Wiliot

CASE STUDY · 2022

FARM TO STORE

Wiliot Physical AI platform helps Israel's largest retailer build the world's first farm-to-store intelligent supply chain

With over 300 grocery stores across the country, this tech-savvy retailer is outfitting more than 1 million reusable transport items with IoT Pixels to track the location and temperature of produce and ensure maximum freshness for its customers.

SCALING AFTER THE PILOT

REUSABLE TRANSPORT ITEMS BEING FITTED WITH IOT PIXELS

1.25M

300	Stores
250	Farmers and distributors
2–11 days	Farm to shelf, now measured



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The world’s first intelligent farm-to-store supply chain

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RESULTS AT A GLANCE

1.25M
RTIS BEING FITTED WITH IOT PIXELS

300
STORES SUPPORTED

250
FARMERS AND DISTRIBUTORS

2–11 days
FARM TO SHELF, BY STORE

0–5 days
TYPICAL TIME HELD IN STORE INVENTORY

80%
OF SHOPPERS RANK PRODUCE QUALITY FIRST

01

Executive summary

Israel's largest retailer and an early adopter of advanced technology to improve operations and customer experience, appreciates prevailing market research that finds as much as 80 percent of shoppers saying their most important criterion for selecting a grocery store is high-quality fruits and vegetables. At the same time, this retailer is committed to corporate responsibility and sustainability, which are critical to reducing waste and carbon emissions in today's food supply chains. Since 2011, it has been a member of Ma'aleh, the Israeli umbrella organization for corporate responsibility, and has held the organization's Platinum Plus rating since 2014.

To meet its commitments of fresh produce for customers, competitive pricing, and sustainable operations for the planet, this retailer is working with Internet of Things pioneer Wiliot, whose self-powered, stamp-sized IoT Pixels and cloud-based analytics engine enable a universal IoT, to create the world's first intelligent farm-to-store supply chain.

By bringing real-time intelligence to what will ultimately be more than 1 million reusable transport items (RTIs) and creating a fully transparent supply chain from farm to store, this retailer aims to ensure the timely delivery and sale of high-quality produce while minimizing food waste.



In a successful pilot of Wiliot technology, this retailer was able to track the location and temperature of fresh vegetables from the fields where they were picked to stores around Israel. Based on data transmitted by Wiliot IoT Pixels integrated into the RTIs, this retailer was able to tell the story of each RTI in the pilot, including:

- The location of each RTI of produce from farm to distribution center to store.
- The total time it took each RTI to travel from farm to store, accurately indicating the time it was picked and the age of the produce itself (freshness).
- The total time each RTI spent at each stage of the supply chain: from the field, packing shed, distribution center, transport, to store.
- The temperature inside the RTIs at each stage and the total time that RTI temperature was above the temperature at which point freshness was more likely to suffer.

With the data provided by the Wiliot Physical AI platform, the retailer for the first time could identify new opportunities to optimize its supply chain, improve the time-to-store of fresh produce, and maximize shelf life by knowing the freshness and condition of vegetables and fruits as they arrived in stores.

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> The ability to see in real time that every crate of fruit and vegetables are being kept at the right temperature throughout the transportation process and to know exactly how much time has elapsed since they were harvested in the field until it arrives at the branch is nothing short of revolutionary.
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> ZVIKA FISHHEIMER
> Executive Vice President

02

Challenge

According to the Food and Agriculture Organization (FAO) of the United Nations, food systems consume about 30 percent of available global energy, 38 percent of which goes into producing food that is either lost or wasted. The FAO also estimates that 14 percent of food produced worldwide is lost somewhere between farmers and retailers. And when food reaches the market, the Institute for Management Development estimates that grocery stores could reduce food spoilage and waste by 40 percent if they could cut in-store inventory times by just half a day. This is a cost-saving opportunity as well as an environmental one.

