



Snowlake Delivers Millisecond-Level Edge AI Perception Powered by Zynq™ SoCs

Snowlake Built Low-Latency, High-Precision Embedded AI Perception Edge Computer, LiDAREYE™, Leveraging AMD's Zynq UltraScale+™ MPSoC

AT A GLANCE:

Founded in 2017, Shanghai Snowlake Technology Co. Ltd. is a pioneering company building specialized chips and power solutions based on heterogenous computing technology. The company focuses on multiple applications including autonomous driving, artificial intelligence services, and high-performance computing.

Industry: Artificial intelligence, HPC

Headquarters: Shanghai, China

Established: 2017

Website: www.snowlake-tech.com/lidareye



Figure 1. Snowlake's AI perception edge computer, LiDAREYE™

SUMMARY:

The combination of next-generation information technologies such as artificial intelligence and Big Data with intelligent road construction and operation will bring V2X (Vehicle to Everything) applications to highways. It is estimated that 150,000 kilometers of highways and 250,000 urban intersections in China will be transformed into intelligent and network-connected roads.

As the core sensor of V2X, LiDAR, with excellent active perceptual characteristics, is expected to realize explosive growth. But V2X applications also need high-performing roadside AI edge computers.

Focusing on LiDAR AI perception for intelligent transportation, Snowlake has launched an embedded AI perceptual edge computer named LiDAREYE™. Powered by AMD's Zynq UltraScale+ ZU7EV and Snowlake's proprietary AI hardware-acceleration engine and AI algorithm, this platform is designed for AI perceptual computing of LiDAR 3D point clouds. It can identify targets in less than 100 milliseconds, and features a variety of detection parameters such as target location, size, speed, and direction. This provides vehicles on the road with timely information about traffic conditions so they can adjust driving modes, switch lanes, and effectively avoid collisions and other traffic accidents.

To date, Snowlake has established extensive collaboration with a number of industry leaders on LiDAREYE™ deployment in intelligent transportation and Cooperative Vehicle Infrastructure System (CVIS).

CHALLENGE:

Unlike most AI edge computing applications, intelligent transportation faces its own set of unique challenges related to AI perceptual and edge computing:

- 1. The requirement of a high-precision perceptual algorithm.** Unlike products used indoors or in closed environments, automobiles have to deal with a variety of different objects on the road. They also have to deal with speed and complex climate conditions that pose a challenge to the perceptual accuracy of laser point clouds. While a 3D deep-learning algorithm can improve accuracy, the performance of the GPU architecture itself is limited; hence the processing frame rate is far from able to meet application requirements.
- 2. Low-latency requirements.** In order to enable higher-level applications such as holographic intersections, vehicle-road coordination and autonomous driving, it's often necessary to perform AI real-time processing of point clouds consisting of more than 100,000 points. The platform must ensure high-performance computing while meeting the requirements of low-latency data processing in the perceptual computing layer. This is not only a key indicator for an intelligent road edge computing solution, but also one of the main challenges faced by the design. Although GPUs can provide excellent parallel computing capability, it is inadequate for dealing with sparse point clouds.
- 3. Adverse operating environment.** In many countries, the climatic conditions of roads are often complex, which drives more stringent requirements for the reliability of computing equipment. Typically, AI computing platforms are often designed for indoor use and are less than ideal for supporting long-term operation under extensive temperature and complex climate conditions.

SOLUTION:

In order to address the above challenges, Snowlake's R&D team selected AMD's industrial-grade Zynq UltraScale+ ZU7EV MPSoC device as its core chip platform.

The highly integrated ZU7EV industrial platform is designed with a feature-rich 64-bit quad-core ARM® Cortex® processor-A53, a dual-core Cortex-R5 processing system (PS), and a AMD Programmable Logic (PL) UltraScale FPGA architecture in a single device. Leveraging the benefits of this platform, Snowlake has been able to achieve:

- **High-performance computing power.** The 3D point cloud perceptual engine of Snowlake's LiDAREYE improves accuracy by 5% compared with 2D algorithms, providing higher precision AI perception of laser point clouds.
- **Low latency.** The Zynq device's unique PL feature provides a high degree of software and hardware reconfiguration and parallel computing capabilities, supporting the full pipeline acceleration of Snowlake for pre-and post-processing of the neural network and the network itself, enabling an ultra-low latency of less than 100ms, which is ideal for the performance requirements of V2X scenarios.
- **Wide temperature ranges.** The Zynq platform supports a wide range of operating temperatures, enabling LiDAREYE to operate reliably in temperatures from -20C to 70C.

RESULT:

LiDAREYE has been adopted in prominent intelligent transportation and road coordination projects throughout China and has been highly recognized by customers for its high performance and reliability.

ADDITIONAL RESOURCES:

[Learn More About Snowlake Technology](#)

[Learn More About AMD Zynq MPSoC](#)

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