EUROCAE WG-114 Kick-Off Meeting Presentation

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National Institute of Maritime, Port and Aviation Technology
Electronic Navigation Research Institute

Organization overview of ENRI

- ENRI (Electronic Navigation Research Institute) is the only research institute in the field of air traffic management in Japan

  Established in 1967 as a part of
  Ministry of Transport

  Three Research Departments
  * *Air Traffic Management Department*
    Trajectory based operations, ATC supporting system,
    Surface management, etc.
  * *Navigation Systems Department*
    Air Navigation support using satellite systems,
    GPS, GNSS etc.
  * *Surveillance and Communication Department*
    Aircraft surveillance and communication technologies

Current Related Research Topics with AI

- **Technologies for Remote / Digital Tower Systems**

  - AI techniques help for intelligent target tracking (target detection and recognition) function to provide accurate targets information in and around the airport.

    ➢ System detects the target on the screen and identifies the target.
    ➢ AI techniques of Visual recognition (Deep learning(CNN, YOLO, Motion pattern matching)

  - Automatic visual target recognition and target tracking system can assist operator's situation awareness

    ➢ The AI tool in a system detects targets on the screen and shows bounding box automatically.

    The function helps monitoring operation by using AI techniques
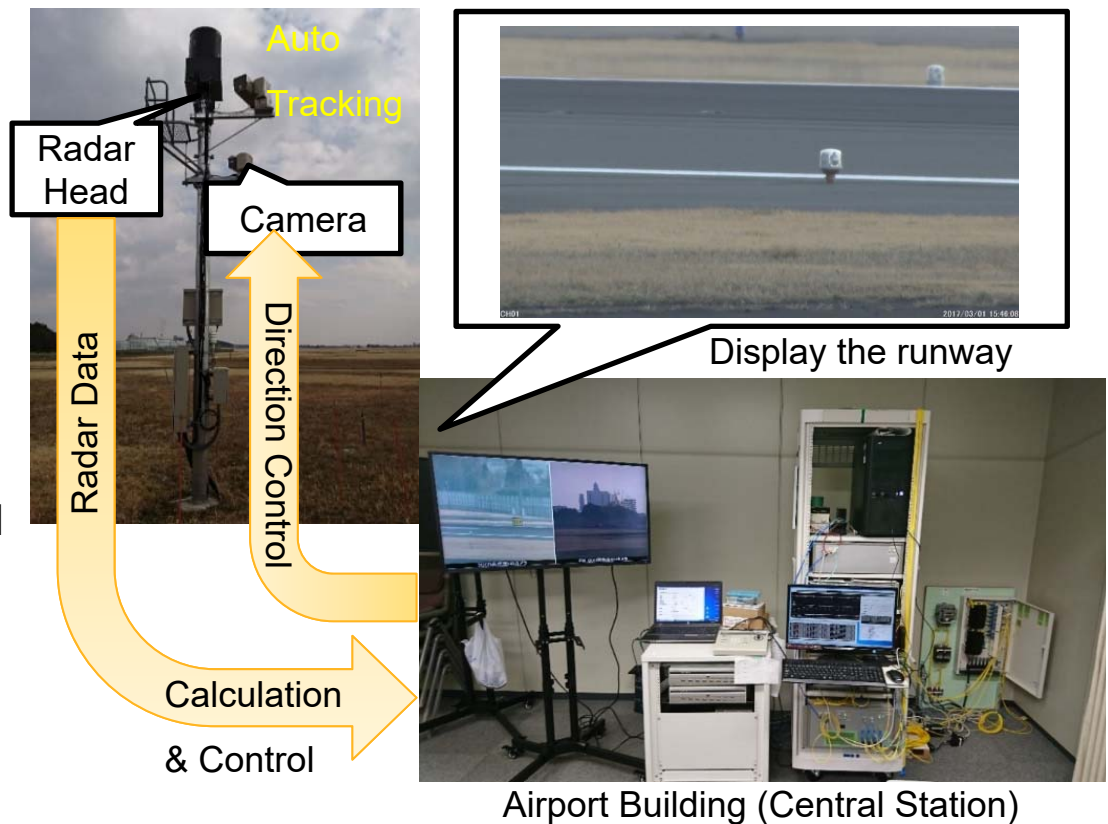   (identification or notification)

■ Technologies for Foreign Object Debris Detection Systems

● Surveillance area on the runway is pre-fixed.

● The camera obtain the image which is extracted by the radar.

→The objects detected by the radar are immediately displayed on the screen automatically.

