occupancy and manage capacity throughout their diverse event spaces in real time. Accurate insights on the location and movement of guests help them ensure the safety and security of the 3 million people who attend events at the NEC annually, increase operational efficiency and optimize guests' experiences.

The same adaptability that makes NEC so appealing as an event venue also makes building an occupancy monitoring solution challenging. Unlike locations with static entrances, exits, and spaces, such as retail environments or airports, the venue's configuration and flow of people inside the NEC can be vastly different on any given day.

"Every event is a different buildup. It could be Halls 1 to 5 one day, Halls 1, 2 and 3 another day. The capacity is different. The profile of the event is different. We had some unique requirements," Bowell said. "One day, an entrance can be an exit. One day, that entrance might not be open ... What we were looking for is to be able to count people in real time in and out of our hall space, not just based on the static walls, but also across an event."

nec
thenec.co.uk

WaitTime

> **"We are a massive venue. We attract over 3 million visitors a year. Security is a key priority for us."**
>
> — Robert Bowell, IT PMO Manager at NEC Group

NEC required a fast, flexible and intelligent solution that could accurately identify and track guests' entrance, movement, gathering and exit across an unlimited number of possible event space configurations. The solution would need to provide live occupancy data for events with over 50,000 attendees with 95%+ accuracy and immediately alert staff about capacity breaches.

Solution: AI-powered crowd insights

The NEC Group worked with Intel and Detroit, Michigan-based WaitTime to develop an AI-driven crowd intelligence solution built for its unique and dynamic requirements. WaitTime's proprietary AI technology uses Real-Time Streaming Protocol (RTSP) video feeds from Cisco Meraki smart cameras installed overhead throughout NEC facilities. The company used Intel® oneAPI to optimize heterogeneous workloads for the highest possible performance.

The company's Entry and Exit algorithm analyzes crowd behavior based on the speed and direction of each person's movement 24 times per second. The software groups various movement types into defined behavior profiles that operators can use to always identify and track visitor movement in and around the venue. All of this is accessed and managed through WaitTime's intuitive Operations Dashboard.
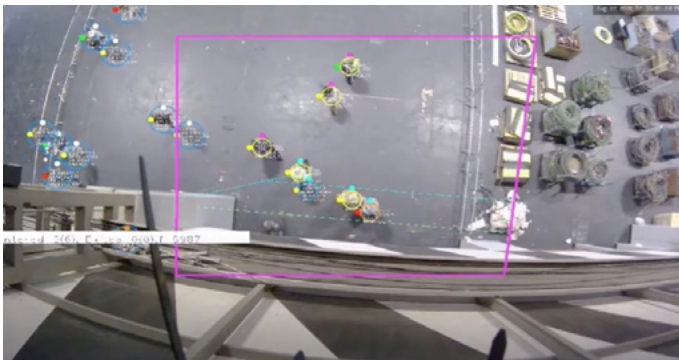
WaitTime Entry and Exit algorithm monitoring real-time occupancy with the entry/exit zone outlined in pink.

"Our system is a data stream that goes directly into the venue — untranslated," explained Zachary Klima, Founder and CEO of WaitTime. "Now what we've done is created this translation layer between the core product of WaitTime and the end user. It allows us to tell a story how they can improve their operations based on the insights that we provide them."

Using the Operations Dashboard, the NEC Group can easily define the entrances and exits in use for any given event, giving the team the flexibility to customize how the system tracks attendee behavior for different events and venue configurations.

Solution spotlight

- WaitTime Operations Dashboard provides flexible, real-time crowd monitoring and tracking
- WaitTime Analytics Dashboard offers AI-powered insights into current and historical guest activity
- 5th Generation Intel® Xeon® Scalable processors with built in AI acceleration deliver latency-free computer vision data processing and AI inferencing
- Intel® oneAPI software development platform simplifies scaling and porting of WaitTime software and optimizes heterogeneous workloads

The solution runs on servers powered by 5th Generation Intel® Xeon® Scalable processors with built-in AI acceleration. This system allows visual data processing and computer vision inferencing to occur on-site at the NEC, delivering latency-free AI performance without needing specialized hardware.

Advanced insights and analytics

The NEC Group's new occupancy monitoring solution also provides a powerful analytics platform in the WaitTime Analytics Dashboard. The Analytics Dashboard gives NEC instant insights and a wealth of valuable analytical insights derived from past guest activities and movement patterns.

"WaitTime recognized that there is a need to look more in depth at that data ... We can compare event by event, year on year, and hall by hall. We can now look at this data historically in a real-time dashboard as opposed to fixed reports, so we can make real-time operational decisions," said Bowell. "Understanding our traffic flow, knowing if we have enough catering units. Also, thinking about security, understanding how we schedule security staff. It's going to drive a lot of key decisions for us."

Results

With the occupancy monitoring system in place, the NEC Group has better-informed responses and strategies for the operations needs of different types and sizes of events. It can capture accurate crowd data for large events, receive automated capacity alerts and gain insights that allow the team to flexibly deploy the right level of resources and staff in real time.

"WaitTime does exactly what we need. It automates and integrates with our event management system so we can get real-time numbers of who's in the hall at any one time," said Bowell.

Foundation for future innovation

Not only does this solution allow the NEC to learn from past events, but it also has the team looking at what they can build upon this AI-powered foundation in the future. NEC's WaitTime system can be expanded to include additional features and capabilities, such as WaitTime's queueing algorithm, which helps minimize the time guests spend waiting in line. The WaitTime system can also integrate with the venue's digital signage or mobile app to drive smart-wayfinding features, open seat information and provide other insights that improve guest experiences.

In addition, the NEC Group can collect analytics from a wide range of crowd scenarios and offer exhibitioners and event organizers detailed attendee data reports to help inform event planning and business practices. These capabilities allow the NEC Group to empower exhibitioners with better data and the opportunity to add data-as-a-service as a new source of revenue.

"We try to accumulate as much data as possible to support our decisions as organizers. Interpreting this information enables us to both improve our shows for attendees and develop them in a way that is beneficial and profitable for all of our stakeholders, partners and customers," confirmed Chris Asselin, Co-founder and CMO at UK Metals Expo.

By optimizing its software to run on Intel® hardware, the future also looks bright for WaitTime. Plus, since they built with oneAPI, WaitTime's developers can be confident that their code will reliably port and scale across existing and future CPU, GPU and AI accelerator architectures.

> "We're excited to scale worldwide to bring our artificial intelligence everywhere. The partnership with Intel allows us to do that. It would not be possible without it. So that's what we're the most excited about, is to scale into every single country and every single large venue in the world that can benefit from WaitTime."
>
> — Zachary Klima, Founder and CEO of WaitTime

Learn more

- Learn more about WaitTime.
- Explore the capabilities of Intel® Xeon® Scalable processors.
- Scale your code with oneAPI.

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