The end of public touchscreens?

How attitudes to touchscreens in interactive kiosks and digital out-of-home are changing post-COVID-19

ultraleap

Executive Summary

Self-service kiosks and out-of-home digital screens are everywhere, from malls to supermarkets to hospitals. The global interactive kiosk market size alone was valued at $23.11 billion in 2018. Prior to the COVID-19 pandemic, it was expected to register a year-on-year growth of almost 9% to 2025.[1]

Across the board, touchscreens are the primary user interfaces for these devices. But there are now widespread concerns among consumers about the health risks of touching shared surfaces.

Ultraleap conducted a survey of over 500 UK and US consumers to assess attitudes to public touchscreens, and touchless alternatives – in particular, gesture control powered by hand tracking.[2]

The results demonstrate a significant shift in consumer perceptions. Around 80% of people now consider public touchscreens to be unhygienic. Only around 50% think they will be likely to interact with public touchscreens in the future.

Conversely, the survey revealed an appetite for gesture control, with over 80% thinking it was hygienic, and over 70% saying they were likely to interact using gesture control in the future.

These new attitudes create significant commercial risks for the status quo. At the most fundamental level, if 50% of people are unlikely to touch public screens, that will make them less likely to interact, make a purchase, or complete a transaction. Requiring unwilling consumers to interact using screens is likely to create negative brand associations, and present operational challenges (such as cleaning and associated needs for increased staffing).

However, the converse is also true. Companies that move quickly to address consumer concerns will gain trust, new customers, and brand loyalty. Taking meaningful steps to enable customers to interact in ways they perceive to be safe demonstrates concern and respect.

Our study showed that people still value the convenience of interactive kiosks and digital out-of-home screens – but they want to be able to interact with them in ways that do not involve touching surfaces. In a world where consumers are hyper-aware of hygiene risks, we now need to be thinking about the next step towards the touchless interfaces of the future.

Saurabh Gupta
Director of Product, Ultraleap

[1]https://www.grandviewresearch.com/industry-analysis/interactive-kiosk-market
[2]For detailed information about study methodology, see appendix

Ultraleap conducted a survey of over 500 UK and US consumers to assess attitudes to public touchscreens, and touchless alternatives.

Over 70% of people think they will be likely to interact using touchless gesture control in the future.

Consumer attitudes to public touchscreens are changing rapidly

There are clear benefits in the rise of interactive kiosks and digital out-of-home (DOOH) screens. These include reductions in transaction time, enhanced shopping experiences, and the ability to handle higher traffic volumes in scenarios where throughput is paramount.

However, in the post-COVID-19 environment, our study demonstrates a sea-change in consumer perceptions of the health risks of public touchscreens.

Hygiene is top of mind. Unprompted, a large number of respondents listed hygiene as one of the top three drawbacks of touchscreens. It was, by a long way, the number one drawback in both the US and UK. Over 40% of consumers mentioned it.

While consumers continue to value touchscreens' ease of use and speed, they now consider hygiene to be a major drawback.

We specifically asked respondents how much they agreed with the statement that "touchscreens are hygienic". Around 80% actively disagreed. Less than 15% agreed.

This reluctance to touch surfaces is also likely to extend to other public interfaces, such as elevator controls and door releases.

Part of our survey involved open-ended questions. Some responses were very strongly worded. One UK consumer told us, *"As for the touchscreen, that's literally asking to get germs and god knows what else, and I'd rather not do that to myself,"* while one US participant said, *"The touchscreen is something I just would not use due to the coronavirus. Too scary."*

This constitutes a major shift in consumer perceptions. It is likely to lead to significant behaviour change.

"The coronavirus has made me rethink my willingness to touch things in public places. This is an unnecessary risk, so I'd rather not."

US consumer

Participants were asked to write down the top three benefits and drawbacks of using a touchscreen.

