

TecFOr 2010, Seminario Sicurezza



TechFOr 2010, 18 Maggio, Fiera di Roma
Conferenza SELEX Sistemi Integrati & AFCEA Capitolo di Roma
"Tecnologie Abilitanti e Sistemi per la Sicurezza: il contributo delle
Università e dei Centri di Ricerca"

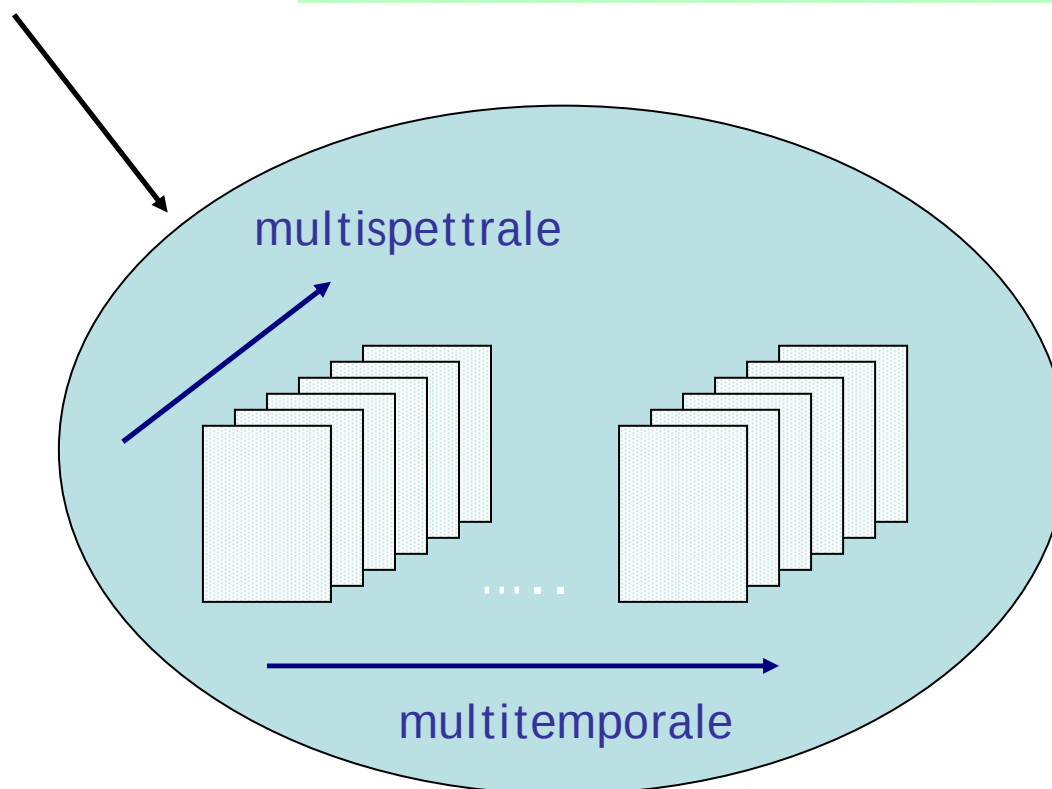
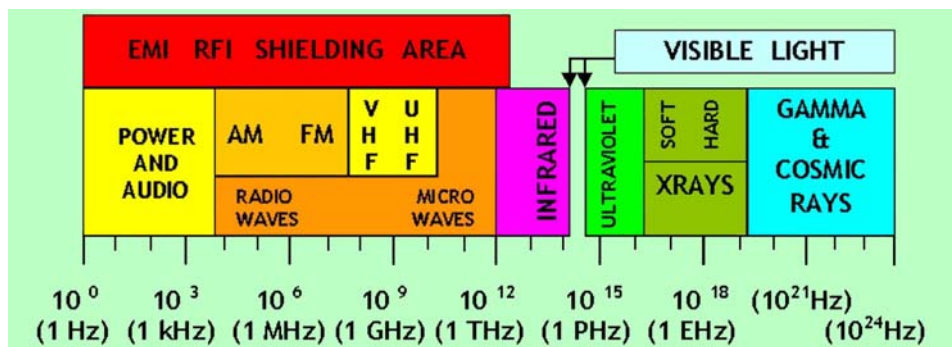


