

AMBIENT INTELLIGENCE – TRANSFORMING THE FOOD INDUSTRY

How Augmented Reality and Wearable Technology Will Transform the Food Industry Over the Next Three to Five Years

By Tom Chestnut and Jennifer Tong

Most of the technology changes in the food industry over the last 20 years have been directed at the customer interface or have occurred through the mechanical automation of food production. At the customer level, these applications have been quite successful at providing better consumer insights and ease of use at the point of sale. For automations in food harvesting and processing, the results have been mixed. When properly executed, automation has created much greater efficiency and for the most part improved quality. But at the same time, the increased speed of execution and the complexity of tasks has pushed the limits of human capability as we know it today. Consequently, it is no surprise to see the significant increase in product recalls and the continued high incidence of food contamination, over 95 percent of which can be traced back to some type of human error.

The problems are quite similar at the retail and foodservice industry level. The menu is more complex with ever-changing consumer demands for organic, gluten-free, non-GMO and other dietary preferences that make proper execution more challenging than ever. And human error, particularly as it relates to the transmission of foodborne disease, is much more likely to be identified through scientific advances in both detection and the ability to trace back microbiological and chemical contamination in food.

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The overarching issue remains that there has been very little change in how we train employees, and we struggle



with the ability to take remedial actions when critical food safety and quality steps are not properly performed. So as job tasks become more complex, the chances for failure become even greater. Hence, we continue to see widespread incidences of foodborne illness and millions of pounds of contaminated products are destroyed each year.

NEW WAYS TO IMPROVE SAFETY AND QUALITY

Given these trends, foodservice, retail and supply chain manufacturers are continuously looking for new and innovative ways to ensure the safety and the quality of the products that they produce. For years, the industry has placed considerable emphasis on conducting inspections of their products to ensure quality. In addition, it is routine that facility and quality systems audits are performed across the supply chain – from farm to plate – to ensure food



safety. These inspections and audits are conducted on-site, either by internal staff or by a third-party inspection and audit provider.

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Recognizing the need for a more innovative solution, NSF International reached out to Google in the fall of 2014 with the idea for a radical approach to food safety auditing, one in which the auditor would never need to leave their office or home. Based upon Glass wearable technology and live audio/video streaming capabilities, a kit containing everything needed to conduct an audit (Glass, thermometer, alcohol wipes, flashlight) would be sent to the restaurant manager. Then, from behind the computer at a remote location, the third-party auditor would guide the restaurant manager through the audit flow, just as if the auditor were actually there in the restaurant — all by using Glass to transmit the same point of view.

The first pilot of this process was conducted in late February 2015 at one of the many foodservice locations on the Google campus in Mountain View, California while the auditor was stationed just outside of Los Angeles. As with any new technology, we experienced hardware challenges such as connectivity issues and difficulty communicating over the noisy restaurant environment.

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But much of this would improve over time, with the most significant changes occurring when we began to test prototypes of the new Glass Enterprise Edition in July 2015. And as we have made improvements, restaurant managers have applauded this new approach as an enhanced learning experience. Imagine driving a car to a new location compared to sitting in the passenger seat; the driver will learn the route many times faster than the passenger. Similarly, this process takes the restaurant manager out of the passenger seat (typical audit) and empowers them

to become the driver, thus enhancing the overall learning experience. We also used the Glass technology to provide the remote auditor with a bank of “teachable moments,” a series of 30- to 45-second video clips that can be played on Glass for the manager to see over the course of the audit to provide immediate training on Google food safety and quality SOPs as opportunities are identified.

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Even more meaningful on that day in February 2015 was the subsequent invitation by Google to meet in the “Glass” building on the Google campus. There, Google shared with us that they had not envisioned this application of wearable technology (it was our “ah ha moment” in Google lingo), and they then shared with us a much more comprehensive vision of wearable technology whereby it would soon become an essential part of our everyday lives. Looking back, that day at Google was one of the most inspirational points in our careers. As public health professionals, for the first time ever we realized that the global war against foodborne disease could be won and disruptive technology holds the key. And being part of the NSF International organization, with a mission to protect and improve human health, it was truly motivating. In fact, in November 2015 EyeSucceed was formed as an NSF International start-up entity to support the roll-out of wearable technology for all divisions of the organization, as well as across the food industry.