TOP 3 BENEFITS OF USING A TOUCHSCREEN

UK

	% of total responses
Easy to use	26%
Quick	23%
Access to information	23%

US

	% of total responses
Quick	24%
Easy to use	20%
Access to information	13%

TOP 3 DRAWBACKS OF USING A TOUCHSCREEN

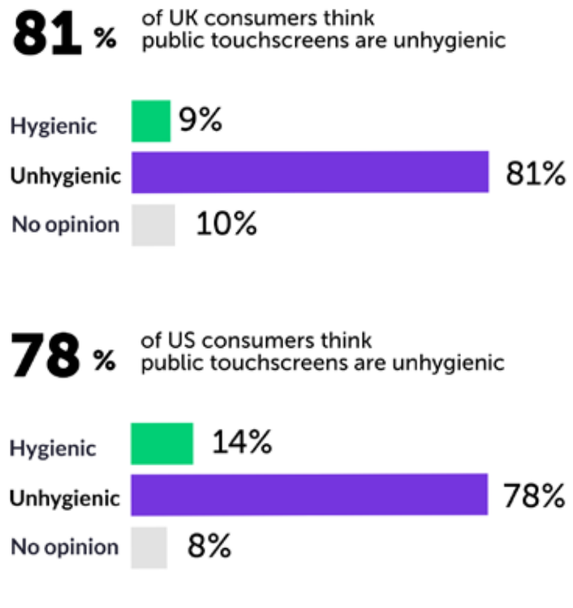
UK

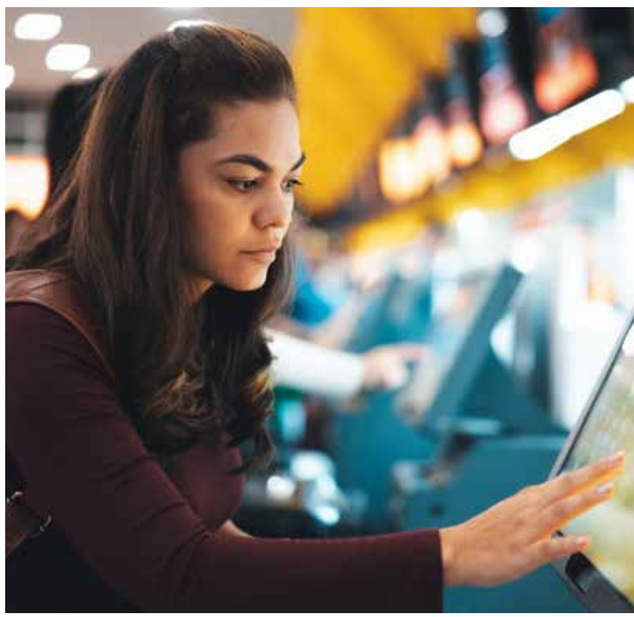
	% of total responses
Unhygienic	**42%**
Reliability of the tech	12%
Ease of use	7%

US

	% of total responses
Unhygienic	**41%**
Reliability of the tech	13%
Ease of use	7%

HOW MUCH DO YOU AGREE THAT TOUCHSCREENS ARE HYGIENIC?





Are consumers right to be worried?

There are no published studies analyzing the prevalence of COVID-19 on public surfaces. However, previous studies looking at public touchscreens have established significant levels of bacterial contamination.

Studies have also shown just how frequently interactive kiosks are used. One 2019 study of supermarket point-of-sale kiosks measured, on average, only 88 seconds between customers. This suggests it would be difficult to implement any effective cleaning regime.

The exact scale of the risk from public touchscreens at this stage of the COVID-19 pandemic is unknown. However, from the perspective of retailers, brands, and other companies in interactive kiosks/DOOH ecosystems, the key thing is that consumers *perceive* there to be a significant risk – and are changing their behaviour accordingly.

Companies could try to reassure consumers, but will consumers trust these reassurances? Why should they, given that robust data on risk is not yet available? And how will they feel about brands that try to convince them public touchscreens are safe, when they themselves perceive otherwise?

