Passenger Information Holograms at Transport Hubs

DETAILS

SECTOR | Transport

STAGE | Operations and Maintenance

TECHNOLOGIES | Holographic Imaging, Cameras, Artificial Intelligence

SUMMARY

Passenger Information Holograms (sometimes called Avatars) are the next generation of digital signage, intended to improve the efficiency of providing tailored assistance to customers. Combined with microphones and cameras to capture user questions, these video-projected customer assistants are completely customizable to provide relevant information to passengers, such as wayfinding, security information and restrictions, and safety information.

The technology can be applied across many different types of infrastructure such as transport hubs, hospitals and universities and is already being deployed at airports and railway stations, to advise passengers on the restrictions enforced by security[1] or warn them not to take luggage on escalators[2].

In 1947, the concept of holography was proposed by researchers investigating ways to improve the resolution of electron microscopes. Since then it has become a well-known 'icon' of futuristic technology. Over the years this technology has been developed through research into lasers, radar, and photography and now has several potential applications, such as in military mapping, information storage and advanced medical imaging technology. In the transport sector, holographic projections are starting to be used as communication devices, for improving efficiency in delivering tailored passenger information. The technology can be used to complement the work of transport agents, by reducing their physical intervention on site, while increasing the guidance provided to people travelling, to thus better address congestion, pedestrian flows and delay issues, that put pressure on the transport network.

Given the versatility of hologram uses, a range of different problems can be solved by this technology. With respect to transport hubs, they can be used for relaying important travel information at airport security, at train stations, or any other mode terminals. This technology addresses issues related to wayfinding and language barriers, improves efficiency by relaying necessary information, and therefore contributes to an enhanced user experience and infrastructure usage. For example, holograms can be used to project a passenger's travel path in a 3D environment to assist them in their movements.

Incorporating holograms into busy transport terminals will result in the further development of the technology's functional characteristics. Currently holograms can be used to communicate key information in multiple languages, arrival and departure times, and respond to travel queries with in-built question responses, among

[1] "Holograms to Help Passengers through Security", The Independent, Accessed 6 May 2020.

[2] "Are You Spooked by the Nation Rail Holograms?", The Guardian, Accessed 6 May 2020.

other things. Additionally, their use can reduce staffing costs and lessen pressure on infrastructure nearing its capacity. Requiring staff to be available on-site to assist customers requires associated ancillary infrastructure such as offices. By utilizing passenger information holograms, more staff can work remotely, and that space can be used for an alternate function.

Artificial Intelligence (AI) can be combined with passenger holograms to perform increasing complex or specialist tasks. For example, a trial of an AI-based virtual border guard was conducted at border security points in San Francisco in August 2019. This virtual guard is designed to make screening at boarder security points more efficient by identifying people travelling with dangerous or illegal intentions. By asking travellers a series of questions, the virtual guard analyses their responses for indications that they may be lying – looking at facial expressions, tone of voice and verbal responses. The virtual guard categorises them as green, yellow or red, which indicates the level of additional security checks they would be required to undergo[3].

Further benefits of the technology arise during disease outbreak or pandemic situations like COVID-19. By minimising the need for on-site staff to provide information to passengers, hologram technologies can enable continued customer service support of passengers using transport services, without exposing staff and passengers to any unnecessary health risks associated with close human contact.

VALUE CREATED

Improving efficiency and reducing costs:

- Reduce the need to invest in infrastructure to assist travellers (travel agent booths, agencies, combine with existing vending machines or digital wayfinding) and an opportunity to centralise remote support.
- Reduce staff cost by minimising number of staff required and/or enable staff to be deployed to other areas of operation, as AI and holograms fill the role of customer direction and assistance wayfinding and other services.

Enhancing economic, social and environmental value:

- Reduce staff exposure to health risks (such as during pandemics).
- Improve wayfinding at transport stations making travel faster, more efficient and less stressful and provide consistent and compelling messaging to passengers.
- Improve accessibility and efficiency for customers, particularly those with disabilities or tourists, and improve efficiency at bottleneck locations such as airport security by proactively relaying information to passengers.

POLICY TOOLS AND LEVERS

Legislation and regulation: Legislation for hologram technologies will focus on data privacy regulations, as well as technologies for safe use of screens and displays. Such technologies need to comply with global and local standards that are currently being established.

Effective institutions: The governance required for the implementation of this technology is related to the system security requirements of the holographic system, specifically ensuring that individual security and data privacy is protected with anti-hacking measures. Furthermore, governments need to decide how the technology will be distributed across government owned services and industries, to ensure that the resource use is efficient.

