

SKY SCANNER

Development of an Innovative LIDAR Technology for New Generation ATM Paradigms

Background

Laser detection and tracking of aircrafts based systems (LIDARs, Light Detection And Ranging systems) are emerging as a critical design trend in development of new generation ATM (Air Traffic Management) paradigms, of which they are the main innovations. The realization of laser sensors as rotating laser range-finder arrays and their combination to versatile systems lead to major advantages for the application such as ATZ traffic control, airport surveillance and ground to air laser communications, and last but not least to save cost usually at the same time with getting an improved ATC (Air Traffic Control) performance. These laser systems that today can be developed without particular difficulties are challenging classical ATM paradigms in many aspects. Nevertheless, it is commonly recognized that the effectiveness of these systems strictly relies on the capability to reliably perform a track data fusion with airport radars and to manage a new generation ATM paradigm. In particular, driving and control a data fusion between laser tracking data and radar tracking data a very high computation power is required.

Objectives

The SKY-Scanner Project's target consists in the development of a demonstrator of an innovative Light Detection And Ranging (LIDAR) technology (SKY-Scanner System), that can allow detection tracking of aircrafts up to at least 6 nautical miles of distance from the ATZ (Aerodrome Traffic Zone) barycentre and that can be the base concept for the development of new ATM (Air Traffic Management) paradigms based on laser positioning and ground to air laser communications (landing and take-off supported by laser guide).

Description of work

The workplan structure is the following:

- System and Testing Requirements Specification; (WP1)
- First Measurement Session; (WP2)
- Laser Beam and Airframe Interaction Model Design and Development; (WP3)
- Simulation Software Design and Development; (WP4)
- Sensor Control Software Design and Development; (WP5)
- Laser Sensor Design and Development; (WP6)
- Sensor Management Computer Design and Development; (WP7)
- Data Handling and C2 SW Design and Development; (WP8)
- Aircraft Collision Probability and Decision Support Model Design and Development; (WP9)
- Field Testing Target Design and Development; (WP10)
- New Generation ATM Paradigm Specification; (WP11)
- System Prototype Integration; (WP12)
- Field Testing; (WP13)
- Dissemination; (WP14)
- Exploitation; (WP15)
- Consortium Management. (WP16)

Results

The technical goals of the SKY-Scanner project are:

- development of a demonstrator based on a rotating cylindrical laser range-finder array, and capable to detect and track aircrafts up to at least 6 nautical miles from the ATZ barycentre;
- development of alpha release software for the computation of the aircraft collision probability and optimal decision on corrective actions (DSS, Decision Support System) based on data fusion between radar data and laser tracking data fusion, and ground to air laser communications;



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- new generation ATM paradigm requirements specification based on data fusion between radar data and laser tracking data fusion, and ground to air laser communications.
- The compliance of the above SKY-Scanner project technical objectives to the technical objectives of the "Aeronautics" Priority is demonstrated with reference to the following project output effects:
- development of an innovative technology useful to increase the traffic capacity of the airports, by means of the full laser control of ATZ volumes and the related aircraft movements in a new generation ATM paradigm perspective provided as output of the project;
- development of an innovative technology useful to attain optimal operational performance of the aircraft supporting infrastructure, seeking to reduce the number of transport fatalities.

More Information

Acronym:	SKY SCANNER
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Research domain:	Airport Operations
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Olympus Engineering S.r.l.	IT
Vilnius University	LT
Piaggio Aero France S.A.S.	FR
AIR Support S.r.l.	IT



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