- On average a point-of-sale supermarket kiosk is used **25 times per hour with only 88 seconds between customers**.[3]
- Viruses can stay viable on surfaces from **several hours to more than 2 months**.[4] Bacteria can survive from a few days to over 30 months.[5]
- The likelihood of a harmful bacterium or virus transferring from a surface to a hand varies but can be extremely high. In one study the bacteria E.Coli, Salmonella and Staphylococcus were all **100% likely to move from surface to hand**.[6]
- Pre-COVID-19 studies suggested the frequency of effective handwashing was low[7] and that we touched our faces, on average, **over 20 times an hour**.[8] (Recent public health campaigns may have changed this behaviour.)
- A 2016 study showed that **100% of 17 touchscreens in a grocery store had bacterial colonies on, and 59% had dangerous bacteria such as E.Coli**.[9]
- A 2009 study of London public transport and a public space in a hospital found that **60% of regularly touched surfaces had medium-high levels of bacterial contamination**.[10]

On average a point-of-sale supermarket kiosk is used 25 times per hour with only 88 seconds between customers.

From the perspective of companies in interactive kiosks/DOOH ecosystems, the key thing is that consumers perceive *there to be a risk – and are changing their behaviour accordingly.*

[3]T. Antczak & R. Weron "Point of Sale (POS) Data from a Supermarket: Transactions and Cashier Operations" Journal: Data. 2019: https://www.mdpi.com/2306-5729/4/2/67 | [4]P. Vasickova et al. "Issues Concerning Survival of Viruses on Surfaces" Journal: Food and Environmental Virology. 2010: https://link.springer.com/article/10.1007/s12560-010-9025-6 | [5]A. Kramer et al. "How long do nosocomial pathogens persist on inanimate surfaces? A systematic review" Journal: BMC Infectious Disease. 2010: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1564025/# | [6]E. Scott & S.F. Bloomfield "The survival and transfer of microbial contamination via cloths, hands and utensils." Journal: Journal of Applied Bacteriology. 1990: https://sfamjournals.onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2672.1990.tb02574.x

[7]See for example American Society for Microbiology Survey. 2003 https://www.eurekalert.org/pub_releases/2003-09/asfm-aua091103.php, P. Godoy et. al. "Effectiveness of hand hygiene and provision of information in preventing influenza cases requiring hospitalization" Journal: Preventitive Medicine. 2012: https://www.sciencedirect.com/science/article/pii/S009174351200151X, Borchgrevink et al. "Hand washing practices in a college town environment" Journal: Journal of Environmental Health. 2013 : https://pubmed.ncbi.nlm.nih.gov/23621052/ | [8]Y.L. Kwik "Face touching: a frequent habit that has implications for hand hygiene" Journal: American Journal of Infection Control. 2015: https://www.ncbi.nlm.nih.gov/pubmed/25637115 | [9]C.P. Gerba et al "Bacterial contamination of computer touch screens" Journal: American Journal of Infection Control. 2016: https://www.sciencedirect.com/science/article/abs/pii/S0196655315010688 | [10]J.A. Otter & G.L. French "Bacterial contamination on touch surfaces in the public transport system and in public areas of a hospital in London" Journal: Letters in Applied Microbiology. 2009: https://sfamjournals.onlinelibrary.wiley.com/doi/full/10.1111/j.1472-765X.2009.02728.x

Alternatives to touchscreens

People clearly still value the convenience of interactive kiosks – but they want to be able to interact with them in ways they perceive to be safe.

Increased cleaning and provision of hand hygiene gel are short-term solutions with significant drawbacks. Given how frequently interactive kiosks are used, cleaning protocols may be ineffective. Additional staff will be needed, and requiring customers to clean their hands creates negative brand associations and friction in the purchase journey.

In the long term, people need be able to interact with public screens in ways that do not involve touching surfaces. There are likely to be multiple different modes of interaction, each with different strengths/limitations for different use-cases and different consumers.

In the future these technologies will form an ecosystem of touchless interaction methods that consumers can utilize to interact with public screens.

Our study specifically investigated attitudes towards touchless gesture control powered by Ultraleap's hand tracking. It showed that, unprompted, people list hygiene as the number one benefit of gesture control. When specifically asked, around 80% consider gesture control to be hygienic.

