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Retail Robotics: Potential Applications and the Human-Less Store of the Future

By Steven Keith Platt, Director and Research Fellow, Platt Retail Institute, and Research Director, Retail Analytics Council, Northwestern University

Robots, in one form or another, have been around for decades. Robots were introduced into the manufacturing of automobiles, for example, as far back as 1961. Adoption in retail, particularly in the case of front-of-store operations, on the other hand, is a much more recent phenomenon.

This article briefly discusses various robots currently being deployed in the retail industry. This is followed by the introduction of five potential applications. Finally, a new concept store of the future that is run entirely by robots is presented.

Current Deployments

The current wave of robots that are being deployed in retail stores provide either shopper assistance or merchandising compliance functions. From a robotics perspective, these can broadly be classified as observational applications (as compared to performing manipulative tasks). Shopper assistance services can include greeting customers, guiding them to a product's location in the store, and providing additional information, for example. Merchandise compliance includes robots that audit items on store shelves to determine the need for restocking, to isolate misplaced and mispriced items, etc. Robots with RFID capabilities will also be arriving in force soon, which will allow for full-time inventory accuracy measurement and location detection for omnichannel fulfillment.



Potential Applications

In this section, five activities that robots can perform better, faster, and cheaper than humans are described. These include intelligent shopping agents, the stocking of store shelves, customer service (for example, in a meat and deli department), shoe sale support services, and storewide checkout and merchandise packing.¹

¹ We invite the reader, when considering the feasibility (or lack thereof), of these applications to bear in mind a five-point evaluation hierarchy advanced by McKinsey & Company. These are: 1. technical feasibility (the ability to perform a physical activity or operate equipment in a predictable environment); 2. the robot's cost; 3. human labor cost offset; 4. benefits such as increased productivity, quality, flexibility and service enhancements; and 5. regulatory and social acceptance. See: "Where Machines Could Replace Humans - and Where They Can't (Yet)," McKinsey Quarterly, July 2016.

1. Intelligent Shopping Agents

Beyond the current retail robots that provide shopper assistance, as noted above, future generations of robots will be much more intuitive and interactive, serving as intelligent agents aiding in the evaluation of merchandise options and making recommendations based on the individual user's needs and preferences.

Customers, aligned with a robot possessing cognitive computing capabilities, will not only have more information available than ever before, but they also will have a companion capable of producing Big Data-generated personalized insights. Massive computing power processing cloud-based data, such as product attributes, availability, individual and like-customer evaluations, product research, and user intent can be processed and relayed to a shopper via a robot assistant inside a store. These insights, coupled with individual in-store customer observations undertaken by the robot, including product emotional response (discovered by facial detection), analysis of paths traveled, time in front of a shelf, what is in a shopping cart, prior purchases and behavior by the same individual, etc., will arm shoppers with more information and know-how than generalized, non-customer specific insights that are currently produced by online search. Whether part of a high-tech shopping cart or acting as a tag-along shopping buddy, such intelligent agents can enhance the shopper's experience and expedite the shopping process.



2. Stocking Store Shelves

Merchandise compliance activities being performed by today's robots, as mentioned above, are limited. That is, they observe what is on a shelf, but they do not actually touch products. Their work is achieved by object recognition. In the future, retailers will leave the stocking task to robots.

Yet this activity is extremely complex for a robot to execute. The ability to stock a store shelf requires a great deal of manual dexterity. Add to this the relatively semi-structured, unpredictable environment (i.e., different aisles, shelves, and products to be manipulated), as may be found in a supermarket, for example, and the challenges become obvious. Notwithstanding, such highly manipulative tasks can and will be performed by robots in the future.

In addition to labor savings, these robots will guarantee 100 percent display compliance. Inventory levels can potentially be reduced and turns increased, as rapid, continuous stocking occurs throughout the day. And analytics that may reveal changes in demand can be relayed to robot workers that can rapidly reset merchandise in response throughout the course of the day.

3. Customer Service (Meat and Deli Department Example)

The next time you visit your local supermarket, be prepared. Instead of a butcher who cuts your meat or a deli staff person who makes your sandwich to order, a robot may be handling these tasks. This is not at all farfetched, as a variety of robotic food service applications have already been introduced. These range from robot baristas and bartenders, to fully autonomous burger makers (including slice, grill, and made-to-order assembly).² Reduced labor costs and waste (as a result of human error), as well as faster turnaround times, are some of the advantages associated with these types of store service robots.

4. Shoe Sale Support Services

Keeping shoes on display at a large department store, for example, is a challenging task. Retailers know that the likelihood of a sale is much higher when a product is on the sales floor, so shoe display compliance is a critical task. While RFID greatly helps,³ high labor costs limit the number of times per week that cycle counts can be undertaken. With robots that continuously monitor display compliance, as well as retrieve items from the stockroom for customers, shopping for shoes may never be the same.