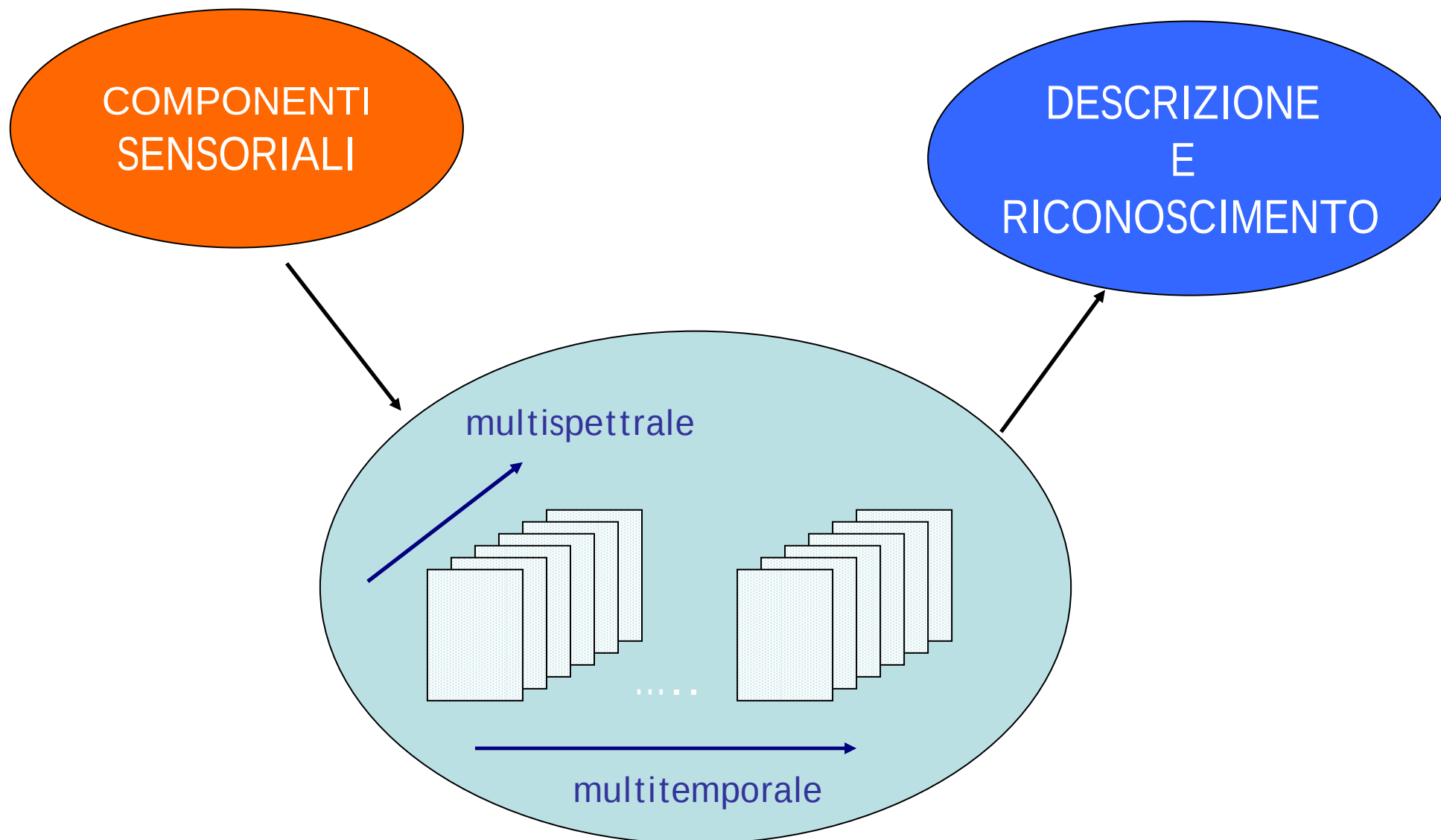
Sistemi multisensoriali intelligenti per la sicurezza