As would be expected for a relatively new technology, consumers also want to be sure it is easy to use and reliable. Companies adopting gesture control, voice control, or mobile apps need to ensure interfaces are intuitive and easy to use.

THE THREE MAIN TOUCHLESS ALTERNATIVES TO TOUCHSCREENS:

- **Gesture control**
  By tracking the position of a user's hands, they can control digital content by moving their hands in mid-air, without touching a screen. Mid-air haptic feedback can be added to boost user engagement.[11]

- **Voice control**
  Voice recognition software enables users to speak to a computer directly. Unlikely to be suitable for all use-cases (for example, entering sensitive information such as a PIN number, or in noisy locations).

- **Mobile apps/second screen**
  Using your own device to connect to a public screen means that you know exactly where the screen you are touching has been and who has touched it. Depends on users being willing to take the time to install an app.

[11]See https://www.ultraleap.com/company/news/blog/boost-customer-engagement-study/

Participants were asked to write down the top three benefits and drawbacks of using gesture control.

TOP 3 BENEFITS OF USING TOUCHLESS GESTURE CONTROL

UK

	% of total responses
Hygienic	**47%**
Easy to use	10%
Quick	10%

US

	% of total responses
Hygienic	**50%**
Easy to use	13%
Quick	12%

TOP 3 DRAWBACKS OF USING TOUCHLESS GESTURE CONTROL

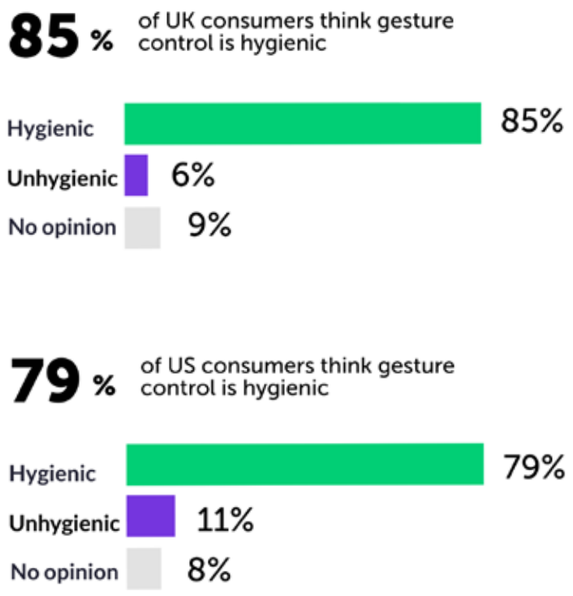
UK

	% of total responses
Ease of use	31%
Reliability of the tech	16%
Speed	9%

US

	% of total responses
Ease of use	34%
Reliability of the tech	19%
No drawbacks	8%

HOW MUCH DO YOU AGREE THAT GESTURE CONTROL IS HYGIENIC?



Business as usual is not an option

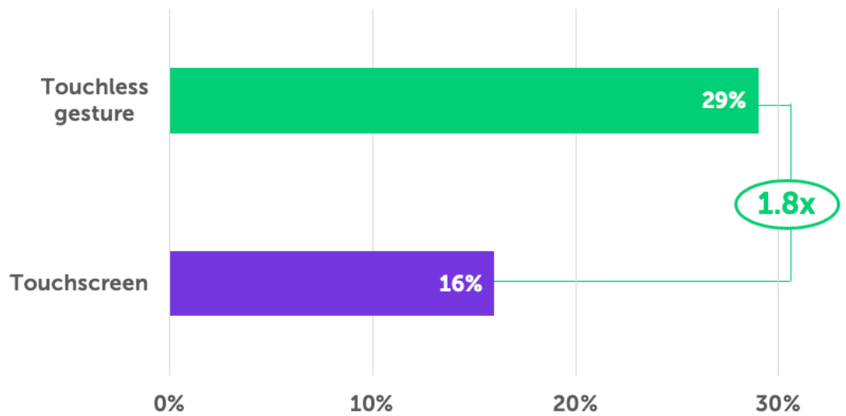
There is a significant business impact of this shift in consumer perceptions. Only around 50% of study participants told us they were likely to interact using touchscreens in the future. Over 70%, however, told us that they were likely to interact using touchless gesture control.[12]

At the most fundamental level, if half of customers are unlikely to touch public screens, that will make them less likely to interact, make a purchase, or complete a transaction. There is also the question of negative brand associations. If consumers are given no choice but to interact using an ATM, gas station kiosk or even elevator button when they don't feel comfortable doing so, how will that affect their perception of the companies that require them to do this?

