

High performance Video Content Analysis

HAVSS 2012

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- From research to product: MvPanoramaDetection
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About ACIC

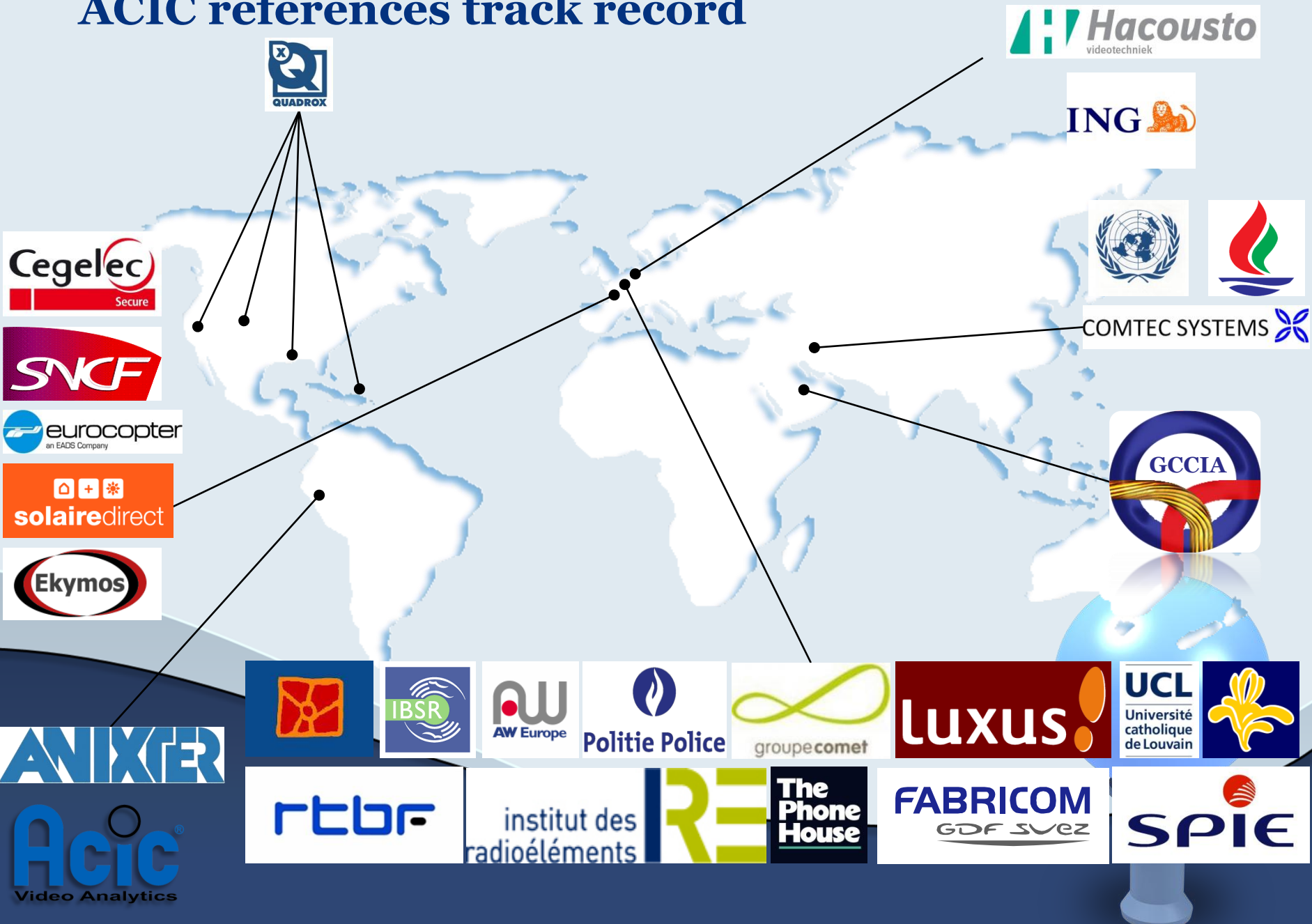
- ACIC is a Belgian spin-off from MULTITEL research centre (2003) (R&D started before 2000 at UCL University)
- ACIC is **Provider of High-Quality Video Content Analysis.**
- ACIC VCA software addresses various market segments:
 - Security/Safety (sensitive sites, public sites, ...)
 - Traffic Monitoring (road, tunnels, crossroads...)
 - People Counting (shops, shopping centres, ...)

