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Multi-Domain AI + Computer Vision



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Enhancing military systems through AI

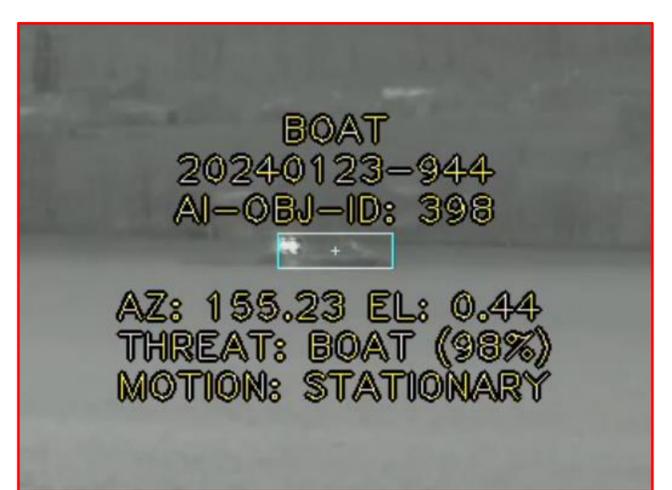
Current challenges

- High number of objects from different directions must be recognized, classified & tracked
- Very large areas must be surveilled simultaneously
- Unknown objects approach from seaside and must be identified and tracked
- Human in/on the loop: Complex situation hardly controllable for humans as decision-makers



Software defined defence solution

- Fusion of new and existing sensors to achieve the best result depending on the situation
- Optical identification of new threats with EO/IR is independent of databases & enables humans to make qualified decisions
- Hardware independence for fast integration into existing sensor & C2 systems
- Edge processing is resilient to interference and works at low bandwidth





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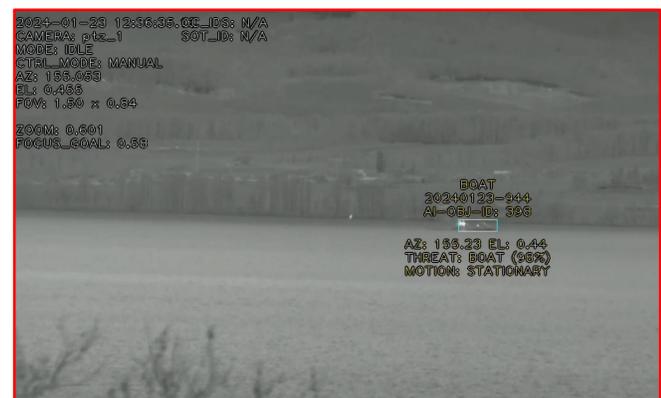
AI based surveillance with AirScout

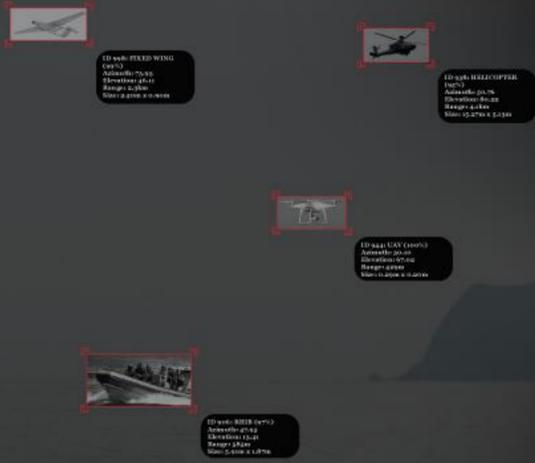
- AI-based processing of the EO/IR sensors (neural networks / machine learning)
- Fast automated response to detections by primary sensors (e.g. fixed cameras or maritime radars)
- Shorter reaction time, less work for the operator
- Automatic classification, visual verification by “human in/on the loop” still possible
- Precise position data with high update rate (e.g. for effectors)



Reference: Maritime coastal based surveillance

- Surveillance of a coastal area (surface / low airspace) using scanning thermal cameras
- Protection of a customer’s sea border
- Autonomous threat verification for human operators with PTZ cameras
- AI Classification and tracking of objects
- Maritime objects and UAS can be tracked with the same system





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Software Functionalities

Target acquisition

- AI-based detection of all objects of interest in the camera field of view
- optional utilization of target motion pattern (automated, situation-dependent decision of AirScout software on information utilized for acquisition)*
- classes of interest are configurable by the user via AirScout API (UAV, fixed-wing, helicopter, bird)

Tracking

- AI-based tracking of the objects of interest in the camera field of view
- multi-object tracking; object-specific identifier assigned to each object
- enhanced tracking capabilities using single-object tracker (automated, situation-dependent decision of AirScout software on method utilized for tracking)
- Object to be tracked by camera can be selected based on object identifier via AirScout API*
- Track provided by AirScout API (websocket)
- Target size obtained by fusion with primary sensor distance information (e.g. Radar)
- classes of interest which should be tracked are configurable by the user via AirScout API (vessel, boat, UAV, fixed-wing, helicopter, bird)

Classification

- AI-based object classification; frame based
- more generic than a classical library-based recognition system; all objects with an appearance typical for the respective object class can be classified
- optional utilization of target motion pattern for classification (can be set by user via AirScout API)
- Classification provided by AirScout API (websocket) as a part of the track information



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Counter-UAS military references

Diehl Defence

Kinetic Defence Vehicle

- C-UAS System with EO/IR camera + radar setup
- EOS remote weapon station with Dillon Europe 503D kinetic effector
- Walaris AirScout AI controls the sensors and the alignment of the remote weapon station



DefSecIntel Eirshield System

- C-UAS System with EO/IR camera + 2x radar + RF sensor setup
- Interceptor UAV as effector
- Walaris AirScout AI for detection, classification and tracking of UAVs
- In use in Ukraine

