



BRINGING MORE INNOVATION TO ATM LOOKING GLASS PROJECT

MIXED REALITY IN THE ATM SECTOR TO DESIGN MORE EFFICIENT ROUTES AND REDUCE COSTS





Context

Bridging real and virtual worlds

Mixed Reality, where Real and Virtual worlds are merged interacting as one in real-time is not only a very powerful concept but offers a plethora of possibilities to explore in the ATM sector.

Indra drives Mixed Reality in air navigation with its development of a pioneer solution based on the Microsoft HoloLens to improve the design of air routes, reducing fuel consumption, CO2 emissions and airline costs, while at the same time contributing to minimizing sound pollution in urban areas near airports. As a first case of possible use of this technology, Indra has selected a real project: the construction of the third runway at London's Heathrow Airport, to develop a conceptual use case where both worlds are brought together in unison resulting in a set of software features that are prototyped in a Mix Reality environment.

The goal was to develop a tool that would facilitate the analysis of the aircrafts' final approach to achieve ongoing landings and takeoffs that would limit fuel consumption and disturbances for nearby populations. To guarantee precise calculations, Indra used real data provided by Eurocontrol, the European Organization for the Safety of Air Navigation.

Indra aim is to explore how the following objectives can be achieved by using a mix of modern hardware innovations (Mix Reality glasses) and ATM industry knowhow.

Looking Glass Project at London Heathrow Airport

The conceptual use case put forward is modelling 3D precision departures and arrivals at London Heathrow airport, where the future expansion of the third runway has been added, providing a glimpse of the possibilities that this technology offers.

The solution takes advantage of the possibilities offered by mixed reality, combining both real and virtual worlds, enabling their real-time interaction. When wearing the Microsoft HoloLens, the user sees the takeoffs and landings of aircraft at the future Heathrow runway. The holographic images are directly projected onto the physical space at which the user is positioned.

- Simulation of precise approaches and departures, in order to evaluate airspace structure and guide aircraft more precisely
- Simulation of precise final approaches, landings and take-offs at airports (that may have a problem due to topography).
- Improving flight service efficiency by visualising more realistic ground noise forecast, with the aim of reducing noise exposure areas, especially around airports
- Defining routes that reduce noise exposure area, i.e. guide aircraft via routes that reduce environmental impact.

London Heathrow airport and its surroundings have been re-created in 3D highlighting the relevant aspects, and different types of aircraft are modelled following realistic approaches and departures on the different runways.

The spatial audio is used to reproduce the sound of the aircrafts to add another level of immersion for the user. Interactions with the application are driven via natural simple commands using voice.

Benefits

Mixed reality to reduce costs

- Improves the design of air routes, reducing fuel consumption, CO2 emissions and airline costs.
- At the same time contributes to minimizing sound pollution in urban areas near airports.
- The visualisation tool is capable of generating holograms that are made visible to the user through the smart glasses, merging both real and virtual world objects, maintaining the user's perception of the surrounding environment.
- Enables a user to continue working while accessing additional information which is superimposed and relates with what is being seen in the real world.
- This concept allows the user to visualise the impact of the aircraft noise assessment on the areas around Heathrow airport. The noise forecast is realistically visualised associated with each individual aircraft type.
- Beyond the air traffic sector, this technology's potential for improving communication, access to information, and cost savings is enormous.
- It will support maintenance tasks, so that an operator may see the layout of a building's electrical installation or the water supply network that runs beneath a street. It will also be possible for the operator to share what is being viewed with someone else who is elsewhere.

Results

The future of mixed reality

In the short term, the Indra solution will offer the ATM market other applications. One of the most immediately applicable uses could be improving the design of the sectors into which airspace is divided in a country or region, and studying the routes which cross it. This complex, 3D information cannot be correctly represented on a 2D screen. It will also support improving the design or expansion of airports so that technicians may select the most suitable location for runways and ensure that the control tower is free of blind spots.

As this technology is optimized, its use will increase in critical operational tasks, for example, providing a controller with support by offering information associated with the real plane seen from the tower. In a control center, it could improve the decisionmaking process between controllers, whether at the same center or separated by hundreds of kilometers.

Indra in ATM

Leading position in the ATM market

Indra is one of the main global consulting and technology companies and the technology partner for core business operations of its clients businesses throughout the world. It offers a comprehensive range of proprietary solutions and cutting edge services with a high added value in technology, which adds to a unique culture that is reliable, flexible and adaptable to its client's needs. In the ATM sector, Indra has gained a leading position having over 4.000 ATM/CNS systems installations in more than 160 countries with over 100 years of experience in the sector.

Indra is a key technology supplier member of the SESAR Joint Undertaking. Furthermore, the multinational is one of the leaders in its sector in Europe in terms of investment in R&D and innovation.



Avd. de Bruselas, 35 28018 Alcobendas Madrid(España) T +34 91 480 50.00 F +34 91 480 50.80 Indra reserves the right to modify these specifications without prior notice.