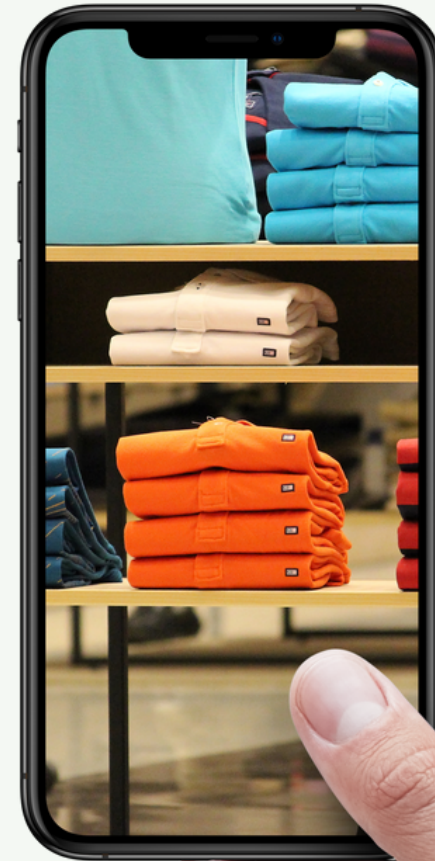


**COURSE:
UBIQUITOUS/PERVASIVE AND
CONTEXT-AWARE COMPUTING**

Ubiquitous computing in retail

By Alessandro Elisa, Padilla Micaela





Summary

- **INTRODUCTION**

The evolution of retail

- **RETAIL AND CALM TECHNOLOGIES**

- Fitting room
- Customer service
- Supply chain
- Cash desk

- **ETICAL IMPLICATIONS AND ACCESSIBILITY**

- **FUTURE CHALLENGES**

The evolution of retail

Today retailers are interested in using such **pervasive technology** in the stores.

The user experience must benefit the customer and bring them back into the shops ideally combining:

- **offline experience**
- **product reviews**
- **rating**
- **recommendations**



Technologies involved



NFC DEVICES

It refers to **proximity** communication. It integrates information about the user profile and his physical activities, to return relevant information



IOT TECHNOLOGIES

The set of digitized physical objects that communicate and interact with each other or with the external environment.

36%

OF
CONSUMERS WOULD LIKE TO ACCESS
TO PRODUCT INFORMATION
BY SCANNING A **BARCODE** WITH THEIR
SMARTPHONE.

14% WOULD LIKE TO USE THE
SMARTPHONE FOR **PAYMENT**.

*Source: Deloitte Research, State of
Media Democracy (UK) 5th Edition, 2011*

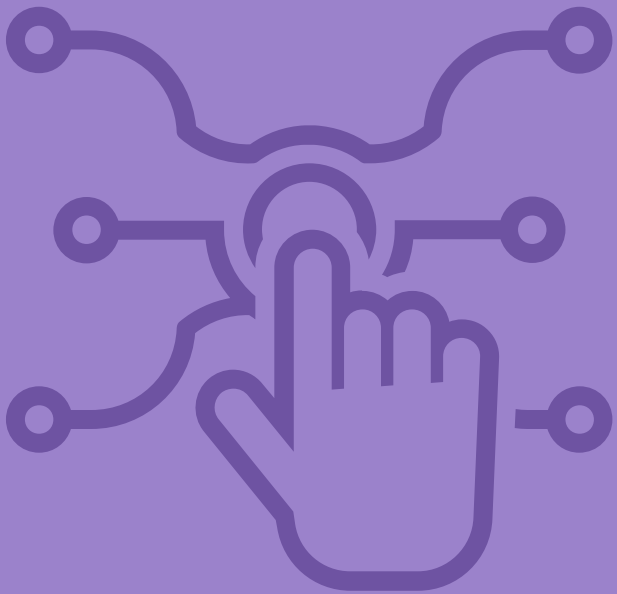
Those data show that
in the world of retail,
particularly in stores,
the physical and social
realities change very
quickly.



