

Is the future touchless?

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The Future

In 2002, **Steven Spielberg** asked **15 experts** to predict what technology would look like in 2054 for the film *Minority Report*. Today, these **technologies** are a **reality**.

Crisis

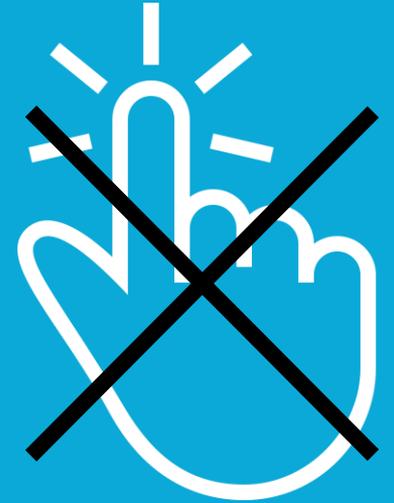
Changes

Do not touch

EVERY DAY we talk about the return to the new normal because we know that nothing will ever be the same, even if we are able to remove our masks and embrace one another again. These months of avoiding contagion will leave an indelible mark on our behavior.

Because what COVID-19 is changing most in our lives is the way we relate to people, things and technology. Before the pandemic, "Touchless" applications were used in very specific sectors (for people with mobility limitations, banking, etc.) but the health crisis has increased interest in these technologies and will undoubtedly promote their development. The **adoption of new habits always takes time**, but it accelerates if a social need exists as its driving force.

Touching has become a conscious, premeditated act to be avoided!



The crisis of the COVID-19 pandemic has changed our perception of what is healthy and safe. Keeping your distance and avoiding contact has become a habit. We prefer to use **touchless** solutions in daily transactions, forcing companies and institutions to adapt the user experience to the demands of citizens, workers and clients.

Some technologies that existed prior to the pandemic have now become a necessity. Technologies such as eye-tracking, voice-control, and gesture or facial recognition have been driven by the pandemic to have uses beyond the scope of hygiene.

To adopt these touchless technologies, training and security in data privacy is essential. We need a transparent and respectful protocol, and widespread awareness, especially, regarding personal information.



Is it a trend or a reality?

The pandemic is encouraging the development of hands-free interfaces to interact with technology and is creating the right environment for habituating us to use them, resulting in a less-traumatic adoption process (Natural User Interfaces, NUI).

Necessity is facilitating their adoption

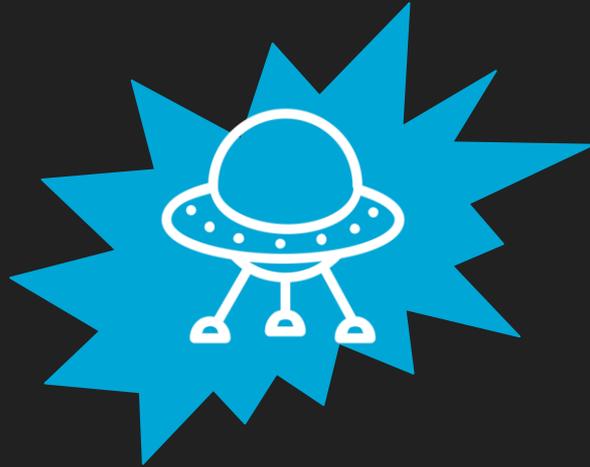
Sensory interfaces will be implemented gradually in applications that use gesture and eye-tracking, and facial recognition will be used for security protocols. Slowly, we will get used to using them in public environments, such as hospitals, offices, airports, schools, universities, and shops, and also within the home, due to their convenience and hygiene.

"52% of consumers during the COVID-19 pandemic prefer personal identification to be carried out through facial recognition."
"And 66% prefer to use their mobile applications in places like physical stores and bank branches, instead of the tactile alternatives."

Capgemini Research Institute,
Consumer Survey, April 2020

According to Gartner, by 2023,
50% of applications will include at
least one type of touchless
experience such as gaze, voice,
gestures, or VR or AR.

Is it science or fiction?



