



Case Study

Smart Nuts Sorting Machine

The repetitive work of picking out nuts is facing labor challenges and is suitable for AI

Nuts are nutrient-dense and create great economic value. But to maintain high quality, the food processing factories must rely on a great number of experienced workers to sort and filter the nuts. However, workers with abundant experience are scarce and aging. The factories are short-handed but if they turn to less-experienced workers, the performance may not meet the expectation and level up the overall cost. Therefore, the factories need to rely on systems with Artificial Intelligence (AI) to ensure quality and speed up the work.

Challenges

The customer, Cam2vision was looking for a small form factor 3.5" embedded SBC to build its intelligent sorting solution to improve nuts quality control. The industrial motherboard requires a powerful CPU to ensure smooth operation with its intelligent sorting software. A wide-range operating temperature design is also necessary for a variety of harsh environments. To complete the visual inspection, the single board computer needs at least two LAN ports to connect two cameras.

Main Requirements

- 3.5-inch embedded motherboard
- High performance yet low power CPU
- Wide-range operating temperature design for harsh environments
- Fanless operation and rugged design
- Multiple LAN ports for cameras

About Cam2vision

Cam2vision, located in Oman, has been an expert in image processing and computer vision fields for over 15 years. It has provided intelligent sorting solutions associated with powerful image processing engines and algorithms.

[Visit the Website](#)

The low-power embedded board runs the AI algorithm for efficient sorting

Axiomtek has proposed its CAPA311, a 3.5-inch embedded SBC featuring the onboard quad-core Intel Atom® x5-E3940 processor (codename: Apollo Lake). The fanless small form factor embedded board is highly reliable with an extended operating temperature range of -40°C to +80°C.



The low power embedded board provides rich I/O including two USB 2.0 and four USB 3.0; there are two LAN ports and four COM ports, with two RS-232/422/485 and two RS-232. The display interface consists of one HDMI and one LVDS, while VGA and eDP are optional. In addition, it features two PCI Express Mini Card slots for various peripheral modules such as Wi-Fi, 3G, and 4G LTE.

Application

AI vision in sorting resolves the labor shortage and inexperience issues

Sorting and filtering nuts are highly repetitive work, and it is what artificial intelligence is excelled in; it can process workloads of a high volume of data and repeat it in a split of seconds. Cam2vision has utilized Axiomtek's CAPA311 to analyze product quality with its intelligent sorting software. With a powerful image processing engine and AI algorithms, it ensures nuts quality and improves production efficiency.

To train the AI model, tens of thousands of pictures were uploaded to classify the nuts. Once the AI is deployed, it will not only save labor costs but also improve product quality. The factories do not need to worry about labor shortages either. Most importantly, the precision of the AI model can be continuously enhanced by training.



System Configurations of the CAPA311

- Intel Atom® x5-E3940 processor (Code name: Apollo Lake)
- 8GB DDR3L memory onboard
- 2 USB 2.0 and 4 USB 3.0
- 2 full-size PCI Express Mini Card slots
- High-resolution HD support for display interfaces: HDMI, LVDS, VGA (optional), and eDP (optional)
- Wide operating temperature range from -40°C to +80°C
- +12V DC power input with AT auto power on function

*For detailed specifications, please visit www.axiomtek.com or go to Products > Boards & Modules > Industrial and Embedded Boards for > [3.5-inch Embedded Boards](#) for [CAPA311](#)

Why Axiomtek

The nuts sorting machine helps end users maintain high quality and accelerate the sorting process. Axiomtek not only provides all-around services but also a variety of single-board computers with different configurations for customers to develop the systems.

“With Axiomtek’s fast-response services and extraordinary product expertise, we came out with our intelligent sorting solution on time that meets the delivery schedule of our end customer. Axiomtek’s small form factor CAPA311 comes with lower power consumption, fanless operation, high network connectivity, stunning graphical performance, and abundant I/O connectivity also help us stand out from the competitors,” said Hannah.Sa, sales manager of Cam2Vision.

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.

Axiomtek is a Member of the Intel IoT® Solutions Alliance. A global ecosystem of more than 800 industry leaders, the Alliance offers its members unique access to Intel technology, expertise, and go-to-market support—accelerating the deployment of best-in-class solutions.