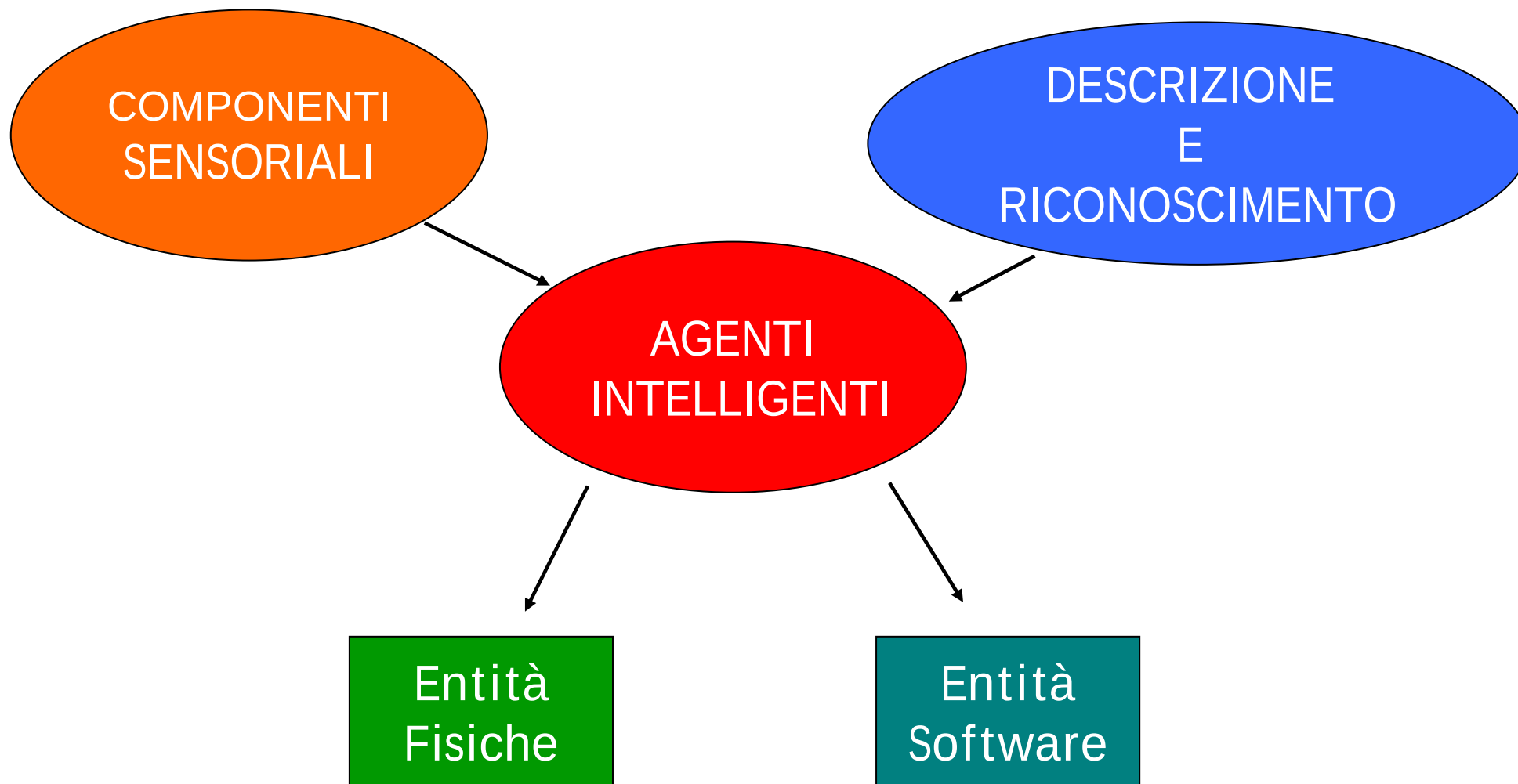


Sistemi multisensoriali intelligenti per la sicurezza

COMPONENTI
MULTISENSORIALI

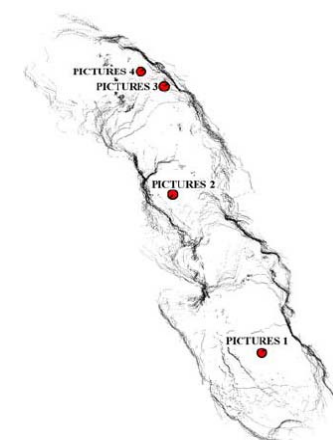
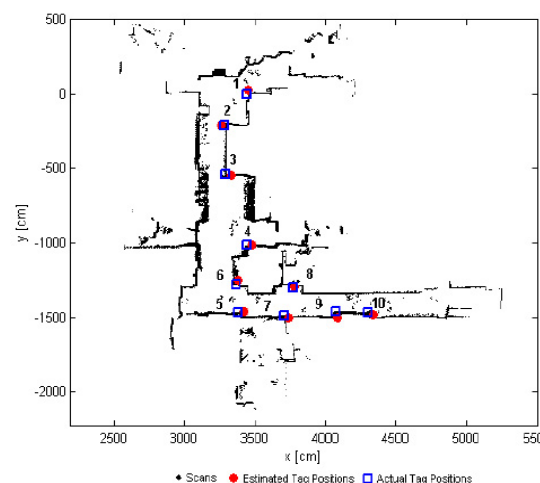
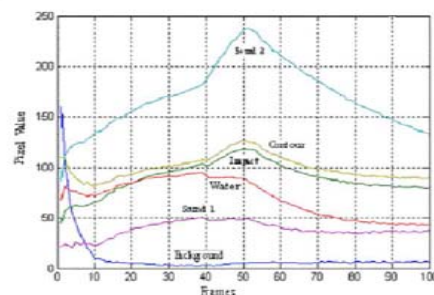
