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Advanced Vision and Awareness Functions

Development and demonstrations in the context of Clean Sky 2

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Avionics Systems

What is Clean Sky 2?

- European research programme
- Aims for reduction in CO₂, gas emissions and noise levels produced by aircraft

Saab Avionics Systems Vision and Awareness research:

- Development of software applications and computer platform
- Integration within a Demonstrator









The Challenges today

- Solutions today are some what fragmented
- Separated systems
- Risk of increased pilot workload
- Technical limitations
 - Electro-optical system limitations
 - Reliance on information and infrastructure
 - Databases resolution, coverage, accuracy and integrity are issues
 - Some limitation with computing capacity





Research Objectives

Increase crew awareness - Vision and situation Reduce pilot work load

- Focused on the challenging phases of a flight.
- Concentrate on 'heads out' information
- Enhancing safety through integration and increased crew awareness.





Advanced Vision and Awareness

- All weather operations
 - Enhanced Flight Vision
 - Combined Flight Vision
 - Innovative sensor blending
 - Synthetic Vision Guidance
- Situational Awareness
 - Synthetic Vision System
 - High Resolution Database
 - Enhanced Terrain and Obstacle Awareness System
- Sense and Avoid System
- System Platform based on multicore technology





Enhanced Vision Systems

What is an Enhanced Flight Vision System?

- Provides an image to the pilot
- Supplements the natural vision

Why is EFVS important?

- Enables Equivalent Visual Operations
- Turns the Instrument Approach into a Visual Approach

Our solution

- All weather long range + short range hi-res sensor
- Multicore Computer Platform
- Image processing and blending





Synthetic Vision System

Investigate the increased utility of synthetic scenes

Main tasks

- Detailed rendering of commercial database
- High resolution terrain and obstacle data display
- Rendering and presentation techniques
 for synthetic data







High resolution database

- Superior accuracy and alignment
 - Database built from commercial satellite imagery
 - Accurate representation of the earth
- The database is an enabler for a Combined Vision System

A new capability in situational awareness!







Combined Vision System

The combination of : Enhanced Vision System (EVS) & Synthetic Vision System (SVS)





Combined Vision System

Currently

- CVS presentations are not widely deployed
- optimal combination the two image type not fully developed.

Our Development

- Investigate and demonstrate techniques for:
 - image blending
 - artefact identification and extraction
 - image correlation.





Sensor Blending

Currently

 Blending of multiple sensors not really explored

Our development

- Advanced filtering techniques enhance salient sensor image features
- Sensor image quality monitored in real-time for optimal visual guidance
- Only information helping the Pilot gain visual confirmation is shown







Enhanced Terrain and Obstacle Awareness

Currently

Terrain Awareness & Warning Systems are in widespread service.

- Limitations to the current TAWS capabilities
 - resolution of the terrain database
 - integrity and completeness of the obstacle database

Our development

- Application of very high resolution databases
- Performance based warning and avoidance techniques
- Obstacle detection using database information and sensor information





Enhanced Terrain and Obstacle Awareness

- Performance based escape alerting
- Complement traditional TAWS systems

Key Features

- High fidelity aircraft performance model
- Advanced terrain scanning modes
- Escape path calculation based on available performance
- Situational awareness enhancing symbology
- Reduced nuisance alerts







Demonstration of functionality

Active Regional Cockpit demonstration

- Visual recognition
- Automatic avoidance manoeuvre

Goals

- Increasing safety
- Reducing pilot workload.





Thank you!

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