



Dedicated to innovation in aerospace

AEROSPACE OPERATIONS DIVISION

AIR TRAFFIC MANAGEMENT & AIRPORTS

Augmented Reality for Tower Control

PRODUCTS & SERVICES



Application of Augmented Reality in ATC Tower environments

Augmented Reality (AR) in ATC Tower environments supports the Air Traffic Controller by blending in real time computer-generated data (virtual reality) into the real world view. To introduce Augmented Reality in ATC tower environments, NLR has developed a concept demonstrator with two different visualization solutions; one solution incorporates a dual-display see-through Head-Mounted-Display (HMD) and a second solution uses Google Glass.



NARSIM ATC Tower simulator

REAL-WORLD PROBLEM

Currently, airport operations under low visibility conditions are usually based on procedures and working methods with limited or without automation support. One of the reasons is the fact that, by definition, the controller cannot visually identify the traffic.

With AR, the visual information is enhanced to enable identification and tracking. Another application area of AR in the ATC Tower is the reduction of so-called head-down time. This term refers to the potential inability of an operator (e.g. a tower air traffic controller) to optimally divide attention between the primary visual field (e.g. out the tower window), and an auxiliary tool (e.g. paper or electronic flight strips or surface movement radar). When applying AR, "head-down" information is presented as an overlay on top of the visual information.

A third application area is related to the problem introduced by an increased number of remote camera video feeds. These video feeds all need video displays set up in the ATC Tower environment, potentially blocking important line-of-sights or in other ways obscuring the outside view. Providing the camera feeds on a Head-Mounted-Display (HMD) or a similar device could potentially solve this problem.



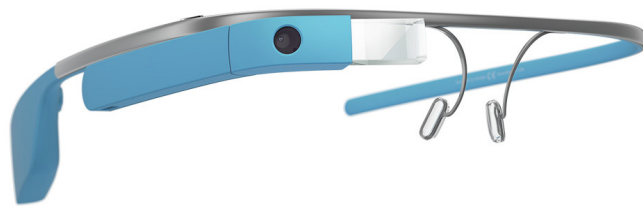
Head-mounted-display for research into augmented reality in ATC Tower environment

CONCEPT DEMONSTRATOR

The NLR concept demonstrator consists of a simulated ATC Tower environment acting as the real out-the-window view and either a Google Glass or a Visor ST Head-Mounted-Display from NVIS with a Flock-of-birds Tracker device from Ascension to augment visual perception.

The HMD position and attitude are tracked with high precision to be able to superimpose a bright virtual image across a 60 degrees field-of-view. The superimposed image can be static data (e.g. arbitrary flight strip information, to reduce head-down time) or information which depends on the direction of view (e.g. direction finder information, flight strip information filtered based on the direction of view, or label information attached to the visual presentation of an aircraft).

The Google Glass direction of view is tracked and can be used to stream video feeds from remote cameras. Selection of the video feed that is displayed on Google Glass can occur automatically, based on the direction of view of the wearer.



Google Glass for use in NARSIM Tower

Feedback from controllers indicated that, apart from ergonomic discomforts (heavy device, unpleasant to wear, cables, etc.) and concerns about the accuracy and availability of (sensor) data, the concept of enhancing visual information using the HMD looks promising. Feedback from controllers on Google Glass confirmed that the camera feeds are bright and informative, the head-down time reduces, there is no need for extra video displays in the ATC Tower environment and there is no ergonomic discomfort. Contact us for more information or a demonstration at the NLR premises in Amsterdam, the Netherlands.