



ADABTBS

Automatic Detection of Abnormal Behaviour
and Threats in crowded Spaces



ADABTBS



Republic of Bulgaria
Ministry of the Interior



Institute of Psychology



UNIVERSITY OF AMSTERDAM

BAE SYSTEMS



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Automatic Detection of Abnormal Behaviour
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*"ADABTS aims to facilitate the protection of EU citizens,
property and infrastructure against
threats of terrorism, crime and riots by the
automatic detection of abnormal human behaviour."*

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 **European Commission**
Enterprise and Industry



Automatic detection of threat behaviours

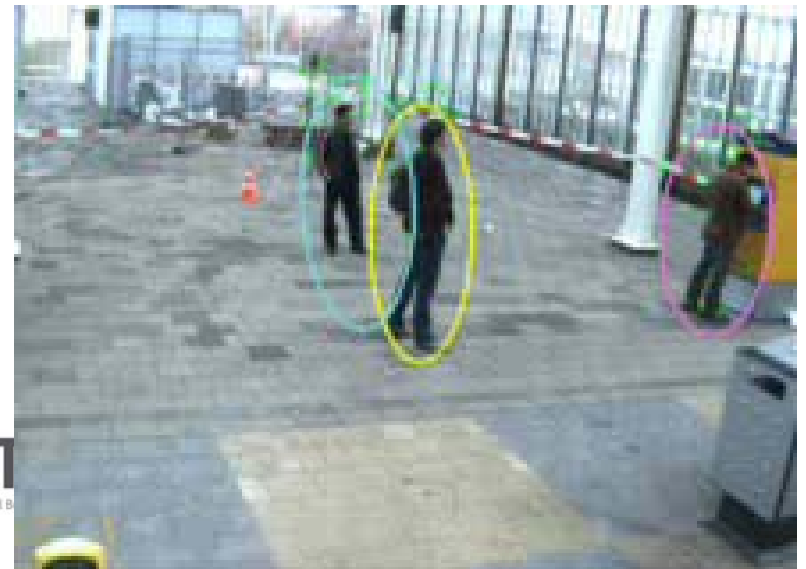


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Introduction

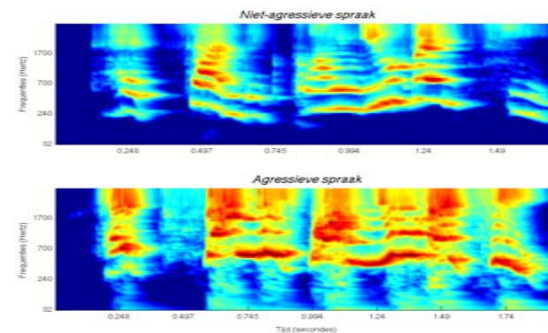
- Situation today
 - Expert operators for the detection of abnormal behaviours or threat.
 - With massive amounts of sensor data, manual detection is not feasible.
 - Methods for automatic detection give many false alarms and need expensive hardware.



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- Approach
 - System to support the operator by filtering the data: focusing on the "interesting" data.
 - Definition of abnormal behaviour through characterization of expert knowledge
 - Combining video and audio
 - Implementation in low cost hardware



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- Goal: Detection of abnormal behaviour of persons in
 - Large-scale events
 - Mass transport systems



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Problems & questions

- Problems/questions:
 - What are the real needs of the end users?
 - What behaviours are to be detected?
 - How do expert operators detect behaviours and threats?
 - How can these be observed by sensors?
 - How is the information extracted from sensor data?
 - How can this be implemented in a low cost system?



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Project approach

1. Find the needs of the users, as they see it.
2. Study how expert operators solve their task. Find out:
 1. What primitives they are observing, *consciously and subconsciously!*
 2. How these primitives form suspicious behaviours
3. Specify a sensor system that can observe these primitives (using video and audio).
4. Develop/adapt methods that can extract the primitives from sensor data and classify behaviours.
5. Integrate the methods on low-cost hardware and test on-site
 - Exploit the gaming industry!
6. Evaluate in cooperation with end users.
7. Disseminate knowledge and exploit technology.



