intel.

Outsight, Advantech and Intel Deliver LiDAR-based Spatial Intelligence

Intel® Architecture

"LiDAR is truly a technology for these times: able to provide the spatial intelligence that is necessary to better understand high-traffic areas for better management and optimization, while delivering the utmost in privacy."

- Cédric Hutchings, co-founder and CEO, Outsight

About Outsight

Outsight's Spatial AI solution transforms raw 3D LiDAR data into actionable information providing the ability to track the motion of people and vehicles. Operators of airports and train stations, sports venues, road infrastructure, and industrial sites can access accurate and anonymous spatial intelligence insights to improve operations and increase user safety and satisfaction.

About Advantech

Advantech is the world's largest industrial PC company, offering a diverse portfolio of edge computers with high performance and rugged design. Advantech, with partners like Outsight and Intel, can enable technologies for the future of ITS, including road infrastructure, connected vehicles, and more.

LiDAR holds a lot of promise as a technology for Spatial Intelligence applications where a full 3D rendering of a facility or a space is required.

Intel is working with LiDAR-based spatial AI solution provider Outsight and edge PC manufacturer Advantech to build a LiDAR-enabled sensor fusion system offering next-level spatial intelligence services.

This solution can be used in a variety of smart transportation applications including automatic incident detection, safe distance monitoring, traffic flow measuring, vulnerable road user safety and parking occupancy monitoring (see Figure 1). In one case, a major educational institution is piloting the roadside solution for a department of transportation agency with the intention to eliminate pedestrian fatalities by improving traffic management.

Figure 1. LiDAR sensors use cases.

Companies Join Forces for LiDAR Innovation

Key components to the LiDAR system include:

Outsight's SHIFT LiDAR Software is a comprehensive spatial AI solution designed for a wide array of ITS applications. The software uses Outsight's advanced 3D LiDAR data processing techniques to provide accurate real-time tracking of vehicles and pedestrians, while ensuring the highest levels of privacy. LiDAR uses lasers to measure distances, creating 3D images known as "point clouds." Outsight SHIFT transforms this raw data into actionable insights, analyzing positions and movements of people, objects, and vehicles with precision.

Sensor Fusion is Essential

LiDAR and camera sensors bring two different and valuable inputs to spatial intelligence applications. Sensor fusion integrates both data types, and others, into an output that augments the camera data with the high resolution LiDAR data. For example, a non-moving object in a common space can be detected and counted by a spatial intelligence system relying on the accuracy of the LiDAR sensor to keep it from being double counted over time.

Intel SceneScape provides sensor fusion across a wide range of sensor data sources for spatial awareness applications and for creating and maintaining a 4D digital twin of a physical space.

Advantech MIC 770 systems are compact, fanless PCs for embedded edge applications. MIC 770s can be ordered with 8th/9th/10th/13th or 14th Gen Intel® Core™ processors. They are hardened to support of a wide range of operating temperatures. One model features IP40 weather proofing for harsh outdoor applications. The systems offer a range of networking, memory, storage and I/O options.

14th Gen Intel® Core™ Desktop Processor family features options for enhanced LiDAR, image and AI inferencing processing power via an integrated Intel® UHD Graphics 770 GPU. The iGPUs feature up to 32 graphics execution units allowing a high degree of parallelization for AI workloads, combined with built-in AI acceleration from Intel® Deep Learning Boost (Intel® DL Boost) and the Intel® Distribution of OpenVINO™ toolkit. These processors maximize CPU processing capacity and power management through a hybrid design that combines performance-cores (P-cores) and efficient-cores (E-cores).

Intel® SceneScape is multimodal scene intelligence software delivering sensor fusion to reach beyond vision-based AI to realize spatial awareness from sensor data. Intel SceneScape fuses camera and LiDAR pre-processed data to create a 4D semantic digital replica by ingesting inferenced detections from LiDAR sensors and cameras and mapping them onto an abstraction layer.

Intel® Geti computer vision AI training platform is compatible with Intel SceneScape and eases laborious data labeling, model training and optimization tasks empowering teams to produce computer vision models in a fraction of the time and with less data.

