



SMARTER TECHNOLOGY FOR ALL



Lenovo and NVIDIA AI Solution for Securing Cities

Solution using the latest AI technology for helping organizations operate safely throughout the COVID-19 pandemic.

Documented COVID-19 cases have spanned the globe, now surpassing 100 million with a death toll of over 2 million. To curb the spread, travel restrictions, closed borders, and lockdown procedures have been put in place.

Even as large-scale immunization initiatives get underway, governments and businesses worldwide are trying to get out of an extended shutdown, restart operations in offices and facilities, and people are trying to return to their (new) normal life.

Indeed, the COVID-19 pandemic has prompted the development of tools that must balance tracking and preventing the spread of the virus with privacy concerns. Many governments are making social distancing, face coverings, and contact tracing a precondition for lifting lockdowns; allowing people to return to shops, offices, and factories. These preconditions serve as a means of control to reduce the spread of infection in the community from those who have not yet developed symptoms or are asymptomatic.

In most cases, complying with this new set of rules means pursuing dramatic behavioral changes which sometimes can be troublesome and difficult to adopt. Recent advances in artificial intelligence (AI) have allowed the development of tools that can be used to ensure that new habits are created and properly followed.

Lenovo and NVIDIA have partnered with Addfor S.p.A to offer a solution using the Lenovo ThinkSystem SR670 and Lenovo ThinkSystem SE350 which interfaces with networked video systems using AI to extract data insights on indoor and outdoor spaces. Using an advanced graphical interface to explore data by time and geographical area, Addfor's crowdHedge enables public or private organizations to track metrics such as foot traffic, crowd sizes, and the percentage of people wearing masks.

Lenovo ThinkSystem SR670 rack server has a well-integrated management suite that makes it ideal as all-in-one solution nodes in distributed environments. Also, the Lenovo ThinkSystem SE350 edge server has built-in Wi-Fi connectivity enabling wireless streaming of video data directly from networked video cameras at the edge, reducing traffic load and improving performance for real-time data analysis.

As an NVIDIA Metropolis partner, Addfor S.p.A uses GPU acceleration to optimize AI run-time performance and maintain cost effectiveness of the solution. NVIDIA V100 Tensor Core and NVIDIA T4 GPUs perform video decoding and heavyweight object recognition. The GPUs provide the throughput and fast response times the scope requires. Addfor's software offering is designed for small to large-scale deployment, monitoring, and management.

Validated Architecture

Lenovo, NVIDIA and Addfor's crowdHedge solution is a system that integrates AI algorithms and analyzes real-time video streams from fixed and drone RGB cameras providing aggregate information useful for public safety and city administration. It is an integrated system that allows punctual and continuous monitoring for issues related to the control of the COVID-19 pandemic.

It includes:

- **SAFE**workspace* – checks that the prescribed personal protective equipment(PPE) is worn. Can be integrated with the access system to prevent entry for unequipped persons
- **SOCIAL**distancing – automatically calculates the distance between each person in real-time and reports any violations. Works with CCTV and drones

Add-ons:

- **FEVER**check** – secure system that automatically measures body temperature without contact and immediately dispatches a report
- **FACE**find* – verifies the user's identity through face biometrics and allows the correct authorized access. GDPR compliant and can be integrated with any existing control system
- **VISION**entry* – analyzes video streams from surveillance cameras, learning to recognize even the most difficult of conditions thanks to constant performance improvement

The system integrates information from city cameras or drone video streaming and provides real-time monitoring of some indices. These indices are calculated in real-time and can be represented over time and space on specific interactive dashboards. Aggregations or 'drill down' can be made of indexes for geographical areas and specific periods, eventually providing aggregate information useful for public safety and city administration.

The calculated indices are:

- People counting: number of people present in an area
- Density monitoring: number of people per surface unit
- Mask monitoring: percentage use of PPE (masks) within an area
- Proximity hazard: assembly risk index
- COVID-19 hazard: contagion risk index (risk of contagion based on percentage of mask usage)

* Works only with CCTV camera system.

** Works only with calibrated thermal camera in the medical range and must be performed only in very controlled conditions.

Design Components*

Edge (Drone)				
ThinkSystem SE350	M.2 1TB P4511 NVMe SED SSD	ThinkSystem 10Gb 4- port Base-T LOM	NVIDIA T4 GPU 16GB PCIe Passive GPU	Addfor's crowdHedge NVIDIA CUDA Tableau
Data Center (CCTV)				
ThinkSystem SR670	4x 3.5" 4TB 7.2K SATA 6Gb Hot Swap 512n HDD in RAID 5	ThinkSystem 10Gb 4- port Base-T LOM	NVIDIA V100 GPU 32GB PCIe Passive GPU	Addfor's crowdHedge NVIDIA CUDA Tableau
*The design components shown here are the minimum requirements for illustrative purposes. Customers have the flexibility to scale up the servers and accelerators based on their unique needs and size of the deployment. Sales representatives can discuss and address customer's unique circumstances.				

Summary

Governments all over the world are issuing a new set of regulations for co-existing with the coronavirus during the resumption of productive, commercial, and social activities. Nevertheless, the high-risk of contamination and the prediction of an even greater wave of infection requires a detailed standard operating procedure (SOP) and calibrated technological intervention to reduce risk of spread, allowing people to live and work in safe environments.

Addfor's crowdHedge system was developed and recently tested on a large scale in Turin (Italy) with the collaboration of the public administration and the local police. Currently, it is the only integrated system that allows the timely and continuous monitoring of an entire city from city surveillance and drone cameras for the issues related to the control of the COVID-19 pandemic.

It is worth noting that the system in Turin can be reconfigured at the end of the health emergency to enhance the investment, offering new tools to the city administration and private companies bringing new services to citizens or employees. Examples include safety, parking management, queue wait times and crowd data.

Resources

- [Explore the Lenovo HPC and AI Innovation and Briefing Center](#)
- [Lenovo Validated Design for AI Infrastructure on ThinkSystem Servers](#)
- [Lenovo AI Research](#)
- [Addfor S.p.A](#)