Case Study

Intel® Xeon® Processors

Arduino, Amazon, and Intel Enable Cost-Effective, Turnkey AI Solutions from the Edge to the Cloud

Arduino devices, Amazon EC2 instances, and Intel® Xeon® processors with AI acceleration make deploying edge-based Machine Learning models easier for rapid ROI.

Solution Summary

- Intel® Xeon®processors
- Intel® Distribution of OpenVINO™ toolkit
- Amazon EC2 instances

Executive Summary

Increasingly, businesses in fields like manufacturing, retail, agriculture, and telecommunications need reliable and efficient ways to capture and interpret business-critical data seamlessly from the edge to the cloud to save time, money and resources. Arduino's PRO device line provides businesses a secure way to quickly connect remote sensors to business logic within one IoT application development platform. The Arduino Cloud runs atop Amazon EC2 instances featuring Intel® Xeon® processors with integrated AI accelerators and features that speed AI workloads. Software developers building edge solutions benefit from the Intel® Distribution of OpenVINO™ toolkit, which provides ready-made models to reduce training time. Combining all these elements helps customers create and operate end-to-end systems more efficiently while saving time, money, and resources.

Challenge

Edge-based AI computing scenarios come with inherent complexities. Edge devices need a high-efficiency footprint to gather data and run AI models. However, demanding training, inference, and modeling workloads often exceed the devices' lightweight design specifications. They need the augmented scale and performance cloud solutions offer. Secondly, models must be able to run locally and without interruption, even when network connectivity with devices lapses. In a vehicle factory, for example, computer vision systems and other devices must be

Arduino hardware devices can detect wind, moisture and other environmental parameters throughout its crop-growing fields. After machine learning processes the resulting data, farmers gain better insight into hydration or electricity requirements.

"always on" to identify potential manufacturing defects along the assembly line, and networking lag must not impede those mission-critical operations. Networking protocol matters, too. For fast, high-definition video capture, a camera may benefit from a wired ethernet connection rather than Wi-Fi, Bluetooth, or 5G. Software development represents another potential challenge since devices and the code running on them must integrate seamlessly with cloud solutions.

> "In our collaboration with Intel and Amazon, Arduino recognizes the pivotal role that AI business solutions play. Together, we provide a seamless and highly customizable AI solution that operates at the edge, ensuring quick deployment and delivering customers a swift return on their investment. We are enabling cost-effective, turnkey AI solutions that span from the edge to the cloud"
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> *– Guneet Bedi, SVP & General Manager at Arduino*

Solution

Arduino designs and builds ruggedized, validated, low-power IoT devices for edge use cases. Customers can purchase Arduino devices at very affordable ranges in the sub $100 range and combine a few—or thousands of them—to bring the power of AI to the edge. The devices feature limited onboard computing power to assist with data collection and running machine learning (ML) models. So, Arduino complements its devices' capabilities with the Arduino Cloud for compute-intensive tasks like training, inference, and advanced modeling. By hosting the Arduino Cloud atop AWS EC2 instances supported by Intel Xeon processors, customers can access a seamless edge-to-cloud solution that offers exceptional scale, solid security features, and excellent performance for AI optimization. Plus, with the aid of the Intel® Distribution of OpenVINO™ toolkit, developers coding for edge-based use cases can use pre-published models to make their jobs more manageable.

Results

While Arduino's turnkey solutions serve many different types of companies, each business can realize rapid ROI from them. For example, an agricultural business installed many Arduino based hardware devices that can detect wind, moisture and other environmental parameters throughout its crop-growing fields; and enable use cases like Precision Irrigation. After machine learning processed the resulting data, farmers gained better insight into how much water was necessary for the highest crop yield without overspending on hydration or the electricity required to run pumps. Arduino devices can also help perform preventative and predictive maintenance in a manufacturing plant. For example, Arduino Opta, an open Micro Programmable Logic Controller (PLC), coupled with either Arduino Smart Sensors (vision, acoustics, sensing) as well as third party smart sensors or cameras detect unexpected behavior in an industrial lathe. In that case, ML systems can message maintenance personnel to schedule repairs and avoid unplanned and costly downtime that impacts production.

Key Takeaways

- Arduino devices with onboard processing power plus robust cloud services provide a "best of both worlds" environment for model training and deployment.
- Consider creating a proof-of-concept edge AI solution with a few inexpensive devices and scale up as needed.
- Embrace OpenVINO to accelerate development through pre-tested models.

For More Information

Explore Intel Xeon Processors.

Learn about Edge Computing.

Read more about the Intel Distribution of the OpenVINO toolkit.

Explore Amazon EC2 instances.

Find out more about Arduino PRO devices.

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