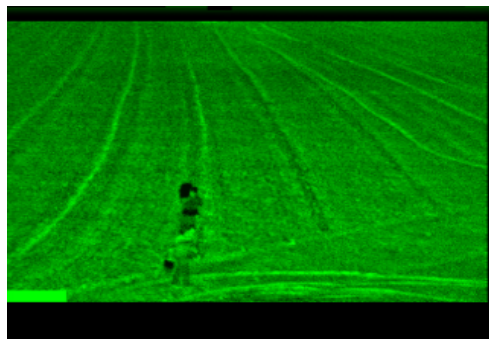




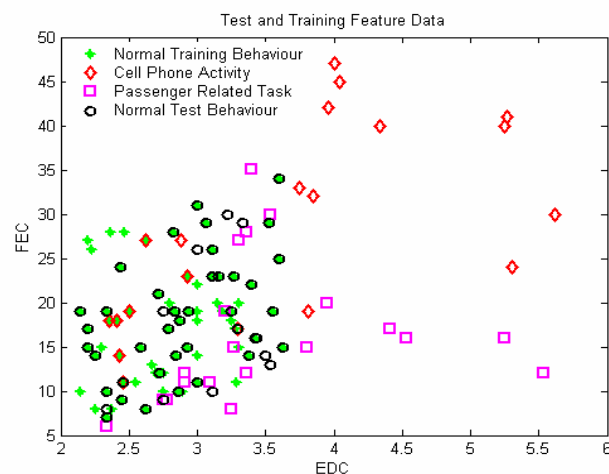
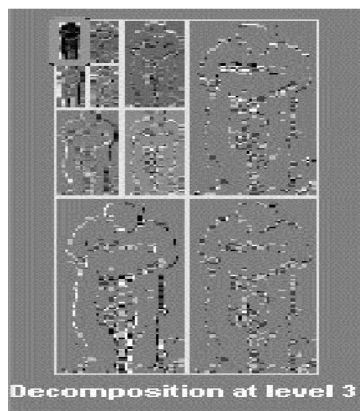


COMPONENTI SENSORIALI

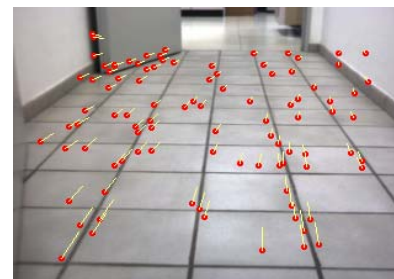
Visual and Infrared Camera
Ultrasonic Sensors
Thermocameras
Range Finder - Laser – Sonar
RFID