Why ACIC? Unique Selling Points

- **High performance (FAR/DR)**
- **Large set of analytics functions**
- Customizable and **open products**
- High quality **support** to integrators
- **Contractual commitment** to a performance level
- Proven track records.



ACIC references track record



Our offer



Software package



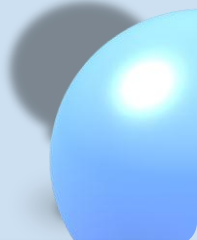
Rugged system up to 4 IP or analogue streams



PC server up to 64 IP video streams



3 Main Software distributions



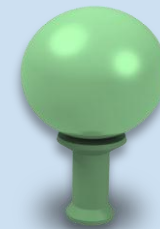
MvActivityDetection

- Sterile zone
- Virtual line crossing
- Perimeter protection
- Very Low false alarms !



MvTraffic

- Automatic Incident Detection (AID)
- Traffic statistics
- Integrated with VMS



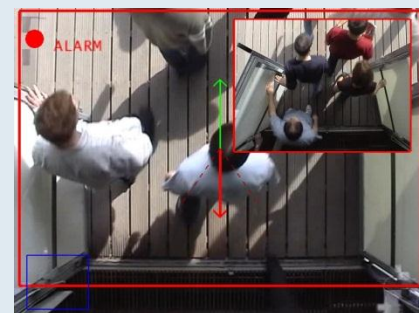
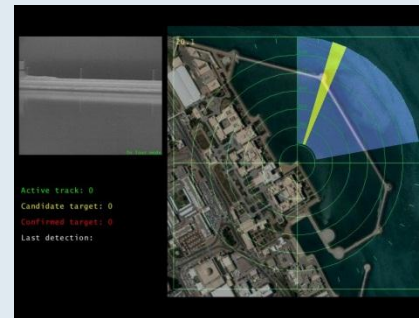
MvPeopleCounting

- Directional people counting
- Counting groups
- Distributed counting
- 95% accuracy in proper conditions



Domain specific products

- PanoramaDetection for long range surveillance
- BoatDetection for canal lock surveillance
- PlaneDetection for airport taxiway surveillance
- BicycleCounting
- WrongwayDetection for exit door surveillance
- ...



Tight integration with Video Management Systems

The screenshot displays the Milestone XProtect Smart Client interface. The top bar shows the application name and the date/time: "lundi 13 août 2012 - 15:02:31". The interface is divided into several sections:

- Views:** A tree view on the left showing a folder structure: "acic" > "Test" > "New View (2 x 2)".
- Cameras:** A section showing "DEVTEST2" as the selected camera.
- MIP Plug-ins:** A section with "ACIC Overlay Side Panel" and buttons for "Select a camera", "Enable All", and "Disable All".
- Video Feeds:** Three main video windows:
 - Top-left: "Camera 1 on Arecont AV21xx Camera (192.168.20.66) Live". Shows a road with cars and lane occupancy graphs. Text overlays show "0% 33KmH", "58% 33KmH", and "100% 2KmH".
 - Top-right: "Camera 1 on Axis 221 Camera (192.168.20.171) Live". Shows an indoor hallway with a person walking.
 - Bottom-left: "Camera 1 on Universal Driver 16 channels (192.168.20.5) Live". Shows a multi-camera view of a parking area.
- Alarms:** A table on the right showing alarm details for "DEVTEST2 (246)".