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Core partners

- FOI - Swedish Defence Research Agency (SE)
- TNO (NL)
- BAE Systems (UK)
- Sintef (NO)
- University of Amsterdam (NL)
- Detec (NO)
- Institute of Psychology of the Ministry of the Interior IPMI (BG)
- Home Office Scientific Development Branch (UK)



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End-users

- Security companies
- Football club
- Airports
- Government bodies
- Police



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Different contexts – different behaviours



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Definition of abnormal behaviour

- Context dependent
- Predefined, e.g. (preliminary):
 - Running in a place where you normally do not run (security check at an airport, at a bank office).
 - Using an emergency exit (a good indicator that we have some kind of emergency situation).
 - Going the wrong way in a one-way passage.
 - Fighting.
 - Screaming (agressively or for help).
- Deviation from normal (anomalous)

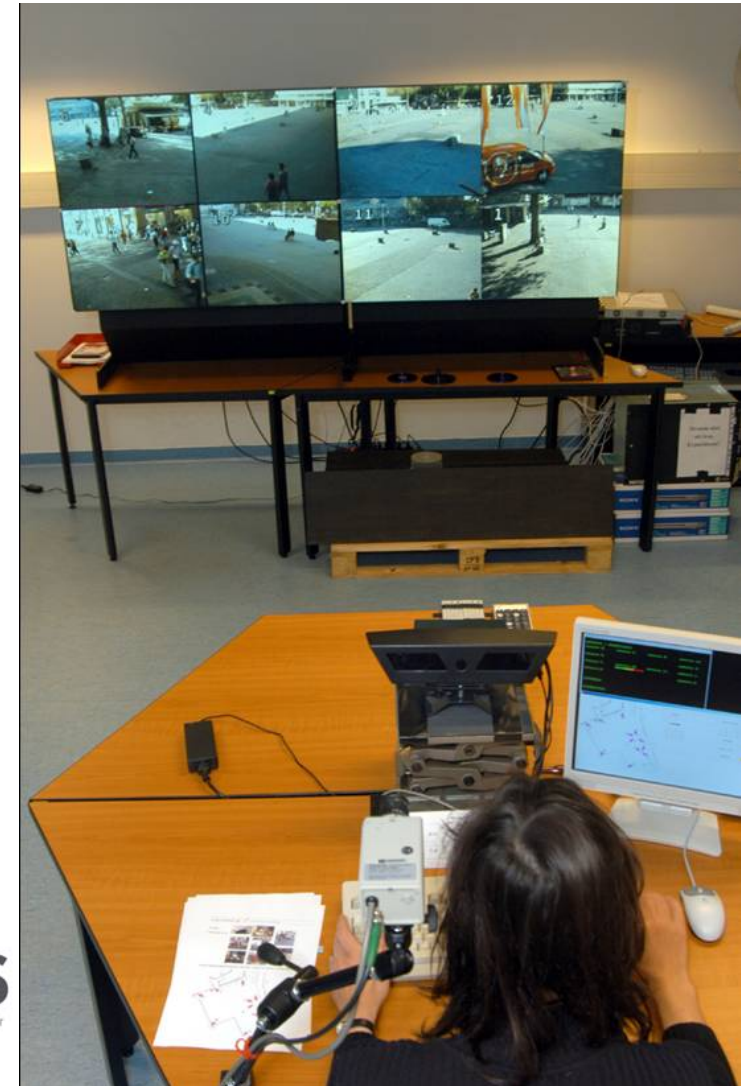


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Definition of abnormal behaviour

- Through the extraction of conscious and unconscious expert knowledge
 - Interviewing
 - Observation
 - Eye movements & verbal reporting techniques



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Definition of abnormal behaviour



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Legal & ethical aspects

- Study includes:
 - Legal (national, EU) and ethical restrictions on proposed techniques.
 - Implications of privacy issues on the design of the system
- Study excludes:
 - person identification (e.g. face recognition, voice identification) or language recognition.
 - tracking people across a wide area connected by sensors.
- Independent ethical committee reviews the trials and results and gives advice during the project.

Note that filtering techniques may contribute to more objective detection, more privacy and may lead to increased acceptance by the general public.



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Summary

- Not yet another video surveillance project!
 - Thorough study of user needs
 - Exploitation of expert user conscious and unconscious knowledge of observable features
 - Detection of pre-defined *and* previously unseen behaviours
 - Adaptation to modern low-cost hardware
 - On-site integration and test
- Strong consortium with European key players
- Strong end-user network



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Questions?



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