Retail and calm technologies: some examples

- **FITTING ROOM**
 1. Responsive Mirror
- **CUSTOMER SERVICE**
 2. Beacon Technology
 3. AI and Machine Learning
- **SUPPLY CHAIN**
 4. RFID and Nanotechnologies
- **CASH DESK**
 5. Multimodal Sensing

Ubicomp and retail: what and how?



IoT approach transforms the physical objects and surfaces in a store into an

- **interactive**
- **activity-aware environment**

This pervasive approach exploit leveraging sensors and actuators and their meta-information, which are exposed on the Internet as “virtual entities” through interfaces.

A photograph of a modern fitting room with glass walls and dark curtains. The room is brightly lit, and the floor is light-colored. The text is overlaid on the image.

1. Fitting room

HOW IS IT CHANGING?

Integrated systems technologies that
"fit" in the traditional concept

If what we already have in the online stores was combined in one physical place, then we should have a **fitting-area mirror**, which would be a specific point of interaction between customer and the product, with its supplemental information.



WHERE?

- **Mango** flagship store (Lisbon, Plaza dos Restauradores)
- **Rebecca Minkoff** flagship store (New York City, SoHo, 96 Greene Street)
- **Ralph Lauren** flagship store (New York City, Fifth Avenue)
- **Tommy Hilfiger** flagship store (London, 138 Regent St.)

FEATURES

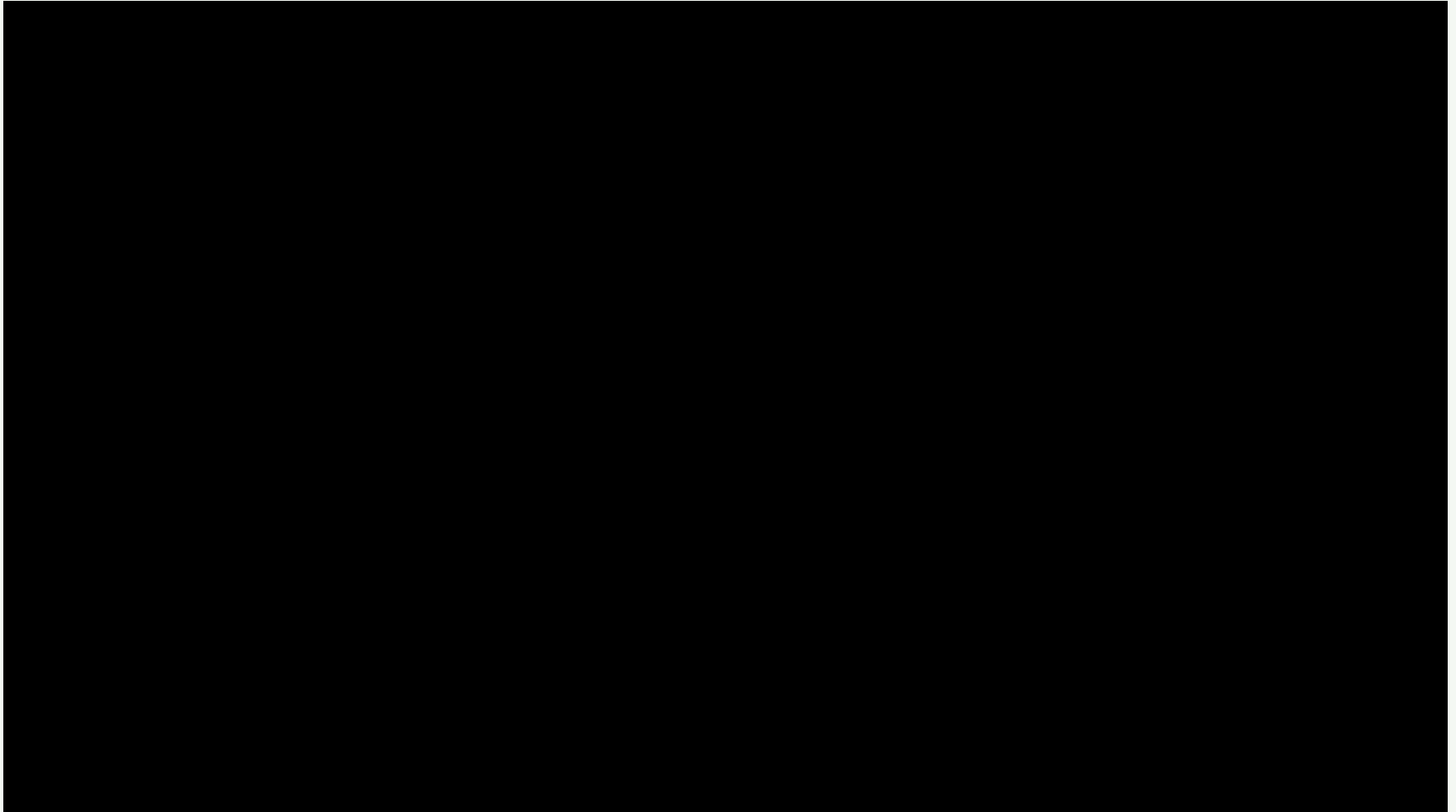
it allows a person trying on clothes to send **video** of himself to friends who can send back comments and vote.