At the more extreme end, retailers and brands run the risk of negative publicity or even legal action.

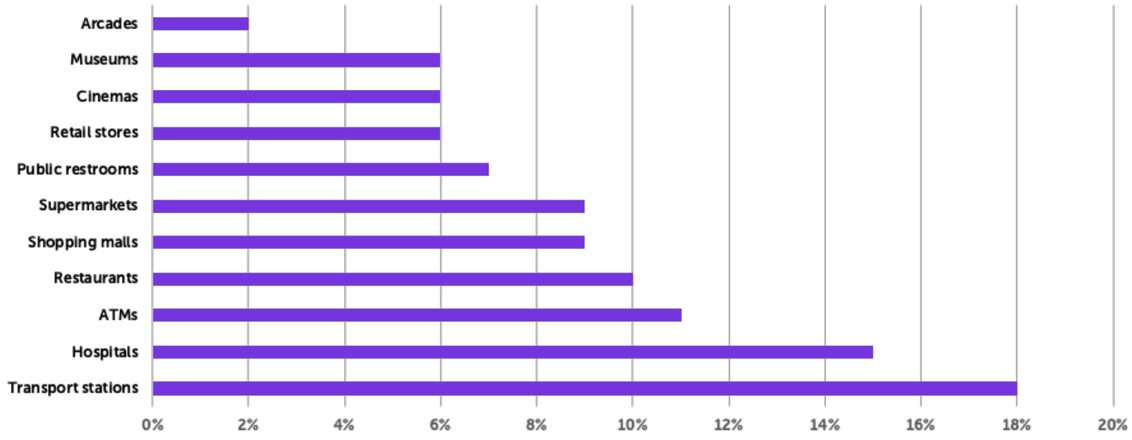
However, the converse is also true. Retailers who move quickly to address consumer concerns by deploying touchless solutions will gain trust, new customers, and brand loyalty. Taking steps to enable customers to interact in ways they perceive to be safe demonstrates concern and respect.

% OF RESPONDENTS STATING THEY ARE "VERY LIKELY" TO INTERACT WITH THE TECHNOLOGY IN THE FUTURE



[12]58% of UK participants and 50% of US participants stated they were "very likely", "likely" or "somewhat likely" to interact with touchscreens in the future. 71% of UK participants and 74% of US participants stated they were "very likely", "likely" or "somewhat likely" to interact with touchless gesture control in the future.

CONSUMERS IDENTIFY TRANSPORT STATIONS, HOSPITALS, ATMS, AND RESTAURANTS AS THE MOST IMPORTANT LOCATIONS FOR TOUCHLESS INTERFACES TO BE INSTALLED.



Consumers identified transport stations as the single most important place for touchless interfaces to be installed.

Delving into consumer preferences in a restaurant

To further explore consumer preferences in a post-COVID-19 world, we asked our survey participants to imagine they were in a public place, such as a food court at a shopping mall.

They could choose how to order and pay for a meal from:

- Touchless gesture control powered by Ultraleap
- Touchscreen
- Go to counter
- Mobile app

We asked them what their order of preference would be.