Alarms Table:

Id	State	Time
287	New	14:59:53 13/08
286	New	14:59:01 13/08
285	New	14:58:39 13/08
284	New	14:57:55 13/08
283	New	14:57:36 13/08
282	New	14:48:52 13/08
281	New	14:44:04 13/08
280	New	14:43:04 13/08
279	New	14:41:56 13/08
278	New	14:41:05 13/08
277	New	14:40:32 13/08
276	New	14:40:00 13/08
275	New	14:39:49 13/08
274	New	14:39:34 13/08
273	New	14:38:59 13/08
272	New	14:38:32 13/08
271	New	14:38:29 13/08
270	New	14:38:16 13/08
269	New	14:35:04 13/08
268	New	14:34:37 13/08

Milestone XProtect

Tight integration with Video Management Systems

The screenshot displays the Genetec Omnicast Live Viewer interface. On the left, there is a 'Tool Pane' with 'Camera controls' and 'Instant replay' buttons. Below these are navigation controls for a 'Fixed camera (no PTZ)', including a directional pad and zoom controls. Further down are buttons for 'Preset', 'Pattern', and 'Auxiliary'. A tree view on the left lists camera sources under 'Acic Demos' and 'Acic ShowRoom'. The main area shows four camera feeds: 'Cam-05 (11)' (road view), 'Cam-06 (12)' (indoor view), 'Cam-07 (13)' (indoor view), and 'Cam-08 (14)' (indoor view). At the bottom, a metadata table is visible.

Source	Date	Type	Description
AXIS Q6032 - Cam - 01	30/06/2011 14:09:03	Playback bookmark ...	MvActivityD...
AXIS 212 PTZ Network Camera - ...	30/06/2011 14:09:22	MvActivityDetection	MvActivityD...
AXIS 212 PTZ Network Camera - ...	30/06/2011 14:09:22	Playback bookmark ...	MvActivityD...

Genetec Omnicast

Tight integration with Video Management Systems



Exacq Vision

Collaborative research projects

- ACIC have contributed to several European or regional research projects:
 - WCAM: wireless camera surveillance
 - TraceThem: multi-sensor object localisation
 - Translogistic: video analytics for the supply chain
 - Apidis: autonomous data collection for sports events and surveillance
 - Agirvit: stereo and laser assisted object detection
 - ...



Current research project: SecureWMS

- Warehouse Management System for enhanced security and traceability
- We use video analytics for
 - Global positioning of mobiles and objects
 - Detection of retrieval and deposit of goods
 - Loading/unloading verification
 - Trailer identification



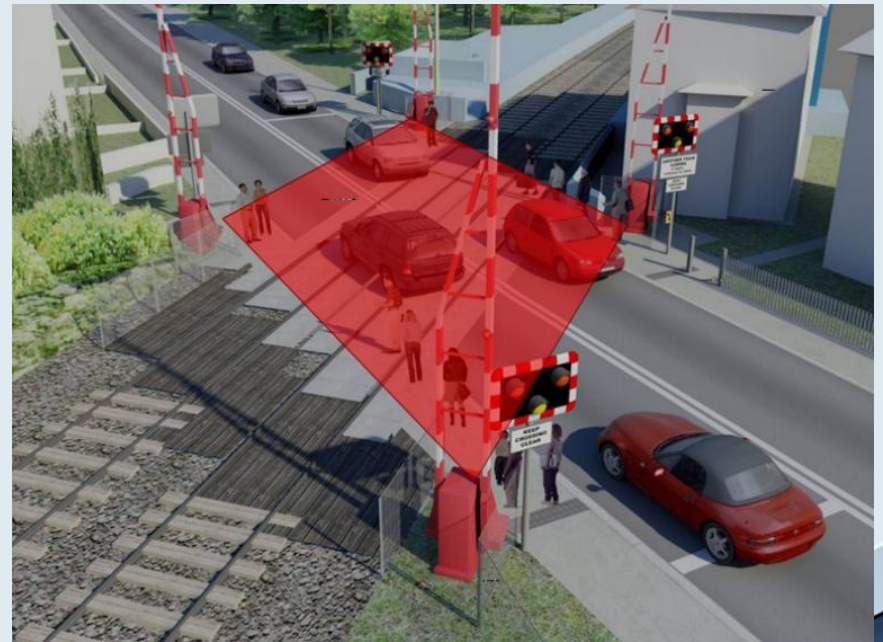
Current research project: SV3D

- Security platform with 3D navigation in large and complex environments
- We use video analytics for
 - Robust person tracking and positioning
 - PTZ autonomous tracking



