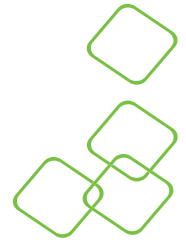


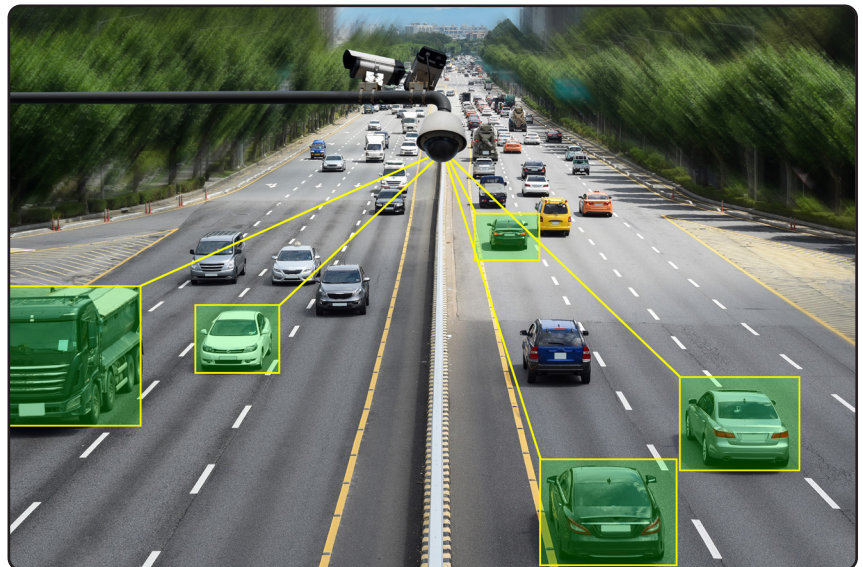
# Building a Custom, Future-Proof AI Edge Computing Solution for Smart City Applications and Roadside Infrastructure



Learn how Advantech helped a department of transportation build-up an Artificial Intelligence Edge video system for improved public safety

A U.S. department of transportation (DOT) needed help from Advantech to create a powerful and robust Artificial Intelligence (AI) Video Monitoring system to help improve road infrastructure and traffic management in its districts.

The goal of the final system was to enable safer transportation on the streets and help solve traffic congestion by tracking objects and delivering accurate actuation and data collection. Additional requirements included the ability to support 5G and smart city applications in the future as the district's needs continued to grow.



The DOT needed to find a video monitoring solution that didn't fit into the traditional method of a loop detection underground system. An underground system set-up would have cost the district exuberant construction time, along with increased expenditures and maintenance efforts.

To build up a powerful edge computing and GPU unit system for video detection, but also avoid unnecessary costs and maintenance, Advantech instead suggested an above-ground system. An above-ground system would use a video camera to process data and provide reliable, needed information to the district's traffic controller.

The collected data from video cameras and sensors would allow the district and traffic control centers to monitor and make proper decisions to help with traffic congestion, traffic flow, operational efficiency, etc. Additionally, an intelligent AI video system with edge data analytics can help provide more predictive travel time and help to effectively relieve traffic intersection issues.

## Engineering Expertise for a Custom Platform

For an intelligent video monitoring system to help support the specific needs of the district, Advantech worked with several alliance partners to shape the building blocks of a custom platform. Working with Intel and NVIDIA, the goal was to integrate an Intel X86 architecture and NVIDIA GPU system into a single platform for roadside infrastructure.

Advantech utilized its engineering expertise and custom design services to help the DOT with its solution, also leaning on design IPs and an extensive knowledge of building integrated systems, thermal engineering, QA processes, and more. With Intel supporting the edge computing system and NVIDIA supporting the edge GPU processing, Advantech engineered a complete a system design to support reliable data processing in traffic cabinets for the district.

Via Advantech's ODM design model, the complexity of the system design was addressed. The end result is a future-proof, powerful edge system to process video data, traffic data, and additional sensor information to improve traffic management, flow, and more. The edge power computing solution and GPU unit also allowed for expansion to other smart city infrastructure applications in the future.

## Advantech and NVIDIA Industrial AI IoT Solutions

[Advantech's partnership with NVIDIA](#) is taking huge steps forward in making AI a reality for transportation and smart city applications. Through close collaboration in AI product development and shared worldwide marketing programs, Advantech and NVIDIA are driving innovative transformations for AI applications.