In that context, fresh produce is also an important driver of customer satisfaction. U.S.-based FMI, The Food Industry Association, as part of its annual Grocery Shopper Trends reports, consistently finds that as much as 80 percent of shoppers say high-quality fruits and produce are the most important factor in selecting a grocery store. And shoppers can be unforgiving: Various analyses indicate half or more of customers say they'd switch preferred retailers based on just two or three poor experiences.

The solution is simple: Sell fresh produce. But arriving at the solution is anything but simple, based on everything from the type of produce to differences in harvest conditions, to variations in handling and transportation. Two crates of produce picked from the same field on the same day can yield very different shelf lives, risking premature spoilage and unhappy shoppers. Success starts with greater visibility into food supply chains.

When this retailer engaged Wiliot, it had no comprehensive way of monitoring produce from a farmer's field to cold storage, to a distribution center, to a grocery store. But if the company could observe shipments of produce digitally—including the temperature at which it's kept—from its operational control center, this retailer could identify ways to shorten the time it takes produce to arrive in stores, work with farmers on solutions for more rapidly transferring produce to cold storage, route certain produce to nearer stores when its freshness might be at risk, and help store managers better identify which produce should be set out for sale first, and which can be held temporarily in inventory.

Wiliot worked with this retailer to build an intelligent, dynamic Internet of everyday Things in which the "things" were the commodity reusable transport items (RTIs) augmented with integrated processors that could communicate in real time their location and temperature. These crates were distributed to farmers, along with ultra-low-cost Bluetooth wireless networking infrastructure that allowed them to communicate data to the cloud for analysis. This hardware/software combination is what Wiliot describes as its Physical AI platform and forms the basis of an intelligent, sustainable, and more profitable food supply chain.

03

The Wiliot Physical AI platform

The Wiliot Physical AI platform combines Wiliot IoT Pixels — the stamp-sized brains of the platform affixed to any kind of product or packaging — and the Wiliot Cloud, which collects data transmitted from IoT Pixels to allow for AI-driven analysis and decision-making.



Wiliot IoT Pixels affixed to a plastic reusable transport item

IoT Pixels are ultra-low-cost, self-adhesive tags that can be battery-free, powering themselves by harvesting radio frequency energy from their surroundings. Each includes a programmable CPU core, a Bluetooth Low Energy Wireless Micro Controller Unit (MCU) that can sense, compute, and communicate, and 128-bit AES encryption so the data it sends is secure.

IoT Pixels come with sensing interfaces to detect, for example, location, temperature, motion, or tampering with the IoT Pixels themselves. They communicate wirelessly over standard—and often existing—network infrastructure, such as the Bluetooth-enabled wireless access points that are commonly already installed by stores to enable connectivity for their customers' and their own wireless devices. This ability to leverage existing Bluetooth-enabled infrastructure is key to streamlining deployment and minimizing the barriers around infrastructure costs that have held back other technologies and restricted the use cases that were possible.

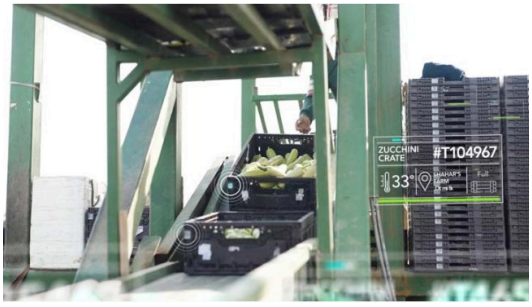
Wiliot IoT Pixels send data securely to the Wiliot Cloud, where it is decrypted and made available to companies for analysis. The Wiliot Cloud transforms raw sensory data into insights and uses machine learning and artificial intelligence to automate important functions such as alerting staff when food handling processes are out of compliance.

04

Solution

In July 2021, the retailer and Wiliot executed a pilot of the Wiliot Physical AI platform for the harvest and transportation of zucchini to five stores in Israel. Zucchini was chosen because it is less pervasive than, for example, tomatoes and therefore allowed the team to achieve focused, reliable results. Zucchini is also a vegetable for which freshness is especially important. Zucchini that isn't handled properly tends to show its lack of freshness more visibly on store shelves.