Current research project: Locotrac

- Road-rail Level Crossing surveillance
- We use video analytics for
 - Detecting vehicles, persons and objects on the railway
 - Laser and camera sensors fusion



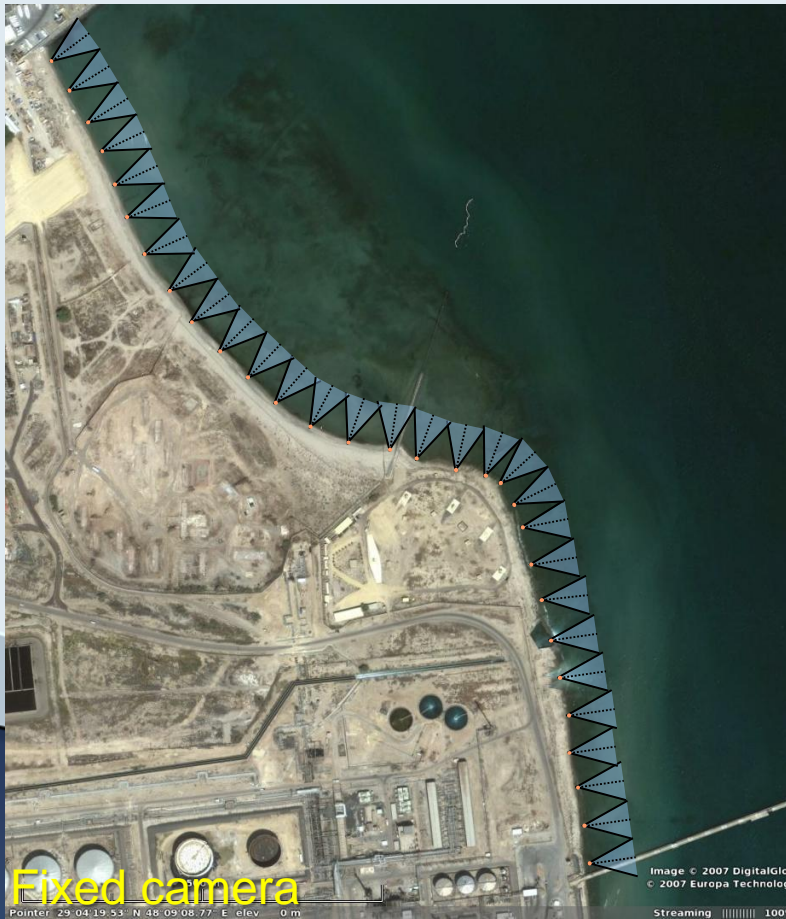
From research to product: MvPanoramaDetection

How to detect distant objects over a large area in a cost effective way ?



From research to product: MvPanoramaDetection

Use continuous sweeping thermal cameras over the area and perform video analytics on panoramic images

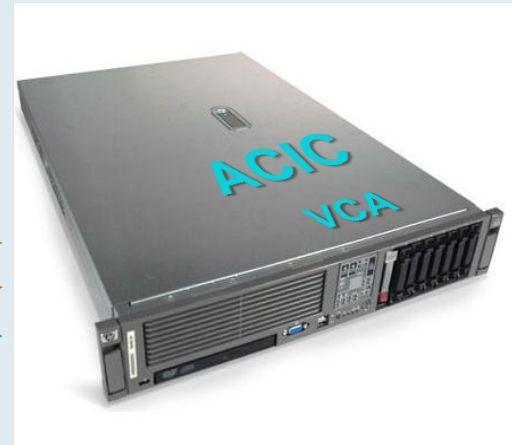
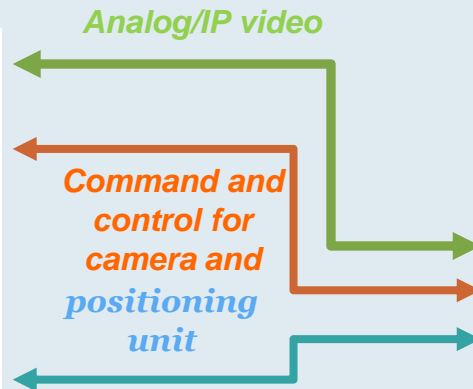