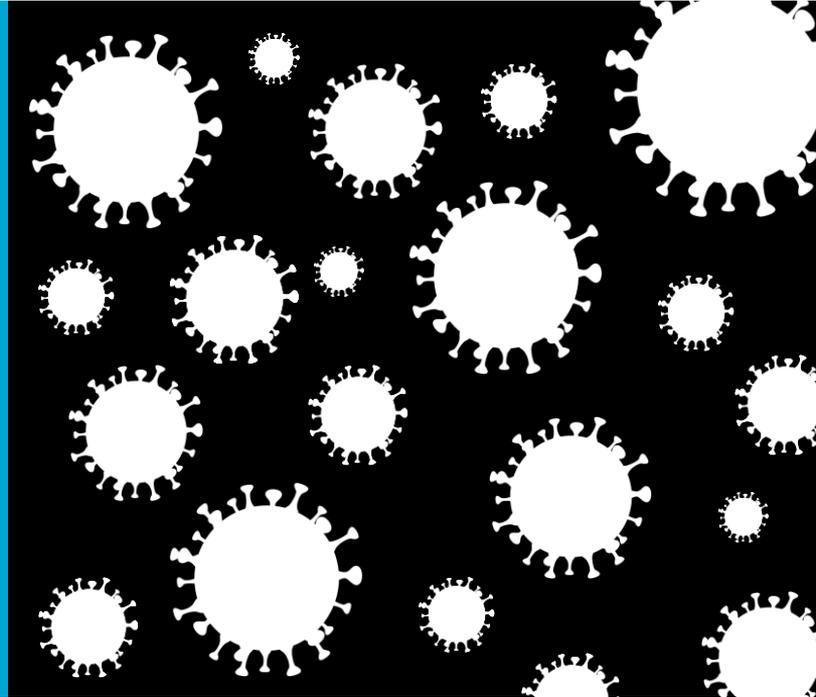
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What is "touchless" technology?

"Touchless" technology is not a new technology and has many uses aside from preventing contagion in a pandemic.

We already use contactless technology for payments (which is touchless), we dry our hands without touching the dryer, we have voice assistants at home and other applications that use facial recognition as a security element. Also, there are technologies that allow interaction through eye-contact and gestures, such as eye-tracking devices, for human-machine interaction.

EVERYTHING can be done hands-free.



What is "Touchless" technology?

Touchless technology has a relational functionality through which we can communicate with a computer using only gestures, gaze or any sensor capable of sending an instruction without physical contact. Touchless technology is based on interpreting the gestures we use every day to count, order, learn and communicate, converting them into relationship models through algorithms so that our technological interactions are **less invasive, more natural** and less conscious. We equip machines with intelligence (interfaces, AI, etc.) so they can interpret our body language (gestures, gaze, voice), humanizing communication between person and machine.

OBJECTIVE: intuition directs our relationship with technology.



"Touchless" every day

Facial or iris recognition technology for access control, for online education, in automatic doors, contactless payment devices, motion sensor lights, cisterns, taps, hand dryers, paper or soap dispensers, rubbish bins, sun blinds, and so on, are some of the more familiar examples of touchless technology. Eye-tracking is also used, for example, to detect when a driver is falling asleep. Combined with VR, we have achieved versatile advances in technology which include facilitating factory machine repairs, training courses for new workers, and virtual assistants for surgeons during operations...

The technology already exists and if we can envision it, **it can be done.**



There is more than one form of touchless technology

There are diverse and combinable uses!

Two types of sensors are mainly used for touchless technology: infrared and capacitive. Both of these function by allowing an electronic device to communicate with its surroundings. Natural language processing is another modality. Some touchless developments include:

- Eye-tracking
- Touchless sensors
- Facial recognition
- Gesture recognition
- Voice recognition
- Personal devices



Personal devices

Although they are not touchless technology themselves, personal devices allow us to perform some actions without having to touch anything other than our mobile, for example, when paying, opening a car or a door, etc.

Voice recognition

This technology has been present in our homes for a few years. Through Natural Language Processing (NLP), speech inputs are combined with executable commands. It can learn using AI techniques. We can give instructions without using our hands, play music, shop, make a phone call, simply by speaking to Voice Assistants such as Siri, Alexa, Bixby or Google.

Eye-tracking

A sensory technology that makes it easy to identify where a person is looking. An eye tracker, through video images, calculates the position of the eye and thus can detect the direction and intensity of a person's gaze. This allows us to analyse a person's attention and their behaviour, and lets us interact with technology. It is widely used in advertising, in assistive communication, in vehicles to detect distractions or in Industry 4.0, among other sectors.

Facial Recognition

This technology does not require the user to do anything. For example, you can unlock or lock a computer or phone or gain access to it by allowing it to recognize your face, or it can also be used in distance learning to know whether students are connected.