Putting the Pieces Together

LiDAR sensors and cameras are connected to the Intel Core processor-based Advantech MIC 770 PC which runs the Outsight SHIFT software. The system processes the LiDAR data using one CPU core for each LiDAR stream and another two CPU cores to integrate the streams so two LiDARs require only four cores. While LiDAR uses the CPU cores, Intel SceneScape uses the integrated GPU to perform video analytics on the camera frames and then the output from both is merged together to create a digital twin. Figure 2 shows how the system works together.
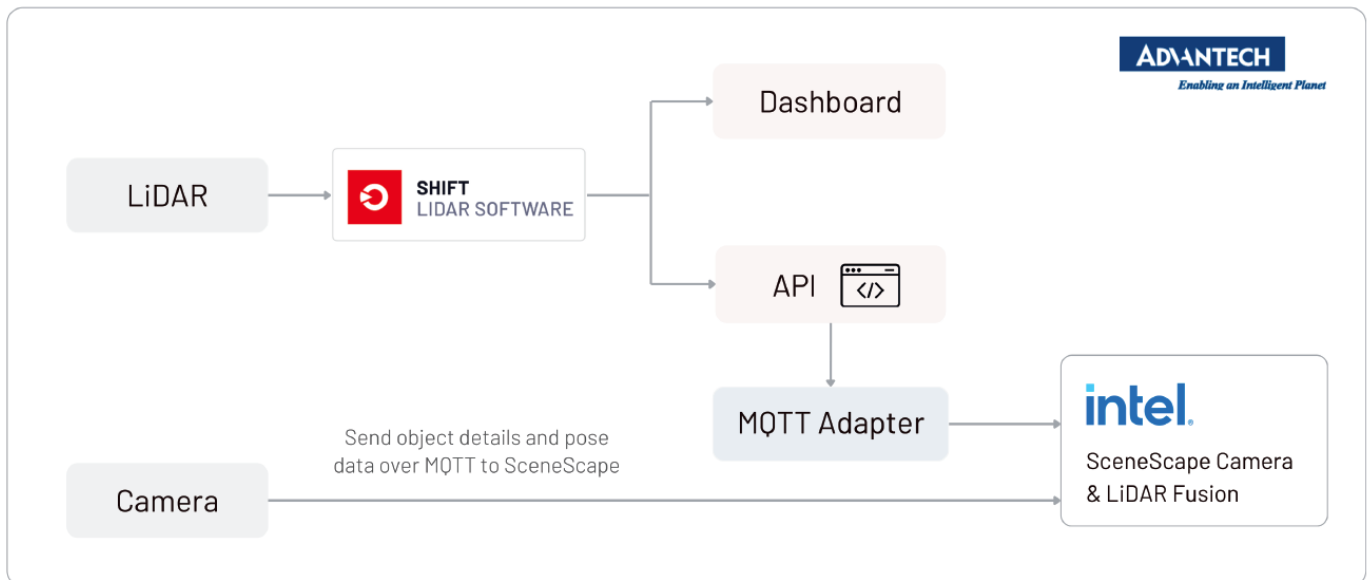

Figure 2. LiDAR system block diagram.

Learn More

Outsight Home Page

Advantech Home Page

Intel Partner Alliance

Government Community - Video & AI Cities | ISB

Via a REST API, that data is passed to a message queuing telemetry transport (MQTT) adapter that converts the data to the MQTT protocol for transport to the Intel SceneScape instance. Intel SceneScape then combines the data and outputs a 4D digital replica of the venue.

> "We're able to deliver this solution cost effectively thanks to our software that can be run on just a few CPU cores combined with the high performance hardware from our partners Advantech and Intel. Intel SceneScape, enabled by Intel Geti, opens new doors for sensor fusion applications."
>
> **- Cédric Hutchings, co-founder and CEO, Outsight**

About Intel

Intel (NASDAQ: INTC) is an industry leader that focuses on developing technologies that change the world, drive global progress, and enrich human lives. Driven by Moore's Law, Intel is dedicated to the continuous innovation of semiconductor design and manufacturing to provide customers with solutions to major challenges. By integrating intelligence with the cloud, network, edge, and various computing devices, Intel unlocks the potential of data and helps improve both business and society.