The Vision to Serve
The machine vision solution for foodservice
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Introduction

With growing levels of data, increasingly fast processing power and continuously improving algorithms, artificial intelligence (AI) solutions are now applied within an increasing multitude of industries across the globe. This is enabling faster decisions, actions and a stronger support base for countless operations day to day and making the most complex of issues simple to solve. As AI proceeds to be adopted across consumer, finance, healthcare, manufacturing, transportation and logistics, and governmental sectors, it is now time to focus attention upon the future impacts on foodservice, of which adoption of AI is still in infancy. This white paper addresses the application of cutting edge AI-enabled machine vision to the canteen checkout.

Customer pain points

For customers, it is a constant challenge to be served at a speed that does not drastically impede on their time. This is particularly prominent in higher traffic scenarios such as:

- Busy staff canteens
- Sport stadiums
- Museums.

The average UK worker spends only 21 minutes on lunch. With 10-20% of this time spent queuing and checking out the time wasted daily is extensive (Davis Smith).

"Time is precious to employees – we found that 61% do not visit their in-house restaurant because they cannot face queuing" – Omnico

The main problem is the checkout process. Today the alternatives to the traditional point of sale systems are pre-ordering apps and self-service kiosks used to pre-order items (such as the system in many fast-food chain restaurants).
Pre-order kiosks cannot be used to serve the whole crowd as there will still be queues to the kiosk itself which the use of a kiosk cannot speed up, merely moving the problem further away from the service counter. Mobile apps are also ineffective due to the struggles of user adoption, which many operators experience and are costly to develop, leaving a window for high-profit losses (eMarketer).

**Operator pain points**

Currently, the foodservice sector is facing the following challenges, preventing the highest quality of service and profit:

- Slow service rates (particularly in instances of high traffic) - On average the time taken to serve a customer via a cashier is 61 seconds. Add on queuing times and there is a significant impact on a customer’s experience.
- Increasing operating costs - such as increased staff wages and rental costs
- Customers that demand convenience - service culture weighs heavily towards speed over any other factor. If a customer can be served faster elsewhere, it is highly likely that they will choose to use this option.
- An increasingly technology-focused culture
- High staff turnover rates of around 70% (Michelin) - leading to a continuous retraining of staff who are not likely to be long term employees.

In order to provide solutions for customers and solve the issues of slow service and high operational costs, companies within these sectors will need to look beyond the traditional standards of practice and adopt newer, more efficient methods of operation. Solving these issues provides a clear and significant opportunity to positively impact huge numbers of people.

Neurolabs’ solution provides such an opportunity, by focusing on the main pain point in service: the checkout times.
Neurolabs’ AI solution overview (Zia)

Neurolabs offers a comprehensive solution to the issues of the current point of sale service in a high traffic foodservice environment. Zia is a software solution that uses machine vision to provide a novel but highly sophisticated checkout service.

Neurolabs’ solution provides this through:

- **Machine vision:** the use of cameras in order to identify all objects presented simultaneously, with the use of AI algorithms. The solution is capable of going beyond the standard that competitors set, operating in poor conditions, with the ability to scan under inadequate lighting or in the instances when a product is partially covered from view.

- **Checkout Hardware:** user-friendly and capable of processing high levels of customer traffic, achieving faster rates of service than a traditional point of sales system offerings. All through a self-service kiosk at the point of pain.
Industry problems

Currently, the foodservice sector is under immense pressure to adapt. This is due to a number of increasingly acute pain points for companies operating:

The industry is subject to tight profit margins

Interviews with prospective customers highlighted the issues of intense competition and drains on resources (such as high rent costs). Industry operators run on tight margins per location, where additional subjection to rent costs stresses the need for relief on financial pressures whilst still maintaining a high level of service.