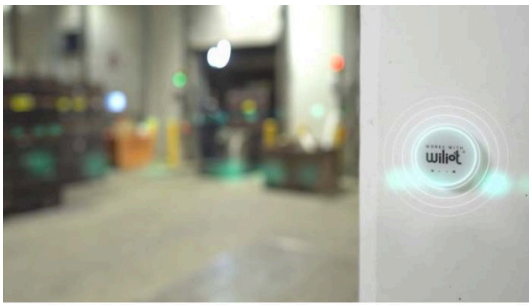
Existing RTIs were fitted with integrated Wiliot IoT Pixels, stickers that were simply applied to the front and back of each crate and distributed to the pilot zucchini farmer. The IoT Pixels' temperature sensors were activated to retrieve and transmit conditions in the RTIs. The farmer's storage facility and tractor were outfitted with wireless Bluetooth readers and communication gateways for reading data from the IoT Pixels and wirelessly transmitting it to the Wiliot Cloud.





RTIs powered by Wiliot IoT Pixels at the zucchini farm

Similarly, Wiliot oversaw installation of Bluetooth readers and gateways at one produce distributor and five retail stores.

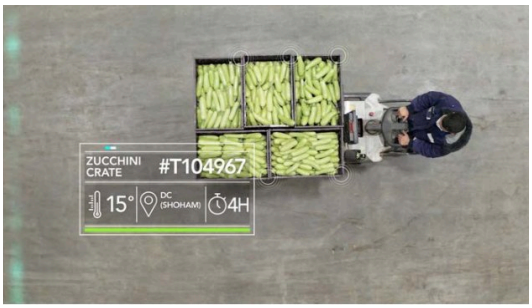


Ultra-low-cost Bluetooth reader at the distribution center



RTIs powered by Wiliot IoT Pixels at the distribution center

As each RTI moved from farmer to store, Wiliot and the retailer could track its location and temperature. This retailer even had the ability to track specific RTIs and receive alerts about the RTIs of interest. When an RTI was emptied at the store and the zucchini put out for sale, the RTI was sent to a washing facility to be prepared for re-use by the farmer.



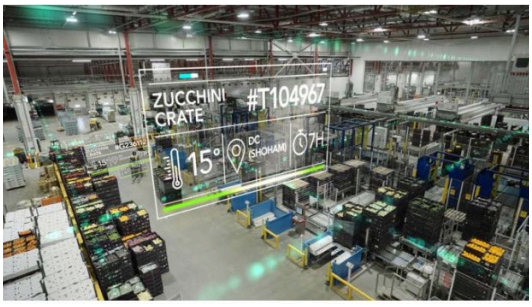
RTIs powered by Wiliot IoT Pixels at the store



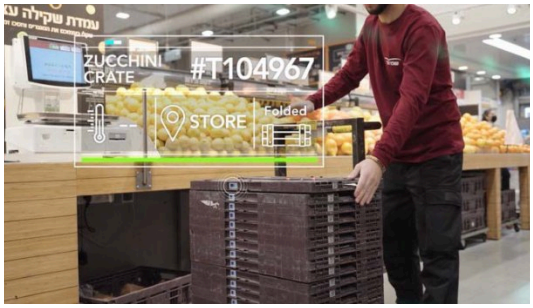
RTIs powered by Wiliot IoT Pixels at the washing facility

The only part of the supply chain without real-time communication with the RTIs' IoT Pixels were the trucks that took the RTIs from the distributor or farmer to the stores. However, with mobile readers and wireless gateways, similar to those used for communicating with tractors in the field, future implementations of this retailer's Wiliot Physical AI platform can include real-time visibility into in-transit conditions.

Using the Wiliot Cloud and its analytics capabilities, Wiliot data scientists were able to present detailed graphics describing each RTI's journey, including how many hours it spent at each stage of the supply chain and at what temperature. For example, clearly, a farmer's field in July is not climate-controlled. But the retailer was able to see which RTIs of zucchini spent more time at higher temperatures and which spent less, an indication of which RTI might contain the freshest produce. And at stores, this retailer could see which RTIs spent the most time in climate-controlled storage and which were emptied quickly so the zucchinis were available for customers.



