White Paper

Intel® Core™ Processors
Intel® Distribution of OpenVINO™ Toolkit

Intel® Architecture-Based WINTEC Smart Self-Checkout Kiosk: Enabling Loss Prevention and Food Identification to Accelerate Transformation of Self-Service

Overview

As industry competition intensifies and consumer demand for higher efficiency and better experience grows, self-checkout has become a key driver of change in payment methods across sectors like retail and restaurant businesses. Enabled by devices like self-checkout terminals and kiosks, this technology automatically calculates prices and allows consumers to pay using self-service methods, such as QR code scanning. While self-checkout reduces labor costs and shortens checkout lines, it also brings challenges, including increased theft, loss, and pricing errors, etc.

To help retail and restaurant businesses implement self-checkout, WINTEC has launched Intel® architecture-based smart retail and group meal self-checkout kiosks. Equipped with the 12th Gen Intel® Core™ processors and optimized with the Intel® Distribution of OpenVINO™ Toolkit, these terminals enable secure and efficient self-checkout with accelerated image recognition model inference. In retail, WINTEC's smart retail kiosks help identify anomalies during checkout, ensuring timely loss prevention. In food service, its smart group meal kiosks enable accurate food identification, speeding up checkout while cutting labor costs.

Challenges

With the growing adoption of self-checkout by consumers, an increasing number of retail stores and supermarkets are opting for self-checkout terminals over traditional cashiers. These terminals significantly reduce cashier workloads and labor costs while optimizing cashier allocation and improving checkout efficiency – even enabling 24/7 operation in convenience stores. This trend has been further accelerated by the shift toward contactless shopping following the outbreak of the COVID-19. Data shows that by 2024, the vending machine market in China is expected to exceed 100 billion yuan, and by 2025, the global vending machine market will surpass 20 billion US dollars[1].

However, challenges such as theft, loss, and item identification issues in retail, group meal, and other industries are hindering the continued growth of this trend.

- **Retail Industry: Significant Costs from Rising Theft and Loss Issues**

  In retail, theft and loss management has become less stringent with the shift from manual cashiers to self-service machines. Studies show that in the UK, incidents of theft and loss are far more prevalent in self-checkout settings than in manual ones, and the situation is even worse in the US, resulting in substantial losses for retailers. The more often self-checkout terminals are used, the more acute these challenges become.

  As a traditional countermeasure, monitoring and verification by staff at self-checkout areas prove inefficient and ineffective, as one person can only handle so many devices and customers. However, hiring additional staff to improve the situation would negate the cost savings from self-checkout.

  Furthermore, issues such as misunderstandings about payment methods can lead to conflicts between staff and consumers, compromising the user experience.

[1] Data Source: Industry Research Institute of Zero Power Intelligence Group, *Research and Competitive Forecast Report China Unmanned Retail Self-Service Terminal Equipment Industry Market (2024-2029)*.

- **Restaurant Industry: Challenges in Self-Checkout Due to Poor Food Identification in Group Meal Scenarios**

  In group meal settings like company cafeterias or school canteens, service providers may use checkout terminals for automatic weighing and checkout, thereby improving efficiency and lowering labor costs. However, this typically works only for food with standardized pricing (e.g., based on weight). For multi-category food with varying pricing, traditional terminals struggle to provide accurate calculations without manual intervention.

  As a solution, some restaurant providers implement multiple checkout channels or rely on manual monitoring of self-checkout, which adds to system complexity and reduces consumer acceptance, ultimately affecting user experience.

Solution: Intel® Architecture-Based WINTEC Smart Self-Checkout Kiosk

To help retail and restaurant businesses implement self-checkout, WINTEC has launched the Intel® architecture-based smart self-checkout kiosk. Its various image recognition algorithms enable rapid item identifications, smart pricing, and self-checkout. Other features include anomaly detection and health management, providing diverse industry applications.

Powered by the 12th Gen Intel® Core™ processors, built on the Intel 7 process, the kiosk not only delivers powerful general-purpose computing and AI acceleration capabilities, but also excels in security, reliability, multi-OS support, low power consumption, and simplified thermal design. The processor features a hybrid architecture with Performance-cores (P-cores) and Efficient-cores (E-cores), ensuring a balanced use of computational resources.

To further enhance the inference efficiency of image recognition algorithms, WINTEC also optimizes inference performance using the OpenVINO™ Toolkit, a comprehensive toolkit from Intel designed to accelerate high-performance computer vision and diversify deep learning applications. It boasts three key features: high-performance deep learning inference, an easy-to-use, streamlined development process, and the ability to write once and deploy anywhere. It offers hundreds of free pre-trained neural network models and reference code, supporting model quantization and tuning to accelerate deep learning inference.

