



AI and Edge Storage: Key Ingredients for Rapidly Deploying Physical Distancing Solutions Amidst COVID-19

Micron Technology Inc, a supplier of semiconductor products, is committed to maintaining a safe and healthy workplace. The overall safety of our team members, customers, contractors, vendors and visitors is our top priority. With the global increase in novel coronavirus (COVID-19) cases, we have proactively implemented health screenings at many of our global sites. We believe the uncertainty surrounding the developing novel coronavirus situation warrants applying an abundance of caution.

As governments across the globe lift, prepare to lift, or ease restrictions on businesses with remote workers during the COVID-19 pandemic, Micron has developed return-to-work protocols to prioritize the health and safety of our team members (see [Micron COVID-19 playbook](#)). An example of one of these protocols is the deployment of a physical distancing alert/monitoring system at our Micron Semiconductor Backend (MSB) site in Singapore. This smart surveillance system helps team members follow distancing guidelines, alerts them when they violate guidelines, and helps ensure compliance with Micron's safety procedures.

In this case study, we discuss how our edge-based smart surveillance system can help physical distancing tracking.

“Edge-based smart video surveillance system deployment expedited the implementation of our physical distancing tracking system. It is an essential tool that helps provide a safe working environment for our team members as we move through the ongoing COVID-19 situation.”

*– Gianpaolo Mettifogo,
Senior Director, MSB,
Micron Technology*

Physical Distancing Compliance

A general guideline for physical distancing is six feet. This can be achieved in standard work areas by desk placement, plexiglass separators, and one-way traffic protocols. Public areas such as outdoor break zones are more difficult to manage and can pose risks, including:

- Not complying with six-foot physical distancing
- Overstaying time in managed areas
- Overcrowding in managed areas

An efficient detection and alert mechanism can help team members follow physical distancing guidelines with real-time alerts, statistics, and video footage for training and education.

One identified systematic solution is the implementation of intelligent video surveillance systems that can automatically detect physical distancing issues with real-time alert notifications.

Edge-Based Smart Video Surveillance System

An edge-based smart video surveillance system is based on a decentralized topology, which includes:

- Surveillance IP camera
 - 6 megapixel fisheye lens with embedded video analytics features (for example, behavioral detection)
 - In-camera onboard edge storage (30 days storage retention)
 - HD audio with integrated microphone and speaker
- Remote server/console for live video monitoring, recorded archive playback, and results analysis for training and policy development



Figure 1: Outdoor Break Area

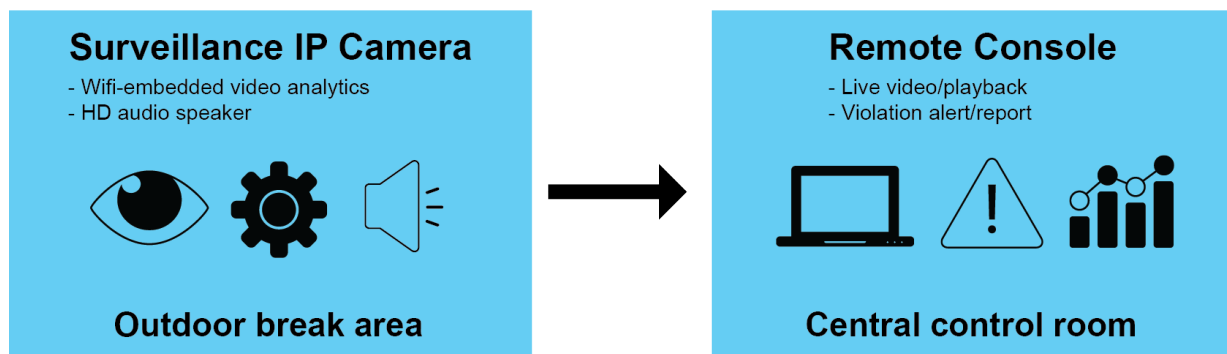


Figure 2: Deployment Scenario

The system automatically triggers an alert notification with voice message broadcasting when it detects an event such as:

- Physical distancing: A person steps into a 'restricted zone' and stays for more than a pre-defined period of time
- Overstay: A person steps into a pre-defined area (noted with marked boxes) and stays for more than a pre-defined period of time

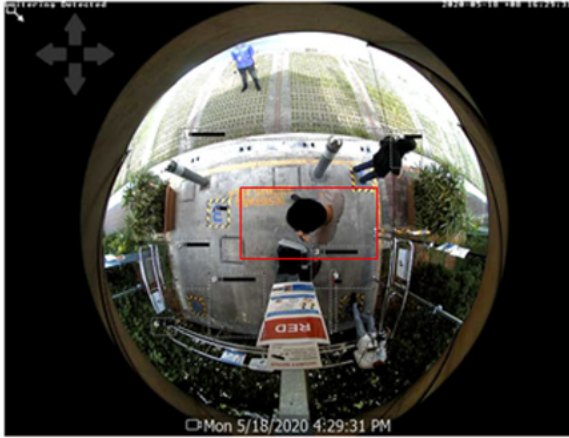


Figure 3: Physical Distance Monitoring
(Loitering in restricted zone, voice message states: "Please move to the numbered box.")



Figure 4: Overstay Monitoring
(Exceeding time limit in box 3; voice message states: "Box 03 time limit exceeded, please leave.")

In addition to real-time prevention and compliance support, advanced analytics data is used to determine high traffic flow/alert areas, times and individuals, which can be used to develop better policies, training and systems.