Transition of workforce capabilities: The implementation of passenger information holograms presents an opportunity to move staff already working in the customer service space into more technical or specialist roles and enables personnel (e.g. airport security personnel) to focus their attention on the more critical elements of their role. The hologram technology would be purchased or leased from a supplier, and maintenance and

[3] "AI lie detector developed for airport security", Financial Times, Accessed 17 May 2020.

upgrade works may be completed by the suppliers, or there could be a requirement to bring these skills in-house.

IMPLEMENTATION

Ease of Implementation 	When using AI technology, it is important to ensure there are no human biases accidentally incorporated into the system. This can be particularly pertinent in situations like airport security screening. Additionally, the current technology has high energy consumption, which can restrict where and on what scale it can be used. Further research and testing to find a more energy-efficient technology is ongoing. Once those two elements have advanced, the implementation of such solutions will be easier across several sectors and at larger scales.
Cost 	The implementation of hologram technology across a range of services currently requires a significant initial investment, without a significant return on investment. As the technology advances, and becomes less expensive, it is expected that these types of solutions will become increasingly cost-effective for operators to deploy, and therefore will become more commonplace.
Country Readiness 	Advanced countries are today ready to implement such technology and are already conducting trials. Once the technology also has been proven to be energy-efficient and key regulations are in place for their implementation, wider adoption can occur. For developing countries, where new transport infrastructure is being delivered, new habits will need to be developed through human interaction first. Although these technologies are not yet ready to be largely rolled-out for completely new assets, they can be used as a first step to engage with the population on the new infrastructure's layout and usage. There could also be an opportunity to trial them on smaller scales.
Technological Maturity 	With some applications of holograms already existing at airports in countries around the world (e.g. UK and USA), the basic capabilities and functional characteristics of the technology are already developed and workable. However technological development still has a long way to go, with application of specific features, such as AI, and interactive abilities still requiring significant development (recognition, image and sound qualities of holograms).

RISKS AND MITIGATIONS

Implementation risk

Risk: Holographic technology is still in its early days of development, and therefore technological risks such as malfunctions and system failures can occur. At a large-scale, holograms can be observed from certain angles, and their interactive characteristics still need to be developed, as currently information is pre-programmed.

Mitigation: Service providers must ensure that the holograms are continually upgraded and maintained in line with new developments. For interactive systems, in-built question and answering systems must include an extensive list of possible questions and answers.

Social risk

Risk: The implementation of hologram systems to provide customer service has the potential to result in a reduction of physical assistance and on-site staff. The replacement of staff with technologies is generally unpopular and can potentially have negative impacts for the company. There is also a risk that with less physical

staff present at a site, the risk of antisocial behaviour will rise, particularly in areas already associated with these kinds of risks.

Mitigation: Where staff can be reassigned to other duties or upskilled to fill other roles, this should be undertaken. It is also essential that alternative safety precautions are put in place, to improve the safety of users and increase the perceived safety of an area. This includes installation of CCTV for surveillance and help points to contact locally based security staff and police.

Safety and (Cyber)security risk

Risk: Like with other digital technologies, the hacking of hologram software is a possible risk that could occur. This could potentially result in technical malfunctions, delivery of misinformation and the accessing of sensitive information.

Mitigation: Implementers and governments must ensure that the technology and software is secure. Specific data privacy policies must be put in place as well as specific use definitions for holograms.

EXAMPLES

Example	Implementation	Cost	Timeframe
UK Airports	UK airports were the first in the world to implement this technology.	High investment costs, but operational savings on staff utilisation.	The first holograms were rolled out at Luton and Manchester airports in 2011. Since then, Birmingham, Bristol and Glasgow airports have also installed the technology.
Brent Council Virtual Receptionist	'Shanice' has touch-screen functionality to enable visitors to input the reason for their visit. She then provides information about where they need to go and what documentation they will need.	Employing humans to do this would cost about GBP 30,000 per year in salary, whereas the capital investment in this technology was GBP 12,000 in total.	The technology was introduced at the Brent Civil Centre in August 2013.
LaGuardia, Newark and JFK airports	The Port Authority for New York and New Jersey unveiled five virtual customer care representatives, named 'Libby' across three New York airports.	The devices cost approximately USD 250,000 each, but the Port Authority spent USD 180,000 to rent five machines for a six-month period.	A six-month trial of the technology took place from August 2012.

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