From research to product: MvPanoramaDetection

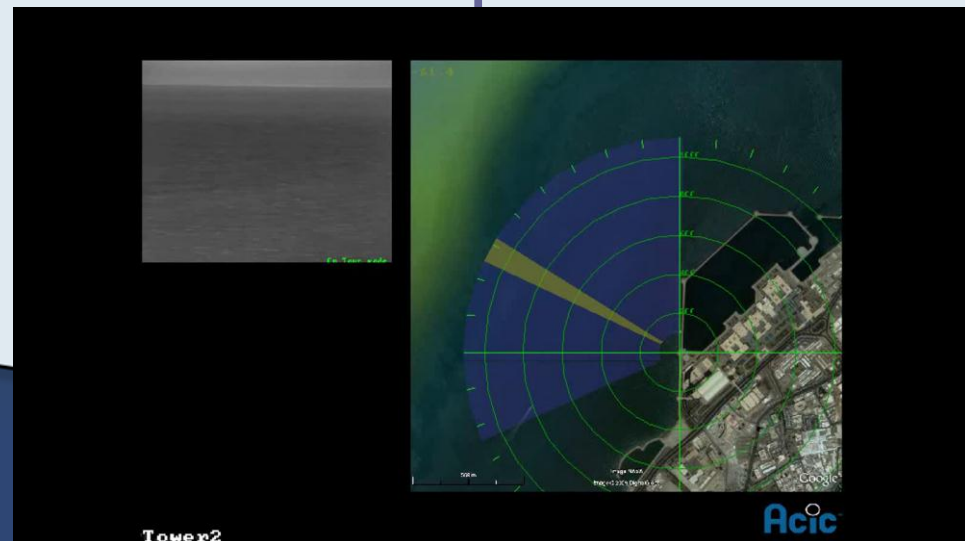
Off-the-shelf components integrated in a complete solution