It can also project a static image of an **alternate garment** onto the mirror allowing the person to see roughly how it might look on him.

Responsive mirror



Augmented Reality fitting rooms in Shanghai





2. Customer service

WHAT'S HAPPENING?

Some extension of actual standards

A hand holding a smartphone. The screen shows a green badge with the text 'BEST PRICE GUARANTEE' in white. The background is a blurred indoor setting, possibly a store or office.

IoT technologies are pervasives:

- **Real time, direct interaction:** customers can interact with the installation to get product details, customize the model they are holding in their hands, or linking to the product using NFC tags, and much more.

- **Indirect interaction:** customers effect a change in the environment. Such changes are detected by sensor and raise events as well as changes in the related virtual entities. As a result targeted advertisement based on customer's preferences and previous behaviors can be shown.

WHAT IS IT?

It is an extension of the **Bluetooth standard** in version 4.0. It enables low-power, low-cost and short-range wireless communication. It is a **proximity** sensing device.

FEATURES

Customer enters into store and get notification about nearer products. In form of **notification** they get discounts, offers, price, description, colors and reviews of previous customer.

Customer can buy any product using application and get many benefits like they don't spend the time to understand the **product features** or stay in line for the payment.

Beacon technology



Beacons: What they'll do for retail



WHAT IS IT?

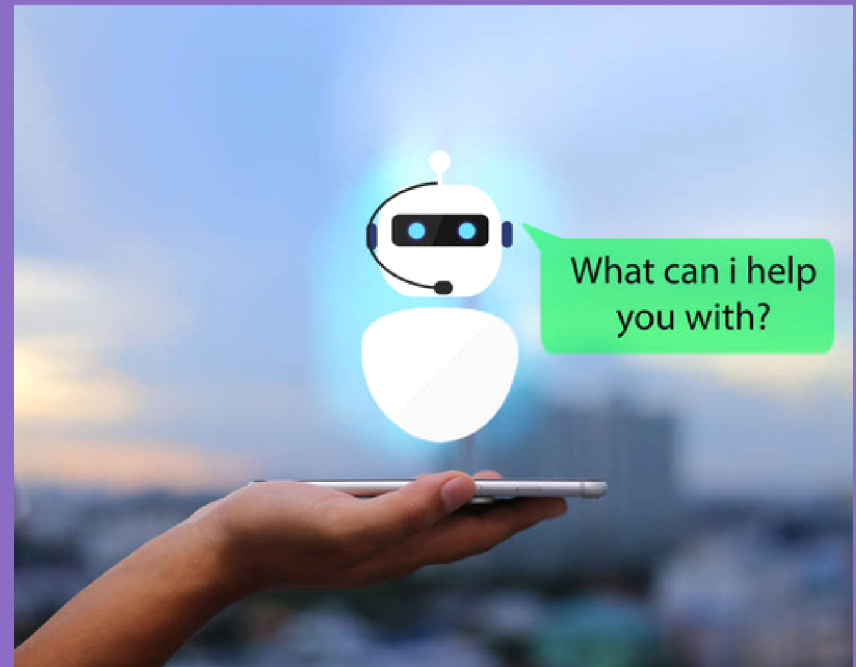
Machine Learning is a branch of Artificial Intelligence (AI) and computer science which focuses on the use of **data** and **algorithms** to imitate the way that humans learn, gradually **improving** its accuracy.

