

The Future of Personalized Advertising using IoT

Tanya Akutota

UG Student

*Department of Computer Science & Engineering
National Institute of Technology, Silchar*

Anshika Bhargava

UG Student

*Department of Computer Science & Engineering
National Institute of Technology, Silchar*

Abstract

At present, the marketing scenario is instrumentalized. But we are heading towards a rapidly changing scenario, with the entire shopping experience becoming more automated and cloud-centric. With the growing web of connected objects, we will have huge amounts of data that can be used to personalize and tailor advertisements suited to each individual. Everyday appliances and wearables will be connected over the internet, and this massive cluster of smart things will help hyper-personalize not just advertising, but also the feedback and customer support, connecting consumers and companies like never before. In the coming years, the Internet of Things will have major implications for both business-to-business (B2B) and business-to-consumer (B2C) companies. This article introduces and explains technologies that implement IoT, which will drastically improve the quality of shopping and advertising, providing for a more convenient, hassle free experience. It also illustrates, how, at each level of the supply chain, we implement concepts of IoT and the relevant RFID tech to automate the production-distribution-marketing process. A summary of a commonplace scenario is provided, from the perspective of a shopper, wherein the shopping experience is revamped using IoT.

Keywords: Advertisement, Business, Internet of Things, NFC, Personalization, RFID, Technology

I. TECHNOLOGIES TO BE IMPLEMENTED

A. Beacons:

Beacon is a device, which allows Mobile Apps to listen for signals from beacons in the physical world and react accordingly. In short, Beacon technology allows Mobile Apps to understand their position on a micro-local scale, and deliver hyper-contextual content to users based on location. The underlying communication technology is Bluetooth Low Energy.

B. Dash Button:

Dash physical instant purchase buttons are one-push buttons for buying everyday items. They are directly linked to the store and can place on order with just one push. This makes buying everyday necessities a convenience. They are installed in homes, especially for objects that people need the most.

Amazon has already tested this prototype in the UK. According to The Guardian, "The branded wireless buttons, which are essentially free to the consumer and purchase a set item when pushed, are another step in Amazon's attempt to lock customers into its Prime subscription service, and edge out traditional supermarkets from the household goods market."

C. Smart Environmental Variable Control:

A smart environment can be defined as one that is able to change the levels of the variables based on the data that is read from sensors. A smart environment system automatically controls the devices according to the sensing information and users' requirements so as to keep the environmental elements such as temperature, humidity, etc. within the desired range.

D. Smart Mirrors:

Smart mirrors are used in the dressing rooms of the clothing shops. They provide the facility of trying on clothes virtually. They might even show how the shirt will fit without you having to undress.

E. RFID:

Radio Frequency Identification (RFID) technology is a non-contact, automatic identification technology that uses radio signals to identify, track, sort and detect a variety of objects including people, vehicles, goods and assets without the need for direct contact. RFID technology can track the movements of objects through a network of radio-enabled scanning devices over a distance of several meters.

1) Security: Anything can be tracked using the RFID Tag thus ensuring security of items.

- 2) Smart trolleys: The products in the shopping centers will have RFID tags to retrieve/access information about it. When a customer places a product in the smart trolley, the RFID Reader will read the Product ID and the information related to it will be stored in a microcomputer. The total amount of the products in the trolley will be calculated and updated on server.
- 3) Smoke detection: RFID enabled smoke detectors, which are connected to the internet, can automatically alert the fire station in case of an emergency. They can also be linked to automatic water/foam sprinklers. Then the smart billboards will display emergency procedures and ways to the exits in the building.
- 4) Power grid: When RFID is utilized in power grid logistics management, it assists to improve the logistics management efficiency. Based on the human activity, the power can be turned on or off, thus saving energy. However, RFID hasn't been used widely till now in power grids.
- 5) Smart inventory control: Effective inventory management depends upon analyzing data collected from many sources such as, distribution centers and warehouses and using it for inventory control. Conventional tracking systems require manual intervention, which is labor intensive, time consuming, and error-prone. Whenever the total inventory at a warehouse or distribution center drops below a certain level, the RFID enabled system could place an automatic order. RFID-tagged products will allow stores to track the location and count of inventories in real time. This will better monitor demand for certain products and place orders to prevent an out-of-stock situation. The items can also be tracked while being transported using RFID. RFID Systems gives total visibility of product movement in the supply chain. This may help to make early decisions about inventory control in case there is any interruption in the supply.

F. Drone Delivery:

A delivery drone, is an unmanned aerial vehicle (UAV). Use of IoT makes it an intelligent device.

It can be implemented in the following way: The window of the house as well as the drone should have microchips installed within them. The drone will be given a unique ID. When that particular drone comes, it will seek permission to enter the house. The window verifies the digital signature of the chip and grants access. After the identity of the drone is confirmed, the window door opens and the drone can enter to leave the package and then fly away.

G. NFC:

NFC stands for Near Field Communication .It is a short-range wireless connectivity standard that uses magnetic field induction to enable communication between devices when they're touched together, or brought within a few centimeters of each other. The customer needs to download the Android application and install NFC enabled devices on their mobile. The products in the mall have NFC tags attached to them. When the customer runs the scans the NFC tags which are placed on the products from his mobile, the information like product name, its price, offers if any available etc. is transferred to the user mobile. The user can select the product and enter the quantity he wants to purchase. The user makes payment electronically and an e-bill is generated on the user mobile devices.