Touchless sensors

This technology detects presence or movement through sensors (ultrasound). It is present in our everyday life: in lights that are activated by our presence or doors that open when we approach. Today it already applies to the use of computers.

Gesture recognition

This is one of the most well known. Users can interact or control devices without touching them, using gestures they are used to but without touching anything. For example, opening a folder by moving your hand without touching the screen.

KOHLER, the American household appliances company, reported an eightfold increase in sales of touchless taps and toilets in March 2020 compared to 2019.

TESLA the automotive company offers a vehicle purchasing experience that minimizes customer contact with company employees, ensuring a safe purchase.

IRISBOND has developed an application for Samsung, Tallk, which allows you to interact with a Samsung tablet using only your eyes, employing the tablet's camera as an eye tracker.

amazon go has implemented payment in its stores using vision and facial recognition to ensure a contactless experience and reduce the risk of infection. Payments can be made through hand recognition.

ICICI Bank, India's second largest bank, introduced the use of a voice assistant during the pandemic. Users can access a wide range of banking services using just their voice.

proxy a Silicon Valley-based startup has developed a contactless identification application to replace keys and key rings.

NEC the Japanese multinational technology and communications company is using AI together with facial recognition for access to offices, airports, etc. Thanks to the sophistication of the technology, it can recognize you even if you are wearing a mask.

If
I hadn't
see it...



has developed a visual detection system that recognizes what you see and gives you information about what is before your eyes. For example, what is that roadside restaurant like? The aim is to combine several technologies: voice recognition (NLP), gaze detection and gesture interpretation, to achieve a more human interaction with the car.

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From luxury to necessity



77%

of consumers around the world think that their use of touchless interfaces will grow in order to avoid physical contact

62%

think the trend will continue when the COVID-19 pandemic has passed

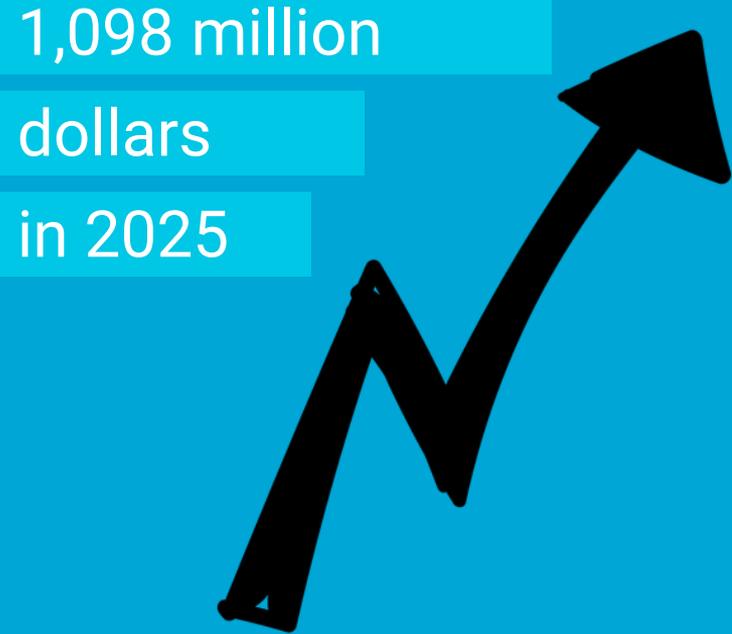
Capgemini Research Institute May 2020 COVID-19 and the age of the contactless customer experience: Winning the trust of consumers in a no-touch world

Market growth

The touchless market is expected to reach a turnover of 1,098 million dollars in 2025*. Today it is growing in areas such as Assistive Technology for Communication (AAC), telephony, Internet of Things (IoT), and is increasing demand for sensors that do not require physical contact for activation, and which good hygiene and the avoidance of contagions.

The key is that the companies of the main operating systems (Microsoft, Apple, Google, Samsung) are adopting these technologies to improve the usability and accessibility of their platforms, and to achieve more efficient and "user-friendly" experiences.