FEATURES

Google Contact Center AI is an example to understand how machine learning could be integrated in retail system, to meet customer needs.

Google Center AI is one of the few technologies based on **Dialogflow**, an avantgarde system which provides a natural lifelike conversation.

AI and machine learning



3. Supply chain

WHICH NEWS?

Identification methods for retail

RFID and nanotechnologies

WHAT IS IT?

The Radio Frequency Identification (RFID) technology is a **wireless identification method**, which contributes to improve communication capabilities of electronic **informations** associated to **physical items**.

FEATURES

- inventory losses reduction
- increase of efficiency
- speed of processes
- improvement of information accuracy



A woman in a blue shirt is handing a card to a customer at a cash desk. A brown paper shopping bag is in the foreground. The background is blurred, showing a retail environment.

4. Cash desks

THE IMPROVEMENT

An efficient way to change the traditional cash desk concept

WHAT IS IT?

Multimodal sensing is a way to revolutionizing the traditional concept of retail. Self-checkout can reach high accuracy, but they could be very unprecisely beacuse they only control the product weights. Those systems require a **training** images and than, a **detection** phase. The sensing is both visual and weight.

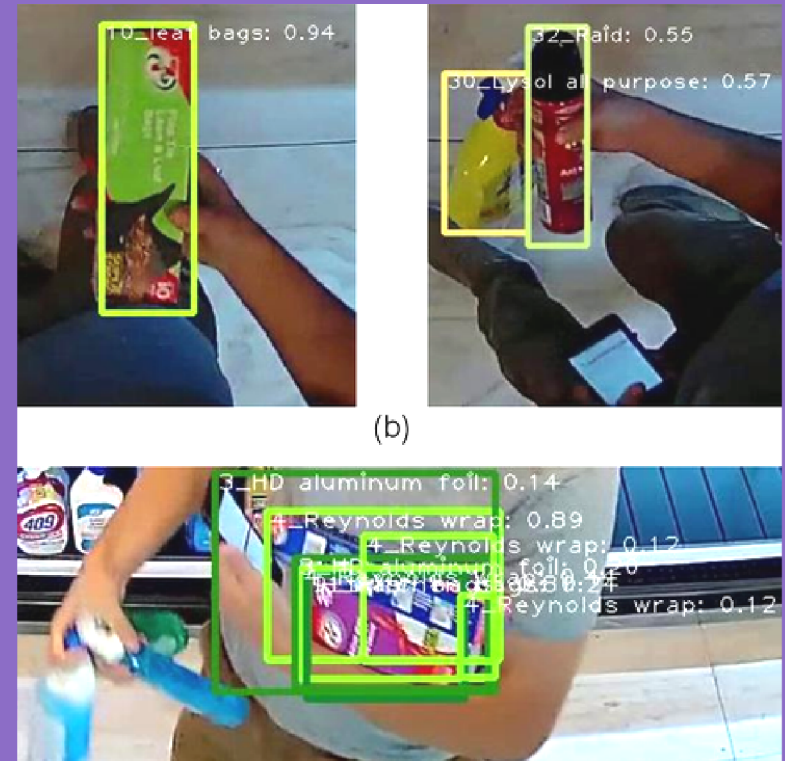
FEATURES

It works through:

- visual recognition
- weight recognition
- emotion recognition

This mapping, can make self-checkout an even **faster** and **easier experience**.