To meet the needs of retail self-checkout and group meal scenarios, the following two products are available.

Smart Retail Self-Checkout Kiosk

Fig.1 WINTEC Smart Retail Self-Checkout Kiosk

In addition to supporting consumer self-checkout, the WINTEC Smart Retail Self-Checkout Kiosk also records and analyzes checkout processes to detect anomalies, comparing scanned items with images to ensure accuracy. In case of anomalies (e.g., blocking the barcode, skipping the scan, or a failed scan), the system will trigger pop-up notifications, voice reminders, and flashing lights, and save video footage for later review. After receiving the alert, users can rescan the item themselves or request assistance from on-site staff. Data from a 10-day test at a leading supermarket in China, using five self-checkout devices, showed 928 real alerts, with 752 rescans by customers and 60 rescans assisted by staff. Thanks to the loss prevention features, approximately 85% of risks were dealt with promptly, helping to minimize losses[2].

The product features a premium aluminum alloy frame and modular design, allowing for customizable combinations of components like cameras, screens in different sizes, printers, and indicator lights. It applies to various checkout settings, including supermarkets, department stores, and convenience stores.

[2] The data is sourced from WINTEC's internal test results. Intel does not control or audit third-party data. Please review this content, consult other sources, and verify the accuracy of the data mentioned.

Smart Group Meal Self-Checkout Kiosk

Fig.2 WINTEC Smart Group Meal Self-Checkout Kiosk

The WINTEC Smart Group Meal Self-Checkout Kiosk is designed for scenarios such as group meal, social dining, and school canteen. Featuring deep visual identification of products, cost calculation and self-service QR code payment, it can simultaneously identify multiple types of food. In a government canteen in Wuhan, Hubei, with approximately four devices, continuous data collection over two weeks shows a food identification rate exceeding 98% and an average identification time of less than three seconds per person. Once the food is identified, the kiosk quickly calculates the total price based on the item pricing, significantly improving the checkout speed[3]. It is also equipped with a digital health analysis system, offering customers evidence-based dietary recommendations to improve public health.

Benefits: Accelerated Digital and Intelligent Transformation in Retail and Restaurant Industries

The WINTEC smart self-checkout kiosk can effectively address issues such as loss prevention and identification accuracy in self-service. Its application in the retail and restaurant industries will provide users with a reliable checkout solution.

For the retail industry, the WINTEC Smart Retail Self-Checkout Kiosk helps retailers efficiently identify theft and loss risks, take prompt action to reduce losses, and lower labor costs. Additionally, the system's automatic reminder mode promptly alerts users when an anomaly is detected, improving the overall consumer experience.

For the restaurant industry, the WINTEC Smart Group Meal Self-Checkout Kiosk effectively identifies food and performs accurate checkout with minimal labor resources. Meanwhile, the increased checkout efficiency shortens queuing time and significantly improves consumer experience during peak hours.

Outlook

Driven by digital and intelligent technologies, the retail and restaurant industries are undergoing a rapid transformation towards higher operational efficiency, reduced cost, and improved consumer experience, while self-checkout plays a key role in this evolution. The self-service and unmanned solutions powered by technologies such as AI and computer vision will further strengthen their competitive edge with improved efficiency and consumer experience.

Intel will leverage its technological capabilities from cloud to edge and the accumulated knowledge and insights of partners such as WINTEC in retail and restaurant industries, to drive the design and integration of innovative solutions including self-checkout. The solutions developed based on such products as the Next-Gen Intel® Core™ processor will help retail and restaurant businesses reduce costs, increase efficiency, and deliver better services to consumers.

[3] The data is sourced from WINTEC's internal test results. Intel does not control or audit third-party data. Please review this content, consult other sources, and verify the accuracy of the data mentioned.

About WINTEC

WINTEC is a national high-tech enterprise integrating R&D, manufacturing, sales, and services, as well as a globally leading provider of comprehensive smart terminal solutions. Its provincial-level technology center is dedicated to technology and independent innovation. Adhering to the spirits of "Honesty, Dedication, Innovation, Win-win", Wintec continues to spare no effort in serving customers, motivating employees' potential and making great contribution to society.

About Intel

Intel (Nasdaq: INTC) is an industry leader, creating world-changing technology that enables global progress and enriches lives. Inspired by Moore's Law, we continuously work to advance the design and manufacturing of semiconductors to help address our customers' greatest challenges. By embedding intelligence in the cloud, network, edge and every kind of computing device, we unleash the potential of data to transform business and society for the better. To learn more about Intel's innovations, go to newsroom.intel.com and intel.com.