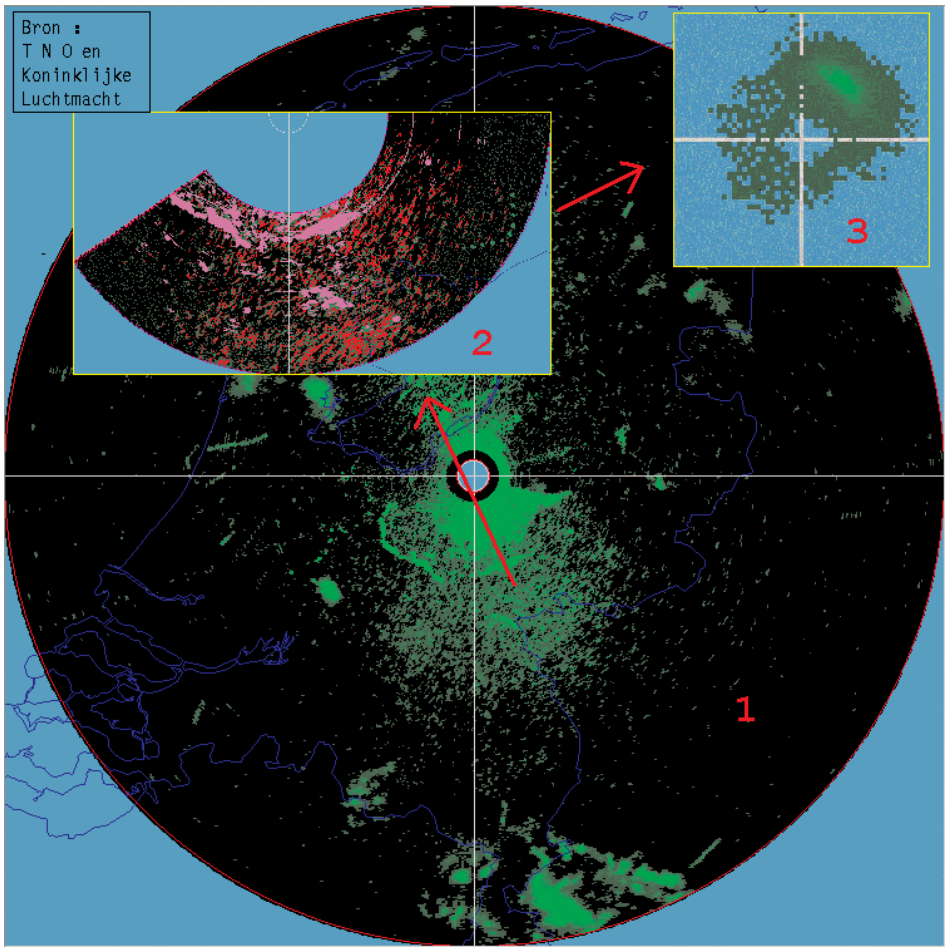
Defence, Security and Safety

TNO | Knowledge for business

Robin Bird Radar

ROBIN can be used for:

- Reduction of midair bird collisions by tracking birds, using standard radar video.
- Investigation of bird density in the early phases of planning windmill parks, electrical power lines, airports, etc.



1: The 'raw' radar image, showing ground clutter, rain, aircraft, birds.
2: The processed radar image, showing tracks of birds.
3: A vector plot, showing the direction of the bird tracks.

The problem

Bird strikes are an increasing hazard to aircraft operations. Damage to aircraft due to collisions with birds is estimated between 5 and 10 billion US$ yearly. Next to severe damage to the planes, fatal accidents caused by bird strikes are reported in several countries. Worldwide, the number of bird strikes increased by 50% in the last decade. As bird strikes generally take place at low altitudes, they often happen during the final approach or during the climb after departure.

The solution

In the late 1980's the radar bird detection system ROBIN (Radar Observation Of Bird INtensity) was developed for the Royal Netherlands Air Force (RNLAF) as a near real time monitoring system for bird movement throughout the Netherlands. The RNLAF has been using this system for about fifteen years in support of flight operations, particularly in support of flight planning and en-route navigation. Since the introduction of the system in 1989 it has been very successful in bringing down the number of bird collisions in flight operations.

This radar based system extracts (flocks of) birds all from the radar data of the RNLAF's Air Defense radars. During the operational use, the system has seen evolutionary improvements.
The ROBIN system consists of two parts:

- Registration system (RS), located very close to the radar.
- Presentation system (PS) to monitor the birds, which can be located everywhere

The PS's communicate with the RS via standard telephone lines.

Although ROBIN was designed to improve flight safety, the value for nature, environment and ecology has been enormous. The radar proved to be the most effective information source for getting answers for questions related to bird migration.

The sensor(s)

The raw video data of radar systems is used to monitor position and direction of birds.

Since the system is not specific in the choice of radar, it can be configured to use already installed radar systems as sensors. Coverage depends on the type of radar attached to the system.

The presentation system(s)

The presentation systems are used to monitor the bird migration. It provides the information where the birds are flying, the direction and speed of each (flock of) bird(s) and the number of birds in the air. Moreover it provides a complete overview of the bird density in the air.

There can be any number of presentation systems in use simultaneously. The only prerequisite is the availability of a standard telephone line, to connect with the registration system(s).

A mobile ROBIN

In the very near future, a completely self supporting ROBIN system will be available for rent. This system consists of a short range radar (15km), a registration system and a presentation system.

This mobile ROBIN system is mounted on a truck + trailer. It provides you all the data you need related to bird migration.

Conclusion

ROBIN can thus be supplied as a stand alone unit or can be integrated in existing radar system networks. In all cases decision support can be of great importance to the authorities responsible for avoiding bird strikes. ROBIN decreases costs (less damage, less bird watching teams) and increases safety.

Future developments

In the second half of 2005, the ROBIN system will be upgraded. Amongst others, it will be possible to do real time assessment of bird movements.

Future updates of ROBIN could include:

- Identification of bird species for ornithological studies.
- Sensor fusion (multiple radar systems, one resulting image).
- Communication via internet in stead of via telephone lines.

TNO Defence, Security and Safety

'TNO Defence, Security and Safety' is the title under which TNO operates as a strategic partner for the Dutch Ministry of Defence and makes innovative contributions to enhancing the security of the Netherlands both at home and abroad. We also use our accumulated knowledge for foreign governments and for defence-related industries.

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