### AI Edge and Inference Solutions

The Advantech MIC Jetson series, powered by the NVIDIA® Jetson™ platform, offers all the performance of a GPU workstation in an embedded module. MIC Jetson models are validated to ensure compatibility with Jetson and are ideal for video capture, recording, and streaming with multiple I/O support. With an AI SDK, MIC Jetson products also offer fast AI deployment with AI function block.

As GPU computing becomes more prevalent in applications of machine vision, 3D imaging, machine learning, big data analysis, and artificial intelligence, more equipment builders and system integrators need to install NVIDIA GPU cards in computers to utilize high-speed, unparalleled computing power. This is where Advantech's inference GPU system with NVIDIA Quadro comes in.

Advantech NVIDIA Quadro solutions have GPU-supported compatibility along with industrial reliability. These machines are designed to work in harsh environments with vibration, dust, high temperatures, etc. They also boast a compact size with easy maintenance.

Featuring strict validation to ensure thermal, mechanical, and electrical compatibility—plus industrial-grade anti-vibration, high temperature operation capabilities, and a modular, compact-sized design—Advantech's NVIDIA solutions are perfect hardware for smart city, transportation, logistics, and smart manufacturing applications.

## Why Edge Computing Solutions for ITS Applications?

- **Traffic flow optimization and reduced congestion.** Cities are able to see how they can perform system optimization to achieve flow planning, progress reporting, reduced environmental impacts, and more.
- **Improved transportation system operations.** System alerts, asset monitoring, and traffic flow



### MIC-720AI

AI Inference System based on NVIDIA® Jetson™ Tegra X2 256 CUDA Cores



### MIC-730AI

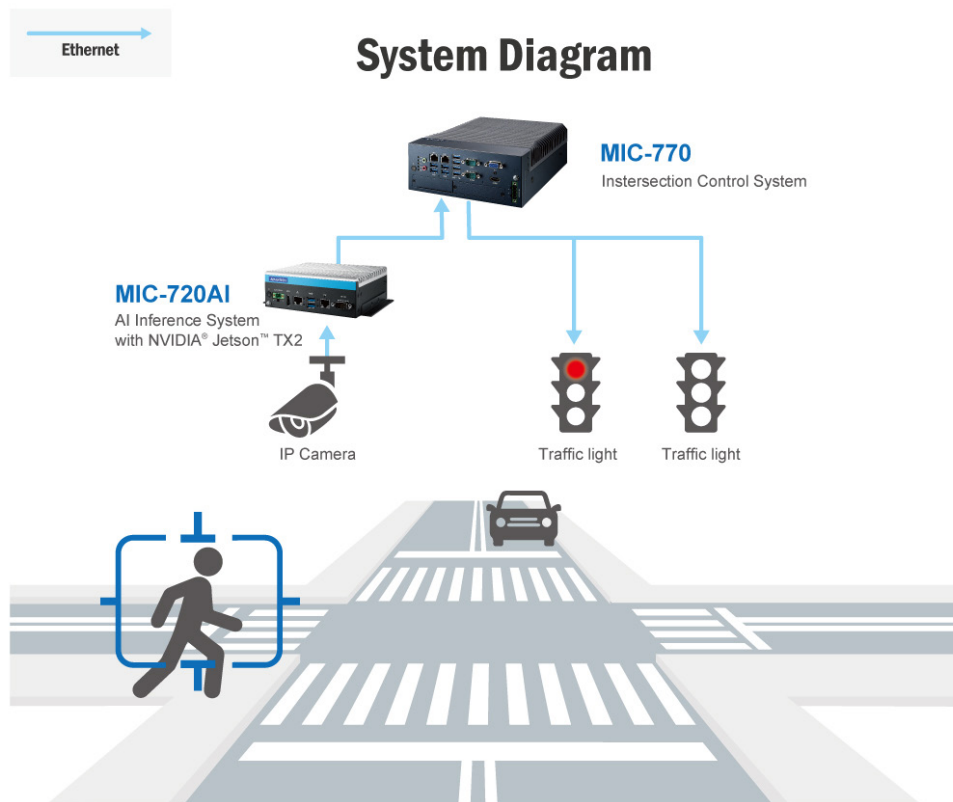
AI Inference System based on NVIDIA® Jetson™ AGX Xavier



monitoring allows cities to have proactive responses to emergencies and perform preventative maintenance on equipment.

- **Improved incident management.** Traffic incident responders need prompt incident notification with timely and accurate incident information.
- **Improved operational efficiency at intersections.** Connected intersections offer a simplified signal timing process and automated monitoring of equipment failures.
- **Adaptive responsiveness in rapidly changing traffic conditions.** ITS communication networks are the enabling technologies that allow adaptive signal control to be deployed.

## System Architecture Example: AI Image Detection at Intersection



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