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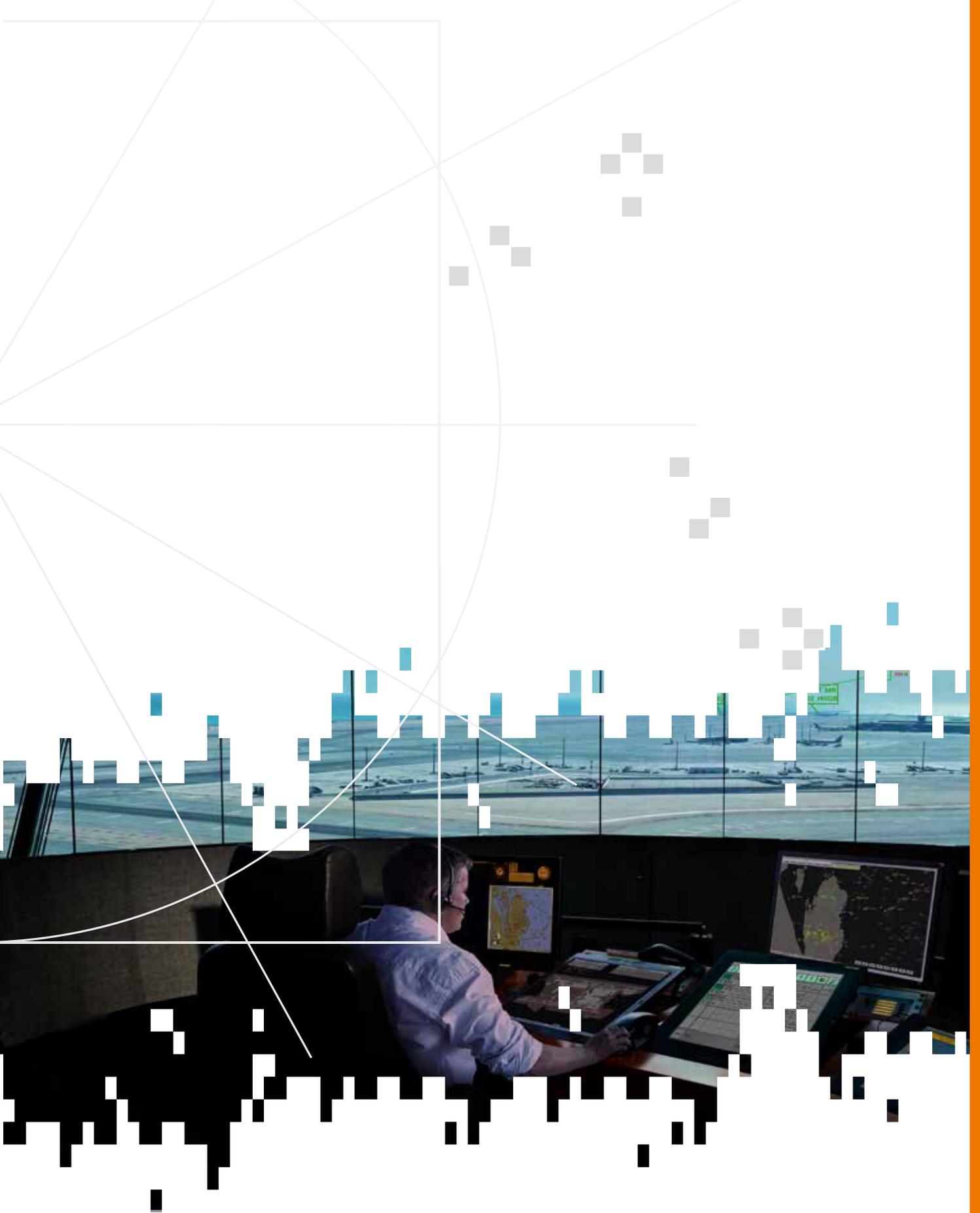
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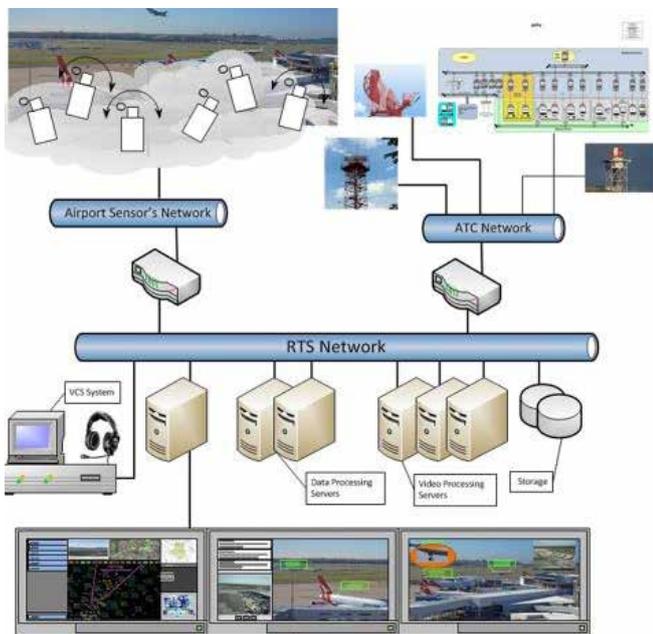