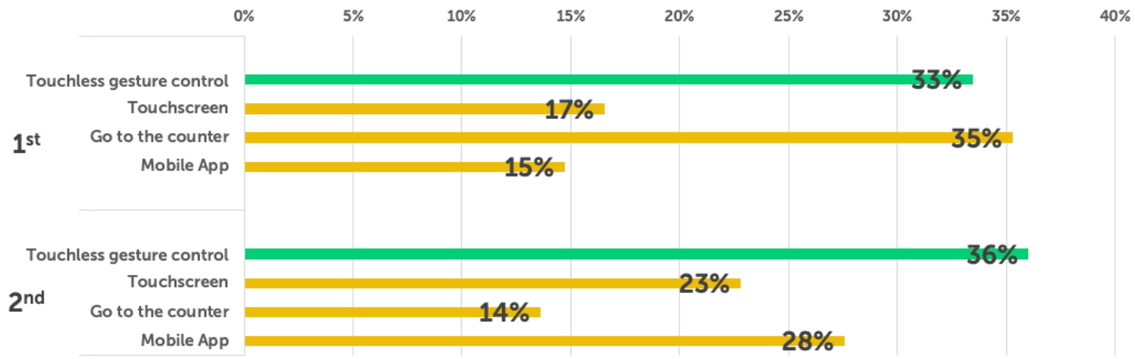
A significant number of people still preferred to order directly from a person (although some will also actively avoid it). However, touchless gesture control was the preferred mode of interaction when it came to self-service options. People would choose to interact using gesture control above a touchscreen or mobile app on both their first and second preferences.

When you combined first and second preferences, gesture control became *the number one choice across all forms of interaction*.

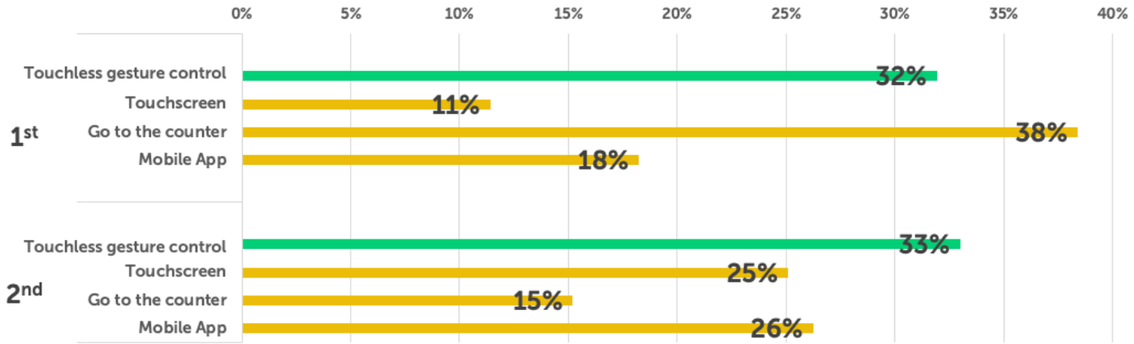
A key point to remember is that consumer choice does not just happen once someone has entered a restaurant. If different restaurants offer different modes of interaction (gesture control, counter service, touchscreen, mobile app), preferences will influence what restaurants customers gravitate to in the first place.

FIRST AND SECOND CHOICES FOR HOW TO ORDER AND PAY FOR A MEAL

UK



US



Combining first and second preferences, gesture control was the' number one choice across all forms of interaction.

+79%
more likely to choose touchless gesture control than a touchscreen[13]

+58%
more likely to choose touchless gesture control than a mobile app[14]

[13]Combined US and UK data and combined 1st and 2nd preferences.
[14]Combined US and UK data and combined 1st and 2nd preferences.

Ultraleap's world-leading hand tracking

Tracking the position of a user's hands enables them to interact with digital content by moving their hands in mid-air.

Your hands are an incredible work of natural engineering: powerful, intricate, flexible, and nuanced. Our world-leading software is all of those things too. It captures all the subtlety and complexity of natural hand movements with near-zero latency.

- Accurate skeletal tracking based on a decade of development and iteration, three generations of research in artificial intelligence and the feedback of hundreds of thousands of developers
- High accuracy and reliable hand/gesture detection
- Near-zero latency
- Hand size/geometry automatically accounted for

Optical hand tracking modules

Small and easy to integrate into new or existing installations. Suitable for interactive kiosks, digital screens, or holographic displays.

