Case Study

Dairy Cow Health Monitoring

AI takes responsibility to take care of the livestock

When the livestock farming industry faces the challenge of labor shortage, it has become more difficult to focus on the health of numerous livestock, which may deteriorate profits. In recent years, farmers have turned to AI for assistance. With machine vision and AI algorithms, farmers can understand the food and water intake of livestock, monitor their behavior patterns, and predict disease outbreaks, helping to improve livestock production.

Challenges

The customer, who was a software company, was looking for an edge AI system based on the high-performance module from NVIDIA to run the AI algorithms to monitor livestock on a farm. What's more, the system must be equipped with PoE functionality to provide power for the IP camera. Also, a remote monitoring system is required to support 24/7 management.

Main Requirements

- NVIDIA® Jetson Orin™ Nano
- High AI computing performance for GPU-accelerated processing
- Supports PoE for camera
- Supports 24/7 secure remote monitoring

The lightweight compact edge AI system for taking care of livestock

Axiomtek has proposed its edge AI system, the AIE100-ONA, bringing advanced AI capabilities to the livestock farming industry. The AIE100-ONA is based on the NVIDIA® Jetson Orin™ Nano SoM which features the 6-core NVIDIA ARM® Cortex A78AE v8.2 64-bit CPU delivering up to 40 TOPS of accelerated AI computing performance and integrates an advanced 1024-core NVIDIA Ampere GPU with 32 Tensor Cores.

The AIE100-ONA is a compact, lightweight system that

can be installed in limited spaces. In addition to fanless operation, it offers an optional waterproof IP42-rated cover kit for enhanced protection in semi-outdoor environments. To help customers to simplify the integration with the IP cameras or sensors, the AIE100-ONX offers one 15W GbE PoE port for intelligent video analytics deployment. When wireless is needed, we provide LTE and Wi-Fi modules for the full-size PCI Express Mini Card slot. For storage, it has one M.2 Key M slot for NVMe SSD. In addition, the AIE100-ONA supports device monitoring and management services, bringing comprehensive remote management onto edge AI devices.

Application
Artificial Intelligence monitors the behavior and health status of dairy cows

The AIE100-ONA system has been deployed on a dairy farm, revolutionizing traditional farming practices through cutting-edge features tailored for cow management. Operating within a semi-outdoor and humid environment, the system boasts an IP42 rating, ensuring its operation. The edge AI system is also capable of operating over a wide temperature range of -25°C to +50°C.

At the core of the system's capabilities is an advanced AI-driven cow face recognition algorithm. By analyzing distinct patterns and features, the system accurately identifies individual dairy cows. This enables detailed behavior monitoring, providing valuable insights into the cows' activity and diet for detailed analysis to ensure health and productivity.

The system's Wi-Fi connectivity facilitates the transmission of real-time images and analysis to central monitoring stations and personal devices. This seamless sharing of information ensures that farmers can monitor cow behavior and conditions remotely, enabling well-informed decision-making. In instances of health issues or insufficient food and water consumption, the system's automated alerts promptly notify farmers in real-time. This immediate feedback enables rapid intervention and care, mitigating potential health risks and optimizing milk production. This technology empowers farmers with 24-hour remote management capabilities, eliminating the need for a physical presence on the farm while maintaining oversight of critical information.

The AIE100-ONA system redefines dairy farming by fusing AI-driven cattle recognition, health analysis, and remote management capabilities. It empowers farmers to proactively manage their herd's well-being and productivity while harnessing the advantages of technology in a challenging application.

System Configurations of the AIE100-ONA

- NVIDIA® Jetson Orin™ Nano, up to 1024-core NVIDIA Ampere GPU
- 8GB 128-bit LPDDR5 onboard
- One USB 3.2 Gen2, One USB 2.0
- M.2 Key M 2280 with PCIe x4 NVMe SSD slot
- Full-size PCI Express Mini Card slot
- One 15W GbE PoE for camera
- One 10/100/1000 Mbps Ethernet
- Wide operating temperature from -20°C to +50°C
- One HDMI 1.4 with 4K2K supported
- Supports 24/7 secure remote monitoring

Why Axiomtek

Today, machine learning and artificial intelligence are being used to revolutionize the way livestock are managed and monitored. As a member of the NVIDIA Preferred Partner, Axiomtek has been in close collaboration with NVIDIA and delivers a full portfolio of GPU-optimized hardware platforms built around NVIDIA® Jetson modules to help customers drive AI innovation at the edge.

About Axiomtek Co., Ltd.

Axiomtek has experienced extraordinary growth in the past 30 years because of our people, our years of learning which resulted in our tremendous industry experience, and our desire to deliver well-rounded, easy-to-integrate solutions to our customers. These factors have influenced us to invest in a growing team of engineers including software, hardware, firmware, and application engineers. For the next few decades, our success will be determined by our ability to lead with unique technologies for AIoT and serve our key markets with innovatively-designed solution packages of hardware and software – coupled with unmatched engineering and value-added services that will help lessen the challenges faced by our systems integrator, OEM and ODM customers and prospects alike. We will continue to enlist more technology partners and increase collaborations with our growing ecosystem who are leaders in their fields. With such alliances, we will create synergy and better deliver solutions, value, and the expertise our customers need.