*<https://www.marketsandmarkets.com/>



1,098 million
dollars
in 2025

Opportunities & Barriers



- Growing demand in AAC, healthcare, industry 4.0 and automotive industries...
- Technological developments are reaching a level of highly-sophisticated and adaptable solutions
- Improvement in the user experience
- Various technologies can be integrated to improve the user experience
- VR requires complementary technologies
- Home consumption is increasing



- Adoption, the learning of a new technology
- Technological improvement to reduce frustration
- Many small players in the market
- Production is still expensive due to its small scale

Uses and Sectors



Disability: eyes that speak

The first approach of many sensing technologies is to **improve the lives of patients with physical disabilities**. This is what is called assistive technology and includes any technology that can facilitate or improve the interaction of disabled people with the world around them and with technological devices. For example, **thanks to eye-tracking**, ALS sufferers or people with cerebral palsy **can communicate**, search for information or write with some degree of normality. Eye-tracking is able to follow their eyes and perform functions through a wink or a fixed gaze. So dependent people can become **more independent**.



Healthcare: the eyes as a diagnostic tool



There is an increase in research into the use of technologies such as **eye-tracking in the diagnosis and treatment of neurological diseases**. A child who will develop autism does not have the same gaze as a child who will not. This can facilitate an early diagnosis that can make a difference in their treatment. It is very minimally invasive. The same goes for diseases like dyslexia or Alzheimer's. In addition, touchless technologies such as gesture recognition or **eye-tracking are being used by surgeons to consult information** on a computer while operating on a patient. Last but not least, hospital information screens or elevator buttons will have a tendency to become touchless because they are in spaces with a high risk of contagion.

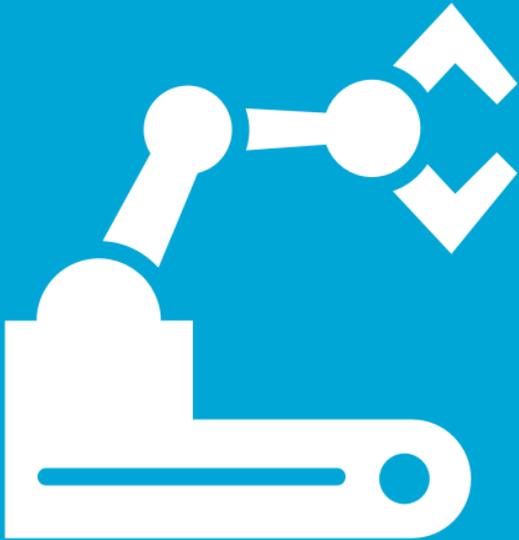
Automotive Industry: the trend towards excellence

The most direct application is in **driver monitoring** systems (DMS), where eye-tracking technology is vital. With the aim of creating safer and more advanced cars, the combination of facial recognition and eye-tracking allows the vehicle **to obtain information about the driver's attention**, alertness or concentration behind the wheel, and issue warnings and notifications while driving.

Furthermore, eye-tracking is used in test processes and safety inspections, since it provides information - through heat maps, for example - about the focus of the driver's gaze. Mixed reality systems are even being implemented and combined with virtual reality to **identify elements that cause distraction** or emergencies while driving.



Robotics and industry 4.0: the human-robot relationship

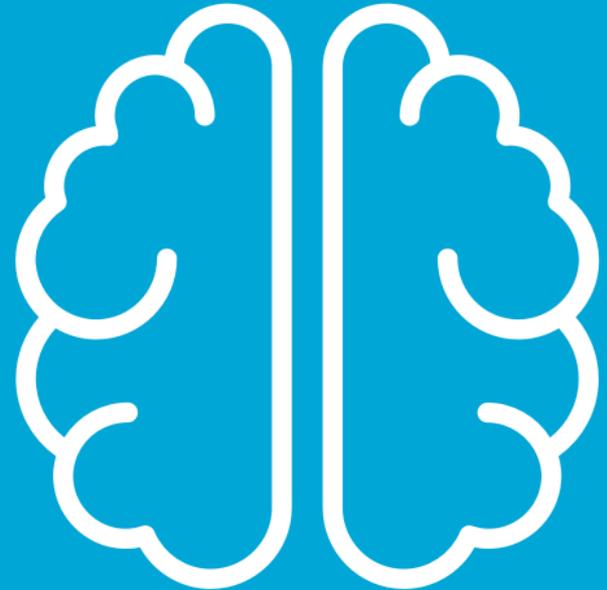


This is one of the professional activities where complex learning and lengthy training are required for its proper execution. In this sector, **technology is advancing by leaps and bounds,** opening up new possibilities of applications for the robotics industry and especially for man-robot collaborative robotics. For example, when carrying out inspection tasks using a camera, the eyes can be used to direct the camera to where the inspection photograph is to be taken, and an order can be given to take the photo by winking an eye. Or the concept of the "third arm", which allows people who use machinery or tools which require both hands to give instructions to a robot using their eyes, allowing them to perform additional operations on the machinery or to manage dangerous tasks.