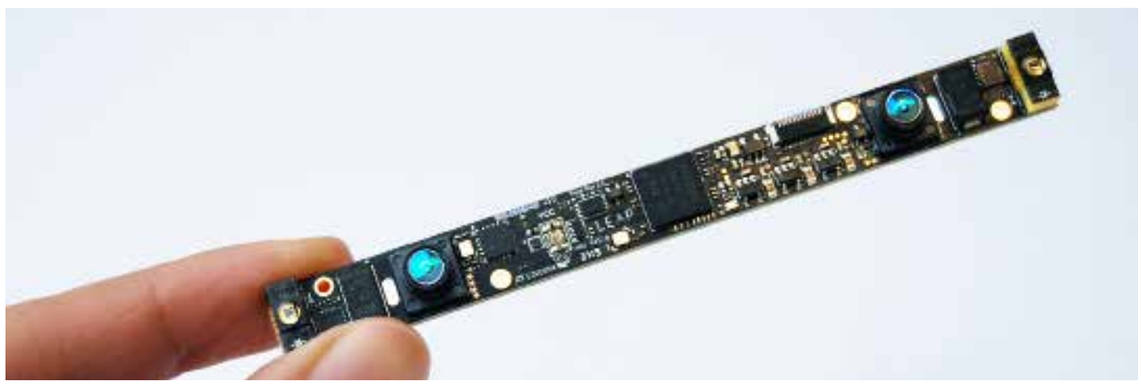
ULTRALEAP'S HAND TRACKING IN INTERACTIVE KIOSKS AND DIGITAL OUT-OF-HOME SCREENS

Ultraleap's hand tracking hardware can be easily retrofitted to existing interactive kiosks or digital out-of-home installations. Our software includes out-of-the-box solutions enabling existing touchscreens to be operated through a non-touch interaction layer. Tool suites support ground-up UI development for next-generation interfaces thought out from a "gesture-first" approach.

"With the advent of COVID-19 there will become a need for this type of [touchless] technology to become common in public places."

UK consumer

*Small. Fast. Accurate. Whether you're an indie developer or a multinational company, the **Leap Motion Controller** makes human interaction in digital worlds natural and effortless. Tracking up to 60 cm or more and FOV 150x120 degrees.*



*The **Ultraleap Rigel Camera Module** is the next generation of hand tracking hardware. Designed to be integrated into commercial hardware solutions, displays, and installations. Deeper range than the Leap Motion Controller, with tracking up to 75 cm or more and FOV 160x160 degrees.*

Ultraleap's "virtual touch" haptics

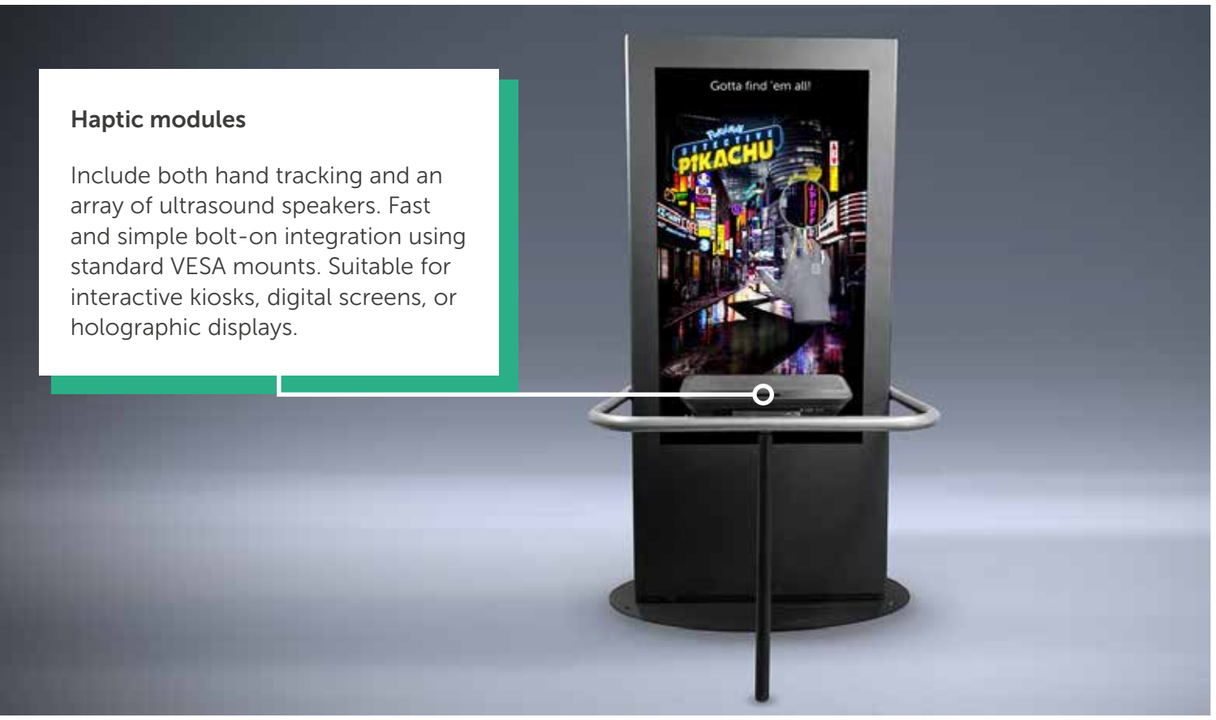
Ultraleap's patented algorithms modulate ultrasound waves to project shapes and textures directly onto a user's hands.