Operators are subject to high staffing costs

Rising wages through the governmental implementation of minimum wage standards, particularly in the UK, stress the financial structure of many foodservice operators (Marketline). Reduction in costs is required in order to maintain profitability and competitiveness within the sector. According to Careersmart, in the UK the average cashier salary is around £16,500, with the majority of workers acting as part-time employees on zero hour contracts (83.6%). The number of part-time employees currently active in the UK is around 950,000 (Statista). An increase in the minimum wage of these employees leads to an amplified increase in cost after tax with no improvement in productivity.

Intense competition between providers

The foodservice environment is a highly competitive space (Marketline). The key competitive factors include high-quality service at an attractive price, service innovation, and the ability to make investments. Without the implementation of innovative novel concepts, a provider will fall behind to competitors that are open to adaptation and adoption of new standards.

Cultural trends

The best foodservice operations are focused on time taken to serve and how to reduce this. The increasingly higher demands of efficient service from customers has now led to the increasing requests for the adoption of ordering ahead services in the
form of mobile applications and kiosks, particularly within in-house workplace canteens.

As mentioned prior, these may seem attractive to the outlet operator, they do not address the problem. Additionally, the process of ordering ahead increases the handling time of food for staff which may affect its quality and is unnecessary for pre-prepared food. The window of time within the overall process that needs the highest level of addressing is the final contact between staff and customers. Automating much of this process removes this contact and enables a faster service.

### Benefits of Zia

- A fully automated self-service system capable of serving 4x as many customers in the same time period as a traditional human-operated point of sale system.
- A flexible system with the ability to increase the efficiency of serving in multiple scenarios, whether it be within a canteen-style environment, a cafe or even a food stand.
- Straightforward operating methods built to ensure customer ease of use with no training required.
- Reduction of space occupied by service and payment terminals previously inhabiting the end of the serving countertop. With Zia, outlets may be placed in...
any chosen spot leaving more space for customer service and stocking of products.

- Zia will continue serving without any break in the flow of customers, meaning no more missed service due to a long waiting time causing fatigue of customer purchase intentions.
- The ability to scan multiple items simultaneously means a reduced customer waiting time even when the customer’s chosen products are partially hidden from view.
- The ability to leverage staff time made available through the implementation of a self-service system, to focus on furthering customer experience through other avenues.
- No missed transaction opportunities due to queuing fatigue, leading to up to 240 additional transactions per hour per checkout point at peak times.

Machine vision

The ability to scan multiple objects simultaneously through the use of cameras inbuilt into a point of sale system completely replaces the need for barcode scanners that identify products individually. The time contrast between multiple object identification and single object identification is extensive and leads to higher serving volumes (up to four times higher) within the operating day.
Hardware

Neurolabs is working with Advantech the creators of the perfect hardware for Zia, the UTK-500 series POS, into which Zia is integrated. The highly sophisticated production abilities of Advantech make them a perfect hardware partner for Zia to serve the largest number of locations in the shortest time frame.

Synthetic data

The process of creating a database for a product is the combination of using 3D scanning and a Virtual Reality engine. The use of this engine enables Neurolabs to create countless scenarios in which synthetic data can be used to provide all the scenarios that Zia may encounter a product and generate labelled images for this context. This ensures the highest level of accuracy in identifying products (>98%), even in the extreme scenarios that the product is occluded, upside down or scanned in poor lighting conditions, or all three at once. Despite less than optimal conditions, Zia is still a fast and hyper-accurate solution for scanning and identifying products. In our testing, we have seen 2 seconds in comparison to an average of 46 seconds with a canteen cashier.
Conclusion

Given the challenges faced. Foodservice providers need to adopt a new technology in order to remain competitive and serve the increasingly demanding customer. A sophisticated and intelligent solution to checkout service problems, Zia allows you to revolutionize the experience of the customer, so that they may enjoy a seamless, streamlined service. Our vision to serve goes beyond the norm and seeks to empower users so that they may create the next generation of service.

If you would like a demonstration of the solution that we provide and see how we may positively impact your operations then please contact us.

Contact hello@neurolabs.eu for further details.
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