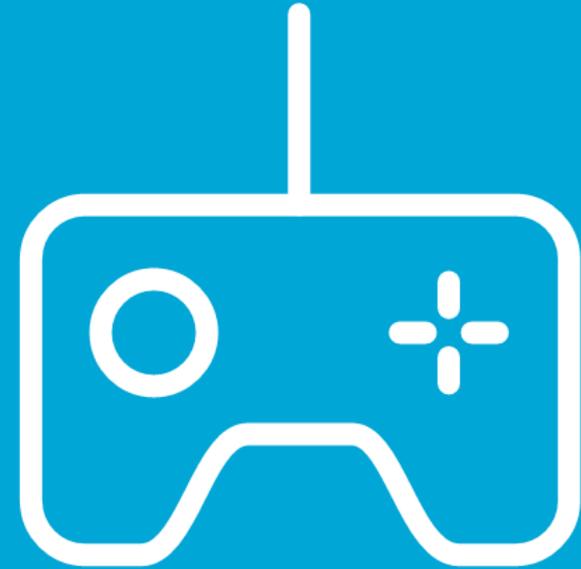
Neuromarketing: what the consumer wants

In marketing, it is vital to understand consumer behaviors, preferences and decisions to be **able to predict future behaviors**; for this, neuromarketing techniques such as EEG, eye-tracking or implicit response tests are used. Eye-tracking technology **allows for the identification** of **behavior patterns** during a visit to a point of sale (physical or digital) or at certain moments of contact with the brand through exhaustive eye-tracking.

The applications are endless, from software/hardware usability, advertising and product testing in stores, to the analysis of consumer behaviors... There are numerous advantages, since it provides information on temporal processes with high-resolution, is adaptable to multiple environments and is combinable with other devices, **at a relatively affordable cost.**



Gaming and Entertainment: more real than reality



The video game industry has been innovating in technologies to achieve a more immersive gaming experience for years. For this reason, it has resorted to sensory technologies. Microsoft Kinect **detects the movements of the person who is participating and integrates them into the game.**

Nowadays, the controls of video consoles have evolved to take the experience to another level: tactile sensations are transmitted through ultrasound to the mechanoreceptors of our skin to make us feel sensations that do not really exist!

Again, it sounds like science fiction, but it is not. Haptic feedback (through touch) seeks to trick the brain into making us feel sensations that do not exist. This is achieved through vibrations of different intensities that make us feel what we see on the screen.

Consumer Electronics: home automation, urban support

There are already companies that offer simple software allowing us to interact with household devices without touch, such as the use of motion sensor lights or voice assistants to which you dictate what you need (such as making coffee, shopping or calling a cab).

Technology can be more sophisticated, **detecting who is in the room** and executing certain functions in a personalized way, for example, changing the TV channel if a child enters the room, or allowing access to your home through facial recognition thereby eliminating the need for keys, among other options.

Outside the home, touchless technologies will spread to restaurants, buses, public buildings, etc. These are the places where COVID-19 is changing the way we interact with the environment.



Privacy: security conducted with individuality



Through biometric technologies, we can **verify the identity of a person by reading the unique characteristics that each individual possesses**, for example, their voice, their fingerprints or their iris. We have mentioned before that there are already means of payment which can verify your identity using your hand **without the need to touch anything**.

The use of this touchless technology raises fears due to the possibility of fraudulent uses of information, but it also enables security measures such as: capacity control or access control, making it impossible for unauthorized persons to use machinery, blocking content from a minor, reinforcing security passwords to avoid identity theft, payments...

What does the future hold for us?

Mind-controlled interfaces.

This sounds like science fiction, but it is not. Scientists are already working on how to operate digital devices using the mind. Mind-clicking technology is already being developed and tested by companies like Facebook. Sensors were implanted in people's brains at first, but today, significant progress has been made and less intrusive means are used.

And even though research has only just begun, like other touchless technologies that help those who need it most, it will permeate our day-to-day lives.

In a future that is closer than we think, we will be able to type words just by thinking about them. This is science, not fiction.

Touchless Technology,

2054 or 2021?

Thank you!

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