RTIs powered by Wiliot IoT Pixels at the distribution center



RTIs powered by Wiliot IoT Pixels at the store

Based on the success of the pilot and the platform's ability to deliver actionable insights, the retailer and Wiliot are now beginning to integrate Wiliot IoT Pixels into about 1.25 million RTIs and install the communications infrastructure to support 250 farmers and distributors and 300 of this retailer's stores.

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> The capability to track our product throughout all stages of the supply chain is allowing us to ensure customers receive the freshest products, at the lowest cost, while maintaining the highest standards.
>
> ZVIKA FISHHEIMER
> Executive Vice President

05

A baseline for supply chain optimization

This retailer has a reputation for adopting new technologies in support of elite customer service. It is the only retailer in Israel with a 100-percent robotic distribution center for fast, efficient customer fulfillment in today's omnichannel retail environment. But until the Wiliot pilot, it did not have the real-time data it needed to identify supply chain efficiencies for its all-important produce business.



This retailer's 100-percent robotic distribution center, now enabled with Wiliot IoT Pixels

As a result, the data to come out of the Wiliot Physical AI platform created a baseline for future optimization. Among the insights:

- RTIs of zucchini could take from two to 11 days to move from farm to shelf, depending on the store.
- This does not include the time RTIs spent at the store, but were held in inventory, which was typically zero to five days.
- The first in first out (FIFO) flow of product through the supply chain that is essential to maximizing shelf life is not always maintained. Item-level tracking of each crate allows it to be detected and corrected in real time.
- Inside actual stores, intelligent RTIs allowed this retailer to accurately manage produce on a first expired, first out (FEFO) basis, ensuring based on actual data that zucchini was moved from inventory to store display in the order in which it should be sold to maximize fresh offerings.
- Cases where RTIs of zucchini were held in inventory longer than optimal indicate a store over-ordered, presenting an opportunity to better align supply and demand and ensure only the freshest produce is presented to customers.
- Each of the five stores in the pilot stored the majority of its zucchini RTIs for just one day or less, a positive sign that customers were receiving fresh produce.
- Similarly, most stores in the pilot minimized the number of hours the RTIs were stored at temperatures above 25 degrees Celsius, though in some cases this retailer was able to identify times when RTIs were above that threshold for a day or more.
- It's in the fields where zucchini RTIs spend the most time at higher temperatures. While this comes as no surprise, having the data to describe exactly how long zucchini were in RTIs at heightened temperatures allows the retailer to incentivize farmers to reduce those times.

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> This retailer is committed to improving the farm-to-store supply chain and giving customers the best possible produce. But it is hard to improve on time-to-market, shelf-life, and freshness without a baseline of current operations. Now they have that.
>
> **OHAD PERRY**
> Director of Sales and Business Development, Wiliot

Perhaps the greatest opportunity for supply chain optimization is in the observed time from farm to store. By using intelligence generated through the Wiliot Physical AI platform, the retailer aims to halve the average time it takes to deliver produce to stores, an improvement that is expected to add several days to the shelf life of vegetables and fruit.

Fresher produce on display increases customer satisfaction and supports healthier sales margins for stores. It also helps reduce unsustainable food waste that results when farmers present produce that doesn't meet the retailer's standards of quality. With the world's first intelligent farm-to-store supply chain based on an intelligent IoT, this retailer can more efficiently meet the demands of discerning customers while helping protect the planet from the effects of food waste.

ABOUT WILIOT

Wiliot is a Physical AI company that gives organizations continuous, scan-free visibility into the location and condition of every item in their supply chain. Battery-free Bluetooth sensors, called IoT Pixels, capture the data, and the Wiliot Physical AI platform refines it into actionable insights — predicting problems like shrink, mis-ships, and spoilage, and recommending the next move. Trusted by many of the world's largest retailers, carriers, and consumer brands, Wiliot has tagged more than 1 billion assets worldwide. Visit www.wiliot.com to learn more.