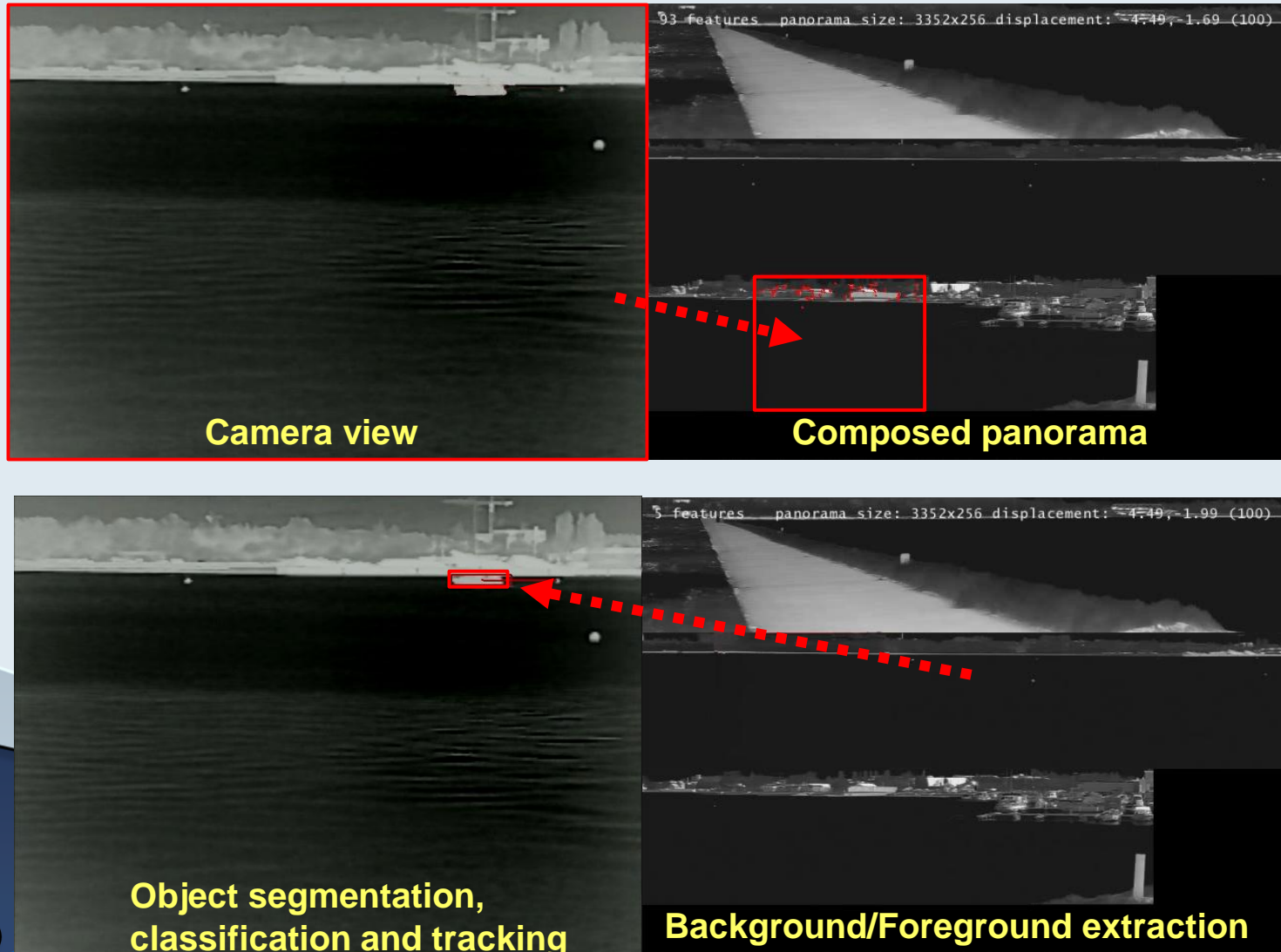
Thermal camera +
positioning unit



Setup & Alarm management



From research to product: MvPanoramaDetection



From research to product: MvPanoramaDetection

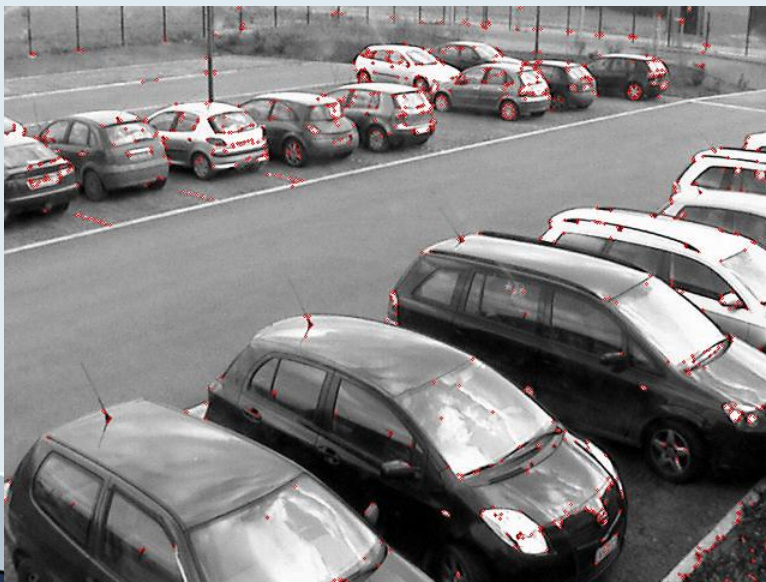
- We use pan/tilt positioning information to compose the panoramic image, but:
 - Images need to be **flat field corrected** (variations in the pixel-to-pixel sensitivity)
 - Images need to be **geometrically corrected** (distortions in the optical path)
 - Image and positional data must be **precisely synchronized**
 - **Field of view** of the camera must be precisely know