Multimodal Sensing





5. Online shopping experience

THE IMPROVEMENT

An efficient way to change the traditional cash desk concept

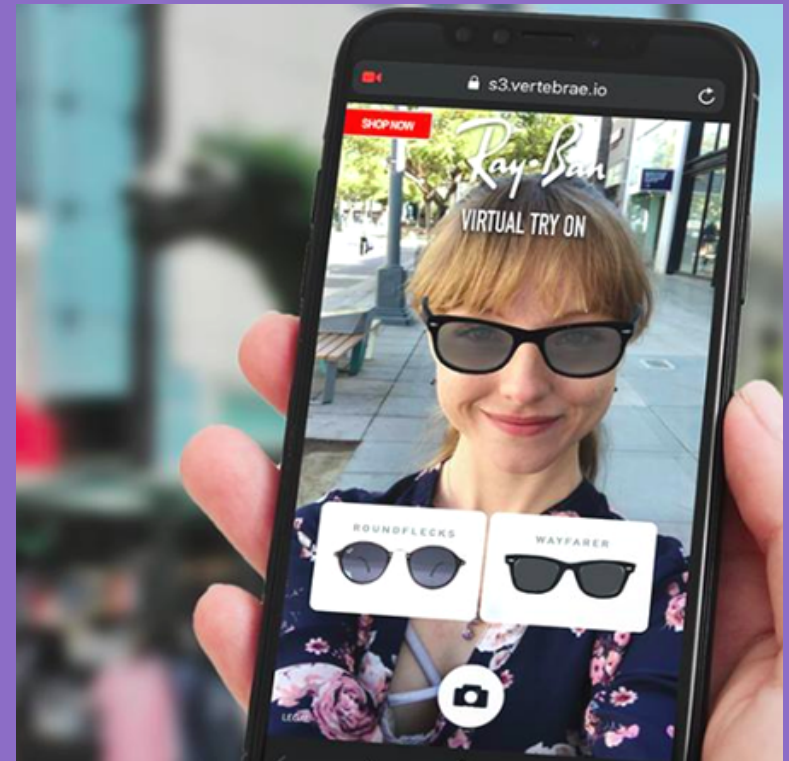
Augmented reality

WHAT IS IT?

The Augmented Reality (AR) is the enrichment of human sensory perceptions through informations. It could be used for retail as well, to get customers chances to **enrich** their shopping experience, in particular when they cannot try garments.

ADVANTAGES

- It reduces returns for clothing stores
- Makes Online Products “Tangible”
- Brings customers inside a store
- Reduce hygiene issues





**Ethical
implications and
accessibility**

- **PRIVACY IN UBICOMP**
- **PHYSICAL BARRIERS FOR PEOPLE WITH DISABILITIES (PWDS)**

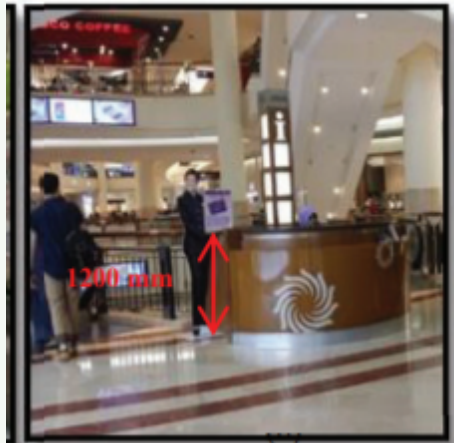
Privacy in ubicomp

- With the advent of modern telecommunication and computers, society's focus changed from **bodily** and **territorial privacy** to communication and information privacy. Ubicomp's embedded and ubiquitous sensors now reassert the importance of bodily and territorial privacy.
- **Privacy violations** can be seen as involuntary border crossings, i.e., whenever information permeates **barriers** without our **consent**.