Why an Edge-Based Smart Video Surveillance System

"Edge-based smart video surveillance system deployment expedited the implementation of our physical distancing tracking system," said Gianpaolo Mettifogo, Senior Director, MSB, Micron Technology Inc. "It is an essential tool that helps provide a safe working environment for our team members as we move through the ongoing COVID-19 situation."

As demand for these systems tends to be urgent, the need to expedite implementation is essential. Major reasons why choosing an edge-based smart video surveillance system can increase the speed of implementation include:

- Less system integration and upgrade efforts.
Installing an IP camera with embedded video analytics compatibility doesn't require upgrades to an existing security system, which can reduce integration efforts with a faster deployment process.
- Plug-and-play scalability with simple on-boarding.
Facilities can keep adding more cameras as needed as additional parts of a facility are opened or when more facilities are opened. It's simple and faster to add more cameras and on-board them to cloud video management systems (Cloud-VMS) without any additional hardware/software integration.
- No additional storage server requirements.
Implementing onboard edge storage in an IP camera doesn't require an additional storage server, which can reduce the IT server allocation process.

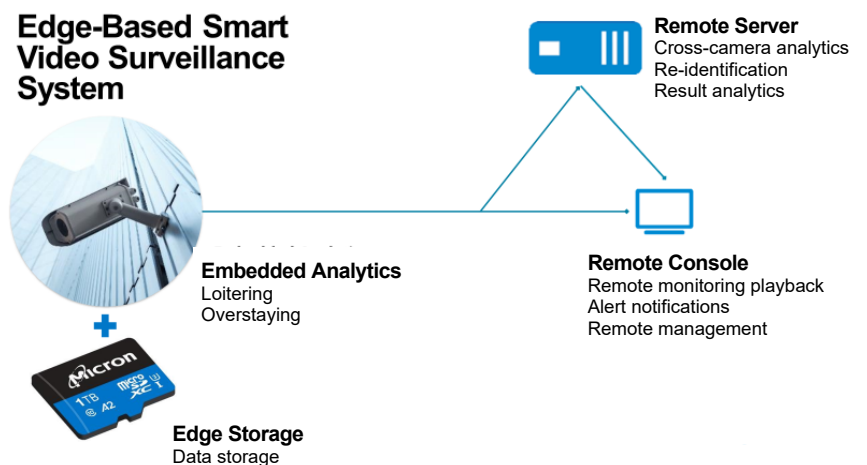


Figure 5: Edge-based Smart Video Surveillance System

microSDs for Primary Edge Storage

Because the onboard edge storage inside an IP camera becomes the primary storage in this type of edge-based smart video surveillance system, a suitable microSD card solution should be considered:

- Capacity: As the average storage capacity requirement is around 20-25GB per day¹, and the storage retention for this system needs at least 30 days, the total capacity required per camera is 600GB – 750GB.
- Endurance and performance: To reduce maintenance and decommission costs during service years and to lower TCO, a high-endurance, surveillance-optimized microSD card is essential—one which can operate 24x7 to capture essential footage.

Micron’s Industrial microSD Card for Edge-Based Smart Video Surveillance Systems

Micron’s industrial microSD cards are specifically designed for edge video surveillance workloads and features.

- Storage densities of 32GB, 64GB, 128GB, 256GB, 512GB and 1TB enable more video to be stored at the edge and increase design flexibility
- Three years of high-quality, continuous, 24x7 video recording in a wide range of temperatures and environments
- A two million hours mean-time-to-failure (MTTF) or 0.44 percent annualized failure rate (AFR), which is equal or better than most surveillance HDDs²
- Special firmware designed for continuous video recording that minimizes frame drops
- Technology for the cards to self-monitor and provide information on usage and expected useful life remaining



About Micron

We are an industry leader in innovative memory and storage solutions. Through our global brands – Micron® and Crucial® – our broad portfolio of high-performance memory and storage technologies, including DRAM, NAND, 3D XPoint™ memory and NOR, is transforming how the world uses information to enrich life *for all*. Backed by more than 40 years of technology leadership, our memory and storage solutions enable disruptive trends, including artificial intelligence, 5G, machine learning and autonomous vehicles, in key market segments like mobile, data center, client, consumer, industrial, graphics, automotive, and networking. Our common stock is traded on the Nasdaq under the MU symbol. To learn more about Micron Technology, Inc., visit micron.com.

1. Estimated recording size based on a 2 Mb/s (average bit rate) configuration for 24x7 recording.
2. Reference WD Purple drive and Seagate Skyhawk HDD specifications.

Reference herein to any specific third-party commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by Micron or the referenced customer. This case study was prepared for informational purposes only as a general account of certain assistance provided by Micron to the referenced customer. Many factors may have contributed to the results and benefits described in this case study, and Micron does not guarantee comparable results elsewhere. The information in this case study is provided "as is" and does not constitute any representation or warranty, either express or implied, by Micron or the referenced customer regarding any information, apparatus, product, or process discussed herein, or regarding the accuracy, completeness, or usefulness of any information, apparatus, product, or process discussed herein, and all such representations and warranties are hereby expressly disclaimed, including without limitation those respecting merchant ability or fitness for a particular purpose. Micron products are warranted only to meet Micron's production data sheet specifications. Micron products and specifications are subject to change without notice. Information in this case study is subject to change without notice. Any dates or timelines referenced in this case study are estimates only. ©2020 Micron Technology, Inc. All rights reserved. All information is provided on an "AS IS" basis without warranties of any kind. Micron, the Micron logo, and all other Micron trademarks are the property of Micron Technology, Inc. All other trademarks are the property of their respective owners. Rev. A 09/2020 CCM004TBD