Internet of things & artificial intelligence in the Retail industry

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Consumer adoption of IoT devices is expected to rise quickly: The "State of the Internet of Things" study found that nearly two-thirds of consumers intend to purchase a connected home device by 2019, while ownership of wearable technology is expected to double year over year in 2021.

The IoT movement offers retailers opportunities in three critical areas: customer experience, the supply chain, and new channels and revenue streams. Here are some examples of how the in-store experience and the connected home of tomorrow might look.

1. Customer Experience

- **Retail Store Layout Navigation:** The customer gets an instant access to the retail store layout on entrance where it asks the customer for the product section to be explored. Using Google speech recognition, it navigates the customer to the desired location.
  Benefit: Saves time to search for the location where he/she needs to visit.
- **Body Scanning Mechanism:** Scans the customer on entrance and the details gets updated in the customer account on the app. If desired to purchase garments, it recommends the clothing size that would fit him/her of each brand for the chosen garment and also, the various available designs and colours are being displayed.
  Benefit: Saves customer's time to try on various sizes for various brands.
- **Smart Mirrors:** Wall-sized mirrors double up as interactive sessions, allowing customers to "try on" different clothing virtually
  Benefit: Saves customer's time and effort to try on multiple garments.
- **Self-Checkout Mechanism:** Sensors attached to every shelf and basket will track the information and scan the barcode of each product that have been finally brought by a customer and the relevant details will get added to the respective account cart. A sensor placed at the exit traces the exit of a customer and the corresponding amount is being deducted from his/her account automatically.
  Benefit: Save's customers' queuing time and effort and a step towards promote digitization.
- **AI-based Customer Purchase Behaviour**: Based on the past purchases of each customer, the application will learn and predict the future requirements of the respective customer using the concept artificial intelligence. The prediction shall be displayed as a recommendation to the customer. Also, the application will perform a comparative analysis of the product at a brand level and suggests alternate options with value for money as the major parameter. The application shall suggest the most frequently purchased brand for the preferred product on a basis of high to low rating.
  Benefit: Save's customers' efforts to go through each and every product that is bound to be bought by him/her.
- **Virtual Closets:** Enable shoppers to browse and virtually try merchandise related to what they are wearing or that may be available in other stores.
  Benefit: Lets the customer have a better product knowledge.
- **Customer Traffic Re-routing Using Heat Map:** Based on the data collected in each product category section of the retail store, the application analyzes the traffic in each of the section. The application displays heap map indicating the traffic in each corner of the

store. The app also suggests an alternate purchase priority order in order to save time and also, provides re-routing for the customer's convenience.

Benefit: Alternate purchase priority order being suggested for the customer adding to his/her comfort value.

- **Interactive Displays:** Display screens in the garments section promoting the elegance of various types of apparel using highly interactive videos featuring good-looking and fit models. This creates a positive impression in the customer's mind, moulds the purchase decision process for the customer and hence, increases the chances of the product purchase.

  Benefit: Better customer experience with the complete feel of actually wearing a garment.

2. Supply Chain Management

- **Seamless Click-and-Collect Model:** New consumer buying patterns can be implemented using the power of the application due to growing popularity of buy online, pickup/return in store. The various models involved are as mentioned below:
  - Buy in store, ship from store to home
  - Buy online, pickup in store
  - Buy online, ship to home
  - Buy online, return to store
  - Buy in store, return by mail with return label from retailer's website
  - Buy online, pickup at third-party location

  Benefit: Ease out the purchase process of the customer and saves time.

- **Out-of-Stock Product Notification:** Smart shelves in store that can detect the present inventory. While a user browses through the app, in case of an absence of a particular product, the app displays an expected time of arrival (ETA) for the product to be available and hence, the customer can schedule his/her visit to the store accordingly.

  Benefit: Availability of each product is known in advance in case of out-of-stock status.

- **Automated Inventory Verification via RFID technology:** The incoming and outgoing of products in the inventory should get automatically updated in the application which is being monitored by RFID. The bar-code based verification is automatically done using sensor detection mechanism.

  Benefit: Automatic tracking and verification of every product present in the inventory which in turn helps in the app updation resulting in better customer experience.

- **Smart Robots:** Robots working autonomously will aid in areas ranging from stock replenishment to product assembly to hazardous materials handling. They can help the customers guide through the store in finding the right product. It is a great way to grasp the customer's mood by the tone/pitch modulation of its voice.

  Benefit: Gain customer's attraction through voice understanding and response mechanism.

- **Security Personnel:** Automated bots with X-ray scanner fitted in their eyes can have a quick scan through each and every person entering and exiting the retail store. This can help in the perfect identification of suspicious individuals.

  Benefit: Keep a better check on incoming and outgoing individuals and identify the suspect.

- **Last-Mile Delivery:** Using drones for the last-mile delivery of products to the desired location on a chargeable basis, thus saving the to-and-fro travel time of the customers.

Benefit: Zero travel time for the customers, increasing the convenience on an urgency basis.

- **Smart Beacon System:** Collects information on customers spending time in each product category section through facial recognition technology and analyzing the data to find out the ratio of no. of products sold per customer/average time spent per person in each category.
  Benefit: An indication of the successful conversion rate helping in predicting the inventory requirement.
- **Smart Packaging:** Packaging of sensitive products via sensors that monitors freshness and age of perishable goods.

3. New Channels and Revenue Streams

- **Smart Pricing Mechanism:** Pricing of a product shall change in real-time based on the various factors such as demand, sale season, festive season sale, duration of the day etc. using smart price tags attached to each product.
  Benefit: Increase in purchase probability of a particular product when a comparison being shown the actual price and the offered price to the customer.

The Unavoidable Need for Humans

The above mentioned smart robots needs to be monitored by human supervisor and identify anomalies or defects, if any. Humans also need to be get trained with the knowledge of using various technologies and know how to get it rectified/repaired in case of any defects. We suggest the number of robots that needs to be monitored per human supervisor for various sections in a tabular format below.

Defined Purpose	No. of Robots	No. of Human Supervisors
Smart Guide to Customers	2	1
Billing Support	4	1
Security Check	3	1
Logistics and Inventory Management	2	1

Parameters based on which the robots to human supervisor ratio calculation is done are mentioned below:
- Priority and importance of task
- Sensitivity of task
- Efficiency of each robot
- No. of customers to be catered by each robot