=> **Automatic calibration process**



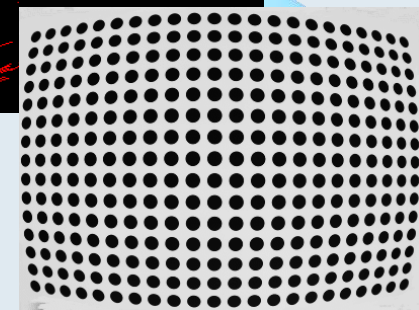
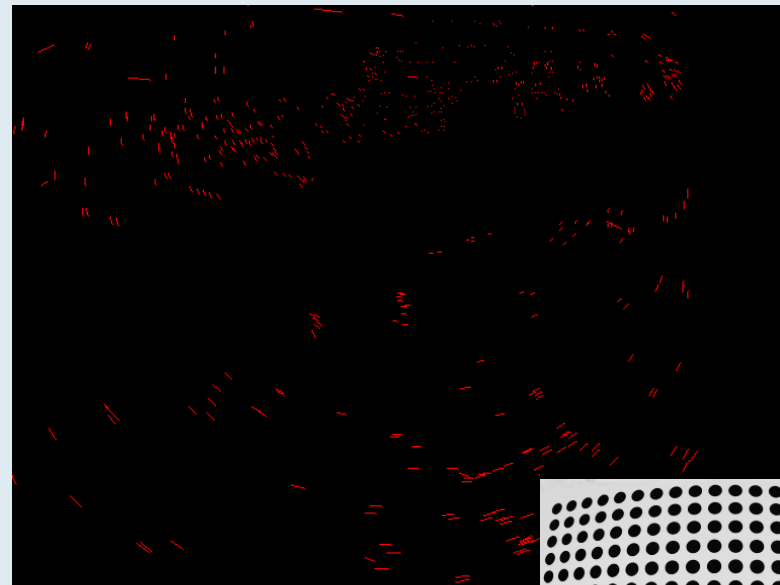
From research to product: MvPanoramaDetection

- For example, find geometric distortions using feature extraction and matching over consecutive images



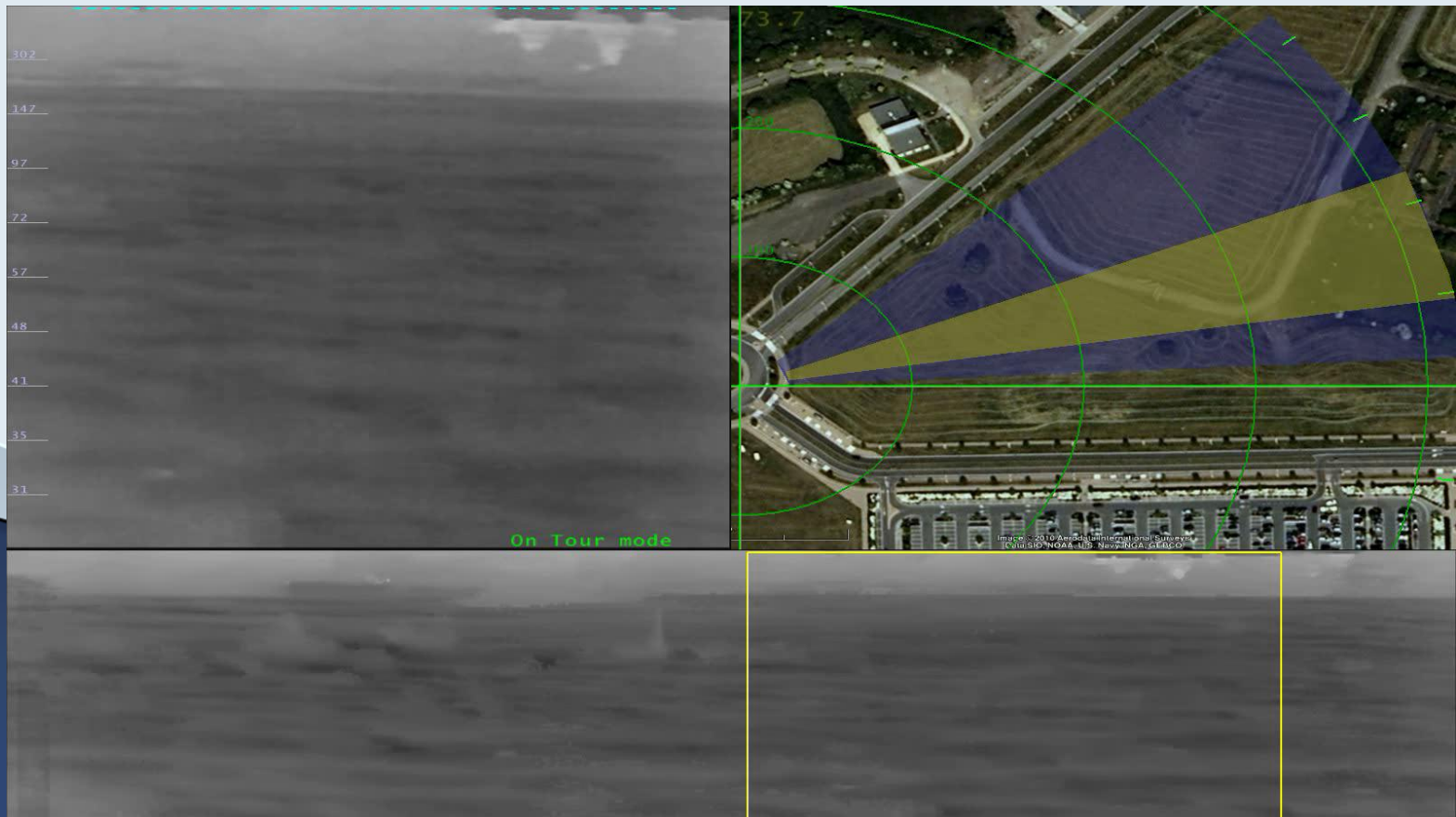
From research to product: MvPanoramaDetection