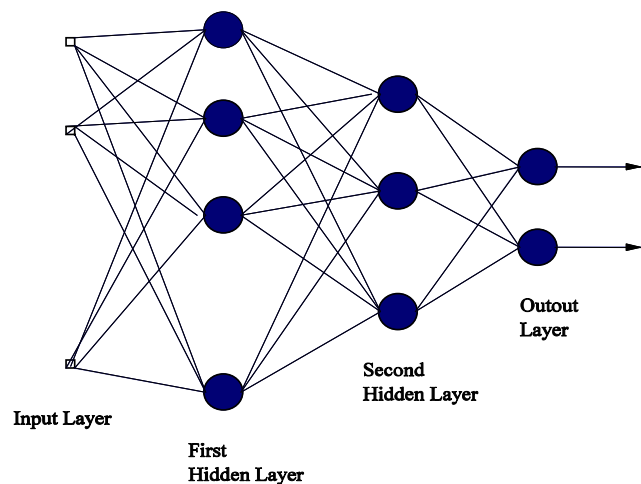
DESCRIZIONE



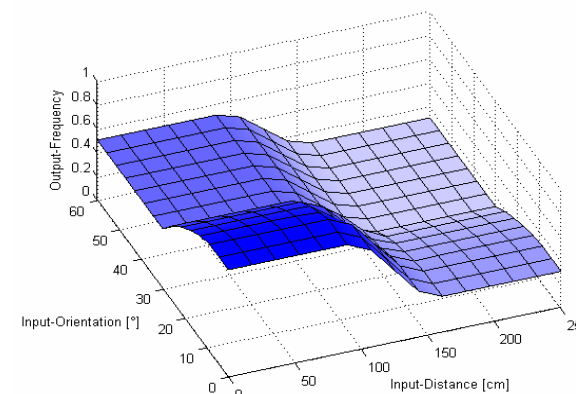
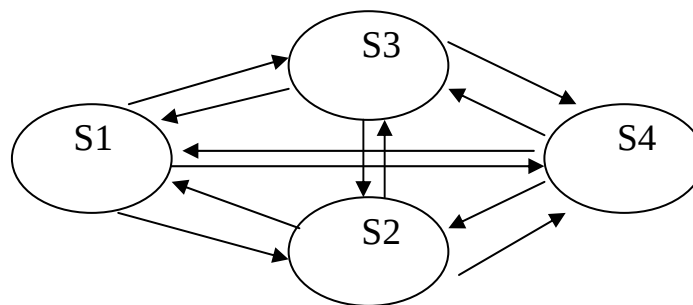
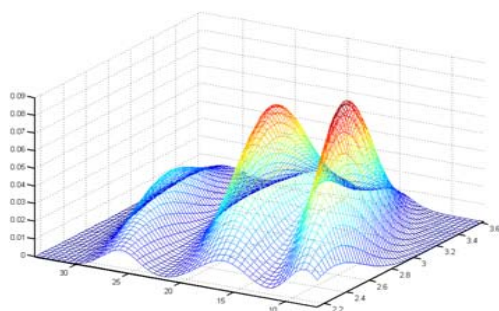
Principal Component Analysis
Independent Component Analysis
Wavelet-Contourlet Transform
Singular Value Decomposition
Empirical Mode Decomposition
Scale Invariant Feature Transform
Speeded Up Robust Features



RICONOSCIMENTO



Neural Network
Self Organized Map
Finite State Machine
Hidden Markov Model
Decision Tree
Fuzzy Logic



RICONOSCIMENTO



Activity Recognition
Event Detection
Anomalies Detection
Object Detection
People Detection and Recognition
Remote Environment Fruition



Activity Monitoring in public environments

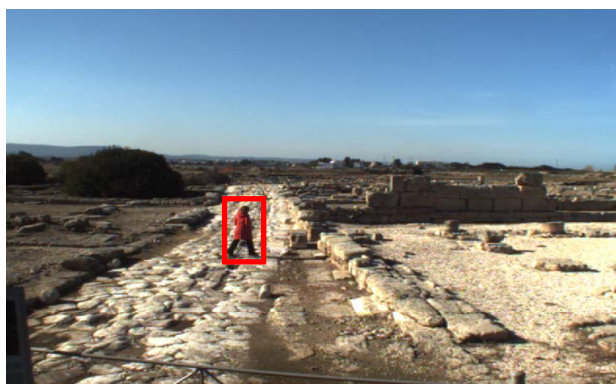
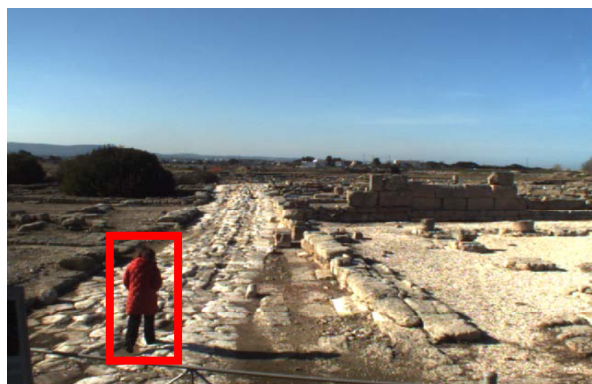
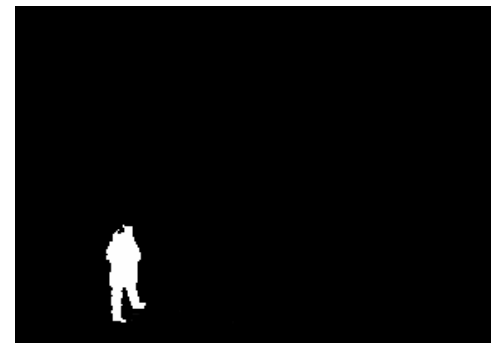