<Requirement>
False alarms generated by the normal operation of aircraft or permitted vehicles must be reduced within once a day
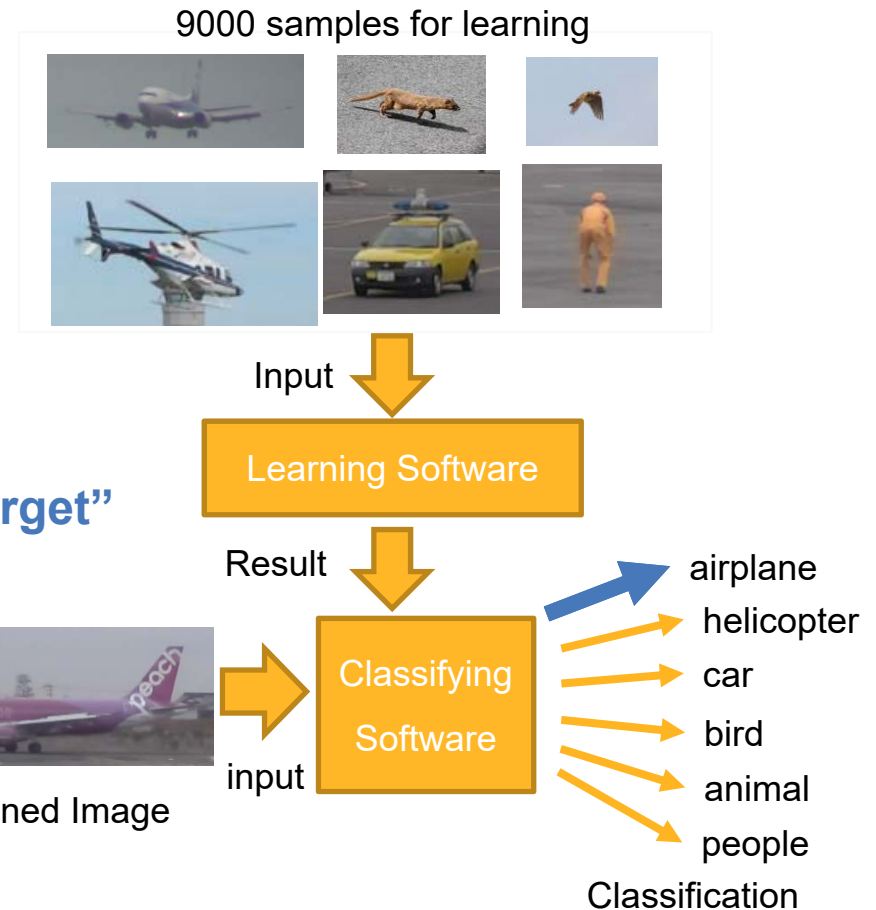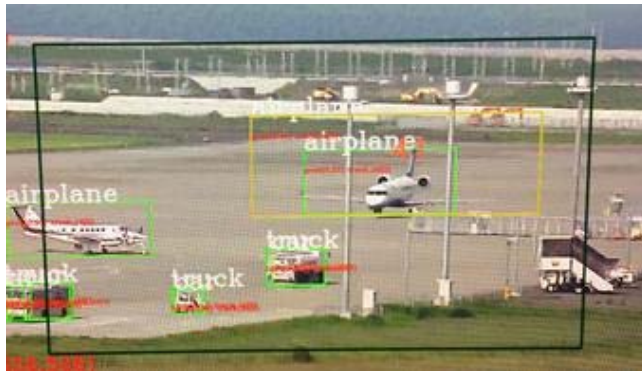
Auto Tracking

Radar Head

Camera

Radar Data

Direction Control

Calculation & Control

Display the runway

Airport Building (Central Station)

□ Introducing Deep learning / AI technique
(e.g.: Convolutional Neural network
, YOLO etc.)

• **High accurate recognition**

(Aircraft: over 99.9% , Vehicle:98%,
Birds & Animals: 97% in a day time)

• **Expecting "reduce mistracking of the target"**

9000 samples for learning

Input

Learning Software

Result

Obtained Image

input

Classifying Software

→ airplane
→ helicopter
→ car
→ bird
→ animal
→ people

Classification

- AI technologies are useful tools for creating intelligent functions or systems in aviation industries.

- The word of "AI (Artificial Intelligence)" covers various kinds of techniques. And, AI technologies can be used in many aviation applications
  - ⟶ Scope of discussion of WG-114 is ambiguous.

- What are specific focal points of standard of "AI" in the WG-114? (Using Area, Usage policy, Method, Algorithm / Software…?)

- To produce a clear, concise and focused ToR to clarify the direction and objectives of WG-114.

Thank you for attention!

…Any question?