REMOTE TOWER

Aerodrome Air Traffic Service (ATS) from a remote position is executed and facilitated by the real-time streaming of the view from an assembly of fixed and moveable high definition digital video cameras situated at the remotely controlled aerodrome.

In Leonardo Remote Tower solution this encrypted signals are used to replicate a view of the aerodrome and its vicinity onto multiple screens presentation which is equivalent to reality but arguably better than the sector-limited view which would exist from a Visual Control Room on the aerodrome.

Fixed cameras provide the main display and any necessary supplementary ones such as ramps and apron close-ups and there are also one or more moveable cameras (PTZ) which can be directed as required from the RTS position replicating the way binoculars might be used in a conventional Tower. This visual situational awareness for the controllers or flight information service operators is supplemented by a range of environmental sensors and microphones capturing sound and meteorological or other operational data.



A complete solution schema



Whilst the initial focus has been given on day-time VMC operations, nocturnal and low visibility operations can also be supported by means of additional sensing equipment, infrared or night-vision cameras and three dimensionally-augmented reality overlays.

Along with streaming video flows generated by different electro-optical sensors (FPC, PTZ, Night Vision, Day-Light), the Remote Tower positions shall be fed with:

- Surveillance Data coming from the operational ATC Centre (conventional/meteo ATC radars, ADS-B/C, MLAT, other possible targets detection facilities)
- Tactical Data coming from the ATC Centre (conflicts, sequences, warnings)
- Strategical Data coming from the ATC Centre (Flight Plans, amendments, ATC clearances)
- Integrated VCS for GAG communications
- Information Data (Meteo Bulletin, Notam, AIS)

Both the streamed video/audio flows and the Tactical/Strategical information shall be integrated in order to provide an Augmented Reality (AR) OTW presentation of the airport area (apron) and its vicinity.

AUTOMATIC VIDEO ANALYSIS

The incoming video streaming can be automatically analyzed in order to detect specific events on selected areas and to refine AR information displaying.

For each area (graphically defined and updated), one or more of the following analysis can be assigned:

- **motion detection:** every movement, detected in an area where this analysis is active, is highlighted with a colored box and the area itself becomes red-filled. It can be useful to monitor where any access is forbidden.
- **anomaly detection:** every difference, from a reference image of an area where this analysis is active, is highlighted with a colored box and the area itself is highlighted. It can be used to monitor the status of special areas like the runways, specific apron zones.
- **target identification:** in the areas where this analysis is active, the detected movements are compared with the list of all known objects in order to associate them and to detect unidentified objects. The unidentified objects and the violated area are highlighted.

The main feature of the System is to combine geo-referenced data coming from ATC/CNS subsystems with video contributes produced by the ip-cameras placed around the airport facilities.



Anomaly detection Step 1 Take the reference image of the area to be monitored (it can be auto updating according to a specified rate)



Anomaly detection Step 2 Compare the video streaming with reference image