They can provide the sensation of touch up to 70 cm away from the surface. The accuracy of the sensation is less than a finger-width apart.

Mid-air tactile effects such as virtual sliders, buttons, and trackballs can be created, together with touchable 3D holograms and immersive sensations such as lightning, raindrops, and bubbles.

"I would use every option that stops me from interacting with other people or things that people have touched."

UK consumer



Haptic modules

Include both hand tracking and an array of ultrasound speakers. Fast and simple bolt-on integration using standard VESA mounts. Suitable for interactive kiosks, digital screens, or holographic displays.

MID-AIR TACTILE EFFECTS YOU CAN CREATE

Interface design

- Virtual sliders and trackballs
- Virtual buttons and dials
- Confirmations and alerts

Sensations

- Raindrops and waterfalls
- Hand scans
- Bubbles
- Tingling electricity
- Swirling wind
- Magical sparkles

*The **STRATOS Inspire** haptic module tracks the position of users' hands, and projects tactile effects onto them using ultrasound. This creates a large, 3D tactile interaction zone.*

Appendix: Study methodology

There were 538 participants in total across both the US (267) and the UK (271). The survey had two sections, one answering questions about touchscreens and the same questions after about Ultraleap's technology.

267
respondents from the US

271
respondents from the UK

The survey progressed from open-ended unprompted questions to more directed questions, finally providing a specific scenario. There were a range of types of questions to elicit quantitative comparisons for stats and open-ended questions to uncover attitudes and further insights. Two researchers conducted thematic analysis on the open-ended response data to arrive at common themes.

Importantly, at the start of each section, participants were asked to watch a video (either a public touchscreen or Ultraleap's touchless gesture control technology). They were asked to describe what was going on in the video and then specifically, "Is the person in the video touching the screen? Yes/No". Participants who answered the question wrong for each condition were removed from the data analysis, so we were confident that the conditions were understood.

The survey had two sections, one answering questions about touchscreens and the same questions after about Ultraleap's touchless gesture control technology.

About Ultraleap

NO WEARABLES. NO CONTROLLERS. NO SURFACES. JUST NATURAL INTERACTION, USING ONLY YOUR HANDS. IT'S TRANSFORMING USER EXPERIENCE ACROSS SECTORS.

Ultraleap brings together the world's most powerful hand tracking with the only haptic technology able to create the sensation of touch in mid-air.

Together, these technologies are a powerful combination.

We have a team of more than 150 spread across the world, with locations in Silicon Valley, US and Bristol, UK. Our team includes world-leading experts in interface design, acoustics, machine learning, and computer vision.

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