II. IOT TECHNOLOGIES AT DIFFERENT STAGES OF THE SUPPLY CHAIN



A. Let Us Take the Scenario of a Shopping Mall

Before starting from home, the customer makes an inventory of items to purchase on his smart wearable; the wearable or carputer (dashboard computer) can then guide him as to the locations where it will be found as he is driving or after he is inside the mall. Money-saving tips and information about the least expensive place to purchase favorite products can also be sent based on location. When the customer enters the vicinity of the mall, he gets a notification for downloading the app for the mall. Smart billboards enabled with NFC can allow the customer to automatically download their APKs by placing his mobile near the billboards. This technology has been already been tested by Dominos. Also it is recognized if the incoming customer is new or a revisiting customer. If he is a revisiting customer, he gets offers and promos- more personalized based on his previous personal data. Else, he gets a walk-through and tips (and offers). The mall is equipped with smart smoke detectors which automatically alert the fire department in case of an emergency.

Each store has its own beacons; devices which recognize customers' identities and notify them of personalized offers and suggestions. Location-based coupons or offers can be delivered to their mobile device for frequently purchased items. In the grocery store, a person can scan the prices of items which are displayed using digital signage.

Upon scanning, the store's app recognizes the person and accordingly displays variant prices to each customer, based on loyalty. This increases the customer's overall satisfaction and loyalty to the company and provides for a smoother, less expensive shopping experience. The smart inventory control keeps track of every item automatically ordering if stock finishes or gets expired. The customer also gets to choose from the variety of foods which are maintained using smart environment variable (temperature; humidity etc.) control. He can avail the use of a smart shopping cart, which uses RFID to scan products that are being put into it and calculates and displays the total price for the same.

In case of a clothing store, he can use his phone to scan the RFID on the clothes and find all the details about the make. He can use a smart mirror to virtually try on clothes, which saves time, and effort and gives him a new perspective, avoiding cruddy trial rooms and the privacy risks associated with it. As he exits, RFID enabled clothes then make him pay automatically through his smart wallet.

Another interesting use of IoT is seen in the Wi-Fi push tech, which helps him buy things directly, without the burden of looking it up or going to a store. Amazon has developed a prototype for the same, using which you can scan an item through the amazon app, and touch to buy. The customer can use the RFID of the product's label and find the details before purchasing thus getting a detailed description of the object. Also scanning becomes easier. Ads don't even have to be bombarded on the customer; suppose his "things" are on the verge of malfunctioning; the ad can be sent to the things, which will then choose the apt product based on the browsing/habitual patterns of the owner; and alert the owner about it.

At home, his fridge is equipped with RFID sensors which can automatically notify him if a product is out of stock. On his mobile phone, he uses an app to generate appropriate recipes for whatever ingredients he has present in the fridge.

B. Should companies be early implementers of IoT or should they adopt it after it becomes mainstream?

Our answer: Advantages of early adoption far outweigh those of mainstream adoption.

The advantages being:

- Data deluge: Massive amount of data can be collected from cross- platform and cross- device IoT tech, which can then be analyzed to tailor business strategies and objectives. IoT initiatives at
- ARI fleet management now collect the same amount of data in two weeks that they previously used to in two decades
- According to an article published by Accenture, "Businesses can capitalize on revenue opportunities in the IoT space by demonstrating value of devices to consumers. Despite concerns with security and privacy, consumers incentivized with coupons or helpful information are more open to sharing data with third parties, such as retailers, manufacturers, or friends and family."
- IoT environment requires cross-functional collaboration and communication with other business units in the industry, which maximizes data insights

Long-term adoption growth across classes of consumers emphasize the significant opportunity for retailers and companies. Although widespread adoption of IoT environment does not exist presently, the market is showing signs of massive growth in consumer adoption of connected devices and objects.

A crucial outcome is that, success in the future of IoT will emerge from providing a singular, easy-to- use customer experience with gripping benefits, irrespective of types of industries or products. The key contributing factors for this are: A resilient strategy, innovative technology, efficient change management and keeping up with the digital trends (digital presence).

The largest opportunities for brands lie in presenting consumers with specific, measurable results from the data they are sharing. Companies using data to connect with consumers via IoT devices should ensure they're offering value every time – whether that be through special offers targeted specifically to past behaviors, or information on how to improve the quality of daily life through specific means

Despite the advantages, there are some setbacks to early adoption, such as lack of standards, interoperability issues, infrastructure challenges, lack of training and long payback cycles. Another disadvantage is that the current level of cybersecurity is yet to be developed and specialized to cater to the massive amounts of connected devices and to protect the plethora of information that flows from them.

REFERENCES

- [1] <http://www.ust-global.com/iot-how-smart-impacting-iot>
- [2] https://www.accenture.com/t20150624T211456___w___us-en/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Technology_9/Accenture-Internet-Things.pdf
- [3] <http://ijarcet.org/wp-content/uploads/IJARCET-VOL-4-ISSUE-10-3875-3877.pdf>
- [4] <http://www.decisioncraft.com/dmdirect/rfidapplications.htm>
- [5] <http://www.oodlestechnologies.com/blogs/Blockchain-And-IoT-To-Make-Delivery-Drones-Smarter>
- [6] <http://sloanreview.mit.edu/article/four-lessons-from-iot-early-adopters/>
- [7] <http://ieeexplore.ieee.org/document/7819297/>
- [8] https://en.wikipedia.org/wiki/Digital_signage
- [9] https://en.wikipedia.org/wiki/Radio-frequency_identification
- [10] [http://www.in.techradar.com/news/phone-and-communications/What-is-NFC-Everything-youneed-to know/articleshow/45223085.cms](http://www.in.techradar.com/news/phone-and-communications/What-is-NFC-Everything-youneed-to-know/articleshow/45223085.cms)
- [11] <https://www.theguardian.com/technology/2016/aug/31/amazon-launches-dash-instant-order-internet-of-things-buttons-in-the-uk>