- For example, find geometric distortions using feature extraction and matching over consecutive images



From research to product: MvPanoramaDetection

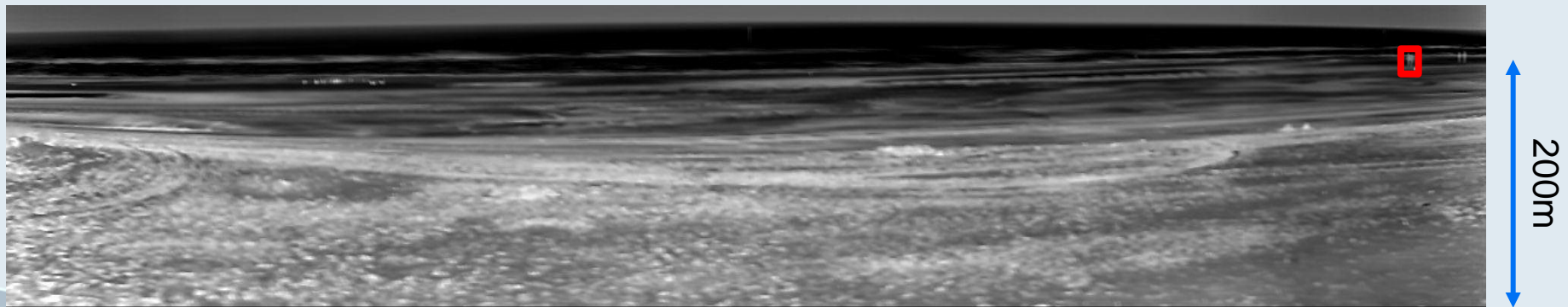
- Knowing the camera calibration, current pan-tilt position and global system location (latitude, longitude) we compute world based target attributes (WSG84 position, real speed and direction, size...)



From research to product: MvPanoramaDetection

- ACIC PanoramaDetection

- Dramatically reduce the number of surveillance cameras
- Perform long range detection over large area
- Support thermal imaging for all weather, day/night surveillance



From research to products: move to real contexts

- Understand the right problem with the customer, can the video content analysis be an answer ?
- Test the algorithm with a lot of different contexts to estimate the real strength/weakness of the approach
- Use large video corpus with high level benchmarking (e.g: the iLids New Technology dataset)
- Keep the configuration/accessibility of the technology in mind
- Don't focus too much on the algorithm speed, it's easier to make good algorithms faster than bad algorithms better.



Perspectives

- Mixed technics used to solve more complex scenarios in difficult environments
 - Explicit foreground/background extraction
 - Learning model for object detection and classification
 - Clustering of spatiotemporal features
 - ...
- Sensors fusion
- Complex processing can now be embedded in the camera (and storage too), manufacturers provides SDK
- Video surveillance as a service, for on line or a posteriori analysis



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