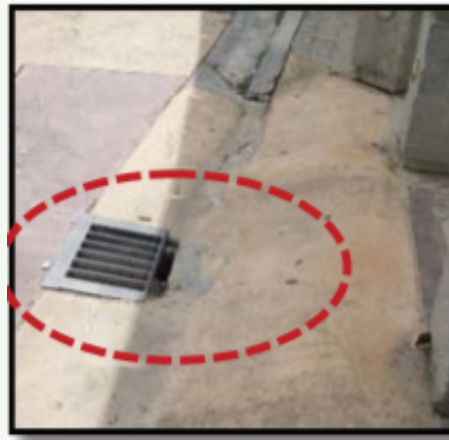


Physical Barriers for PWDS

Examples of barriers in shopping malls



Reception



Pedestrian



No guiding blocks



Future challenges

- **Omnichannel:** it provides seamless customer experience whether the client is shopping online from a mobile device, a laptop or in a brick-and-mortar store.
- **Holistic approach:** involves the age-old and proven fundamentals of retail. This strategy does demand investment, but its future will secure the retailers from being disrupted and has long-term payouts.

«In the age of mobile internet, the merging of online and offline retail is a trend, consumers don't distinguish between online and offline as long as it fulfills their needs.»

Jianzhen Peng, Secretary General of the China
Chain Store Franchise Association

SOURCES

1. [Enriching Shopping Experiences with Pervasive Displays and Smart Things](#)
2. [Designed to Fit: Challenges of Interaction Design for Clothes Fitting Room Technologies](#) - Bo Begole, Takashi Matsumoto, Wei Zhang, Nicholas Yee, Juan Liu, Maurice Chu
3. [Real-time virtual fitting with body measurement and motion smoothing](#)
4. [Designed to Fit: Challenges of Interaction Design for Clothes Fitting Room Technologies](#) - Bo Begole, Takashi Matsumoto, Wei Zhang, Nicholas Yee, Juan Liu, Maurice Chu
5. [The Impact of Virtual Fitting Room Technology on Consumers' Online Purchase Intention](#)
6. <https://thecurrentdaily.com/2018/02/17/mango-launches-digital-fitting-rooms/>
7. <https://cb4.com/blog/smart-fitting-rooms/>
8. [Smart Shoppe using Beacon](#)
9. [AUGMENTED REALITY PLATFORMS FOR VIRTUAL FITTING ROOMS](#)
10. [The adoption of RFID in fashion retailing: a business value-added framework](#)

SOURCES

- 11.[Tecnologia RFid, come funzionano i lettori di radiofrequenze e i tag](#)
- 12.[AutoTag: Visual Domain Adaptation for Autonomous Retail Stores through Multi-Modal Sensing](#)
- 13.[Human Friendly Interface Design for Virtual Fitting Room Applications on Android Based Mobile Devices](#)
- 14.[10 ways how augmented reality can help retailers](#)
- 15.[7 Benefits of Augmented Reality in E-Commerce](#)
- 16.[PRIVACY IN UBIQUITOUS COMPUTING](#)
- 17.[Design for Privacy in Ubiquitous Computing Environments](#)
- 18.[Physical Barriers Faced by People with Disabilities \(PwDs\) in Shopping Malls](#)
- 19.[Le nuove sfide del retail: dalla digitalizzazione ai nuovi format](#)
- 20.[How does Contact Center AI Work?](#)
- 21.[Future Of Retail Is Omnichannel](#)

VIDEOS:

- <https://www.youtube.com/watch?v=ZGL0HpNm5BY>
- <https://www.youtube.com/watch?v=zBKtZvy5r1A>

**Thank you for your
attention!**

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