CREATING A WEARABLE TECHNOLOGY SOLUTION FOR THE FOOD INDUSTRY

Now came the difficult part – how to take what we learned, leverage our combined 50 years of experience in the food industry and emerge with a roadmap that can help to transform the food industry through the use of wearable technology. After several whiteboard sessions, and a few more Google “ah-ha moments,” over the next six months we applied for four trademarks (including EyeSucceed) for our technology and were co-inventors on two U.S. patent applications for applying wearable





technology processes to the food industry. These patent applications were then expanded to Patent Cooperation Treaty (PCT) global status in 2016.

The first patent application involves livestreaming applications, like the initial Google pilot. Today, over two years later, this EyeSucceed technology is used around the globe by NSF and others in the food industry. Some further examples include:

- > **NSF training and calibrating** food safety/quality auditors without the need for travel and to be on-site
- > **Audits/inspections** conducted by generalists but guided by remote experts who can be located anywhere around the globe
- > **Food companies/importers** evaluating and making adjustments on first production runs through EyeSucceed livestreaming from the food processing plant
- > **Restaurant corporate personnel** evaluating a specific restaurant's operational practices and equipment from thousands of miles away

The second patent application brings an entirely new training modality to the food industry through w-learning, employee training conducted with wearable technology like smart glasses combined with augmented reality (AR). AR is the technology of combining real-world images, videos, etc. with computer-generated information and/or imagery.

Compared to the costly and inconsistent peer-to-peer training, printed materials or tablets/mobile devices,

learning with wearables has many advantages. The two primary gains are the ability to train directly at the workstation (and even as the workstation changes as tasks change) and to do it in a simple, hands-free manner. Essentially, AR and wearable devices are the trainers of the future.

Augmented reality (AR) and wearable devices are the trainers of the future.

While livestreaming applications and w-learning represent more of an evolution of current practices, we believe that EyeSucceed's Smart Execution functionality will be transformational to the food industry. Imagine, if you will, having the ability to monitor in real time if an employee follows the step-by-step requirements that are needed to complete a job task. Taking it a step further, any deviation from the correct process results in the employee being immediately notified through the wearable device, which also displays the corrective action that needs to be taken. All of the output, including time between steps, deviation from correct procedures and whether corrective actions were taken, is uploaded into the cloud from which data analytics can lead to process improvements. After two years of R&D, field trials for the training applications and the initial mapping of data in the Google Cloud platform will commence in late Q3 or early Q4, 2017.

Welcome to the new world of ambient intelligence where human error can be eliminated through the use of wearable devices and AR. This is the future of food and workplace safety, and it holds the key to reducing labor costs and optimizing operational execution throughout the food industry.



ABOUT THE AUTHORS



Tom Chestnut, Senior Vice President, Global Food Division, NSF International.

NSF International has over 60 offices and laboratories around the globe where Tom oversees a team of over 2,000 public health professionals that are responsible for over 150,000 food safety audits each year on farms, food processing facilities and distribution networks in 150 countries, as well as consulting, training and technical support across the food industry. Prior to joining NSF 10 years ago, Tom spent over 20 years in the food industry working for Darden Restaurants where he was Vice President, Total Quality, responsible for all aspects of supplier and restaurant quality assurance. In 2015, he co-founded EyeSucceed as a means to leverage the emerging power of AR and wearable technology to address key food industry challenges.



Jennifer Tong, Co-Founder, EyeSucceed. As Director of Integrity and Process Excellence for NSF International, Jennifer was responsible for bringing new technologies and improved processes forward to the over 2,000 public health professionals that conduct food safety and quality audits around the globe. Prior to joining NSF 10 years ago, Jennifer spent over six years with the National Restaurant Association where she gained significant insight to the challenges that are faced each day by both chain restaurants and independent operators. In 2015, she co-founded EyeSucceed as a way to bring AR and wearable technology to the forefront of addressing food industry issues such as labor costs, training and execution, and food safety.