- Recognize Moving People in the environment
- Estimate their positions in the observed area
- Detect People Behaviors
- Prevent Illegal Activities



Activity Monitoring in public environments

- Moving Object Detection
- Shadow Removing
- People Detection
- Activity Modeling



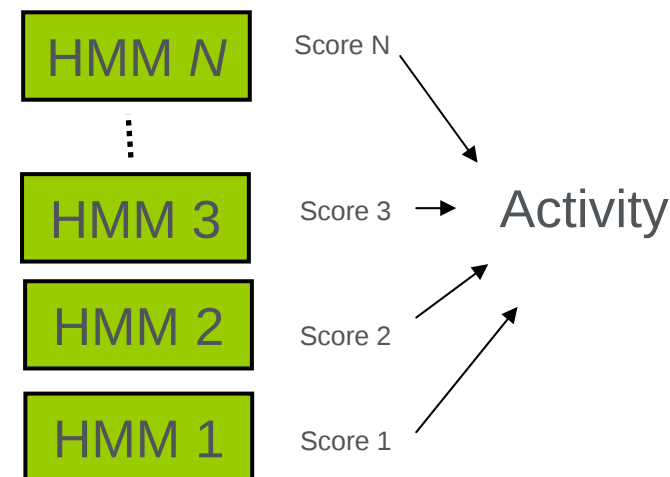
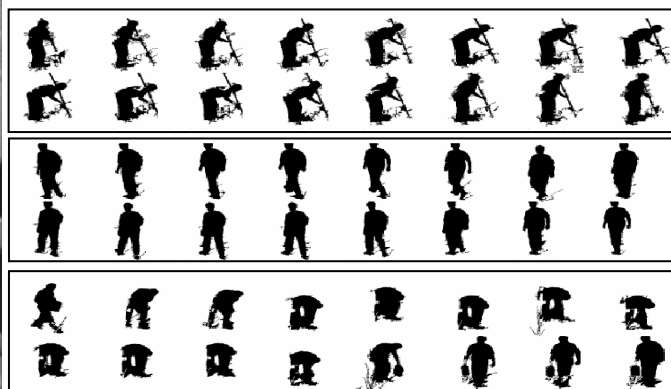
Activity Monitoring in public environments

- People tracking
- Access Violation
- Removed Object
- Abandoned Object

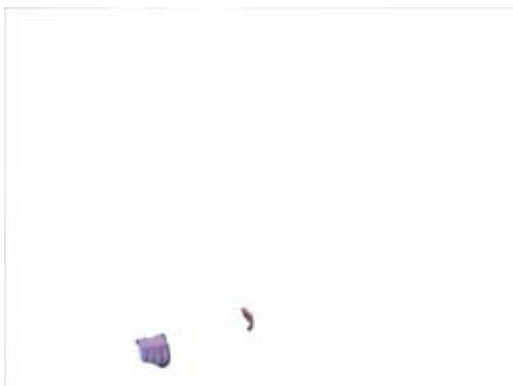
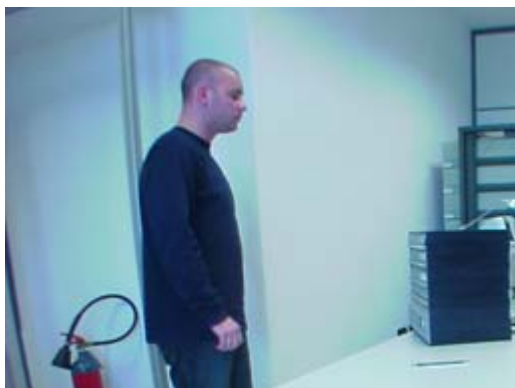


Activity Monitoring in public environments