² Information available at: www.businessinsider.com/momentum-machines-funding-robot-burger-restaurant-2017-6.

³ See, for example, "Quantifiable Benefits and Analytical Application of RFID Data," PRI Working Paper Number 9, January 2017.

5. Storewide Checkout and Merchandise Packing

Non-interventional (cashier-less) checkout is rapidly evolving. Retailers are testing a variety of options. Amazon Go, Walmart's Scan & Go, and Kroger's Scan, Bag, Go are a few examples. The next iteration will be robots circulating in stores that scan merchandise, accept payment via facial detection, and bag merchandise anywhere in a store. Store formats can become completely flexible, as there no longer will be a need for customers to follow a predetermined path to checkout and bagging. No more cashiers, no more wasted space for checkout lanes; store-roaming robots will handle the task.

Arrived!! The First Store Without Human Staff

There are several noteworthy issues faced by retailers today. One is static store presentations (that is, inflexible layouts that cannot easily be refreshed). This results in a non-differentiated store experience and an inability to quickly get fresh merchandise onto the sales floor due to stocking schedules and high labor costs. Another is the failure to harness cognitive computing at the store level. Introducing Arrived!!, a hypothetical store populated by robots, that addresses these drawbacks.

Arrived!! is the first fully robotic retail store. Its brand is aimed at delivering a unique store experience by the daily introduction of new merchandise sold at competitive prices. Customer traffic will be driven by the excitement associated with the daily range of merchandise options presented in an exciting and compelling environment.

Arrived!! stores are smaller. Most of the footprint is dedicated to product storage, with the sales floor serving as a merchandise showroom. New categories of merchandise arrive each day. Each evening, robots are programmed to reset the store, load merchandise, and place digital screens nearby to display content related to the next day's promotion.

To illustrate the Arrived!! concept, assume that yesterday's merchandise included women's dresses. In preparation for tomorrow's event, the women's dress area is displaced by ski and related merchandise that is the theme for the next day.

After closing, dress display rounders (fixtures) and merchandise are moved off the sales floor. Robots install fixtures capable of displaying skis, poles, ski boots, and apparel. Digital screens are moved into place to display content that is highly targeted to the customer via cognitive computing that determines optimal personalized messaging. Analytics determine the best mix of size, color, and number of SKUs to display (as most product is housed in a stockroom).

When customers arrive the next day, they experience an entirely "new" store. The layout and merchandise have been entirely transformed overnight. The intelligent shopping agents provide an unmatched level of customer assistance. One customer interested in a particular boot has her feet scanned to determine the best size, which a robot quickly retrieves from the stockroom. Another customer, going on his first-ever ski trip, is provided with product recommendations for a novice skier, with detailed product and price comparisons on all the equipment he will need. After his body is scanned, correctly sized matching pants, coat, goggles, and related items are retrieved and presented by the robot associate. Ordering of lift passes and arranging for local transportation at his destination resort are also completed, as well as enrolling him in ski school and making dinner reservations. When the customer makes his final selections, the robot scans the merchandise for invoicing and the customer's face for payment. The merchandise is either placed in the customer's vehicle, shipped to the resort, or transported to his home by a delivery robot.

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After the close of business, the 24/7 robots get ready for the next day's event, the promotion of housewares, which arrive via an autonomous vehicle. And if a shopper needs help on choosing the perfect blender, all she needs to do is ask her always-helpful robotic assistant.

This article discusses some current applications for robots in retail, as well as postulates various future applications. It also introduces a new concept, Arrived!!, the first fully robotic retail store. While these future applications and Arrived!! may not come to fruition, one thing is certain: customers will be seeing a lot more robots in retail stores in the future.

Editor's Note: Retailers interested in learning more about this subject should plan to attend the Retail Analytics Council's Retail Robotics and AI Conference, on April 26, 2018, at the San Francisco campus of Northwestern University. Registration information is available on the PRI [website](#).



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About



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Platt Retail Institute (PRI) is an international consulting and research firm that focuses on the use of technology to impact the customer experience. PRI develops marketing and technology deployment strategies, supported by analytics, to build brands and increase sales. PRI clients include retailers, media companies, financial institutions, hardware and software companies, educational institutions, and other businesses. In addition to its global consulting expertise, PRI also publishes the quarterly Journal of Retail Analytics and other pioneering industry research.

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The Retail Analytics Council (RAC) is the leading organization focused on the study of consumer shopping behavior across retail platforms to provide an understanding of how these impact retailers, particularly as new technologies are introduced. Established in August 2014, RAC is an initiative between Medill's Integrated Marketing Communications department, Northwestern University, and the Platt Retail Institute. The RAC unites industry, faculty, students, and its Advisory Board members for the study and exchange of ideas.

To learn more about the Retail Analytics Council, please visit <http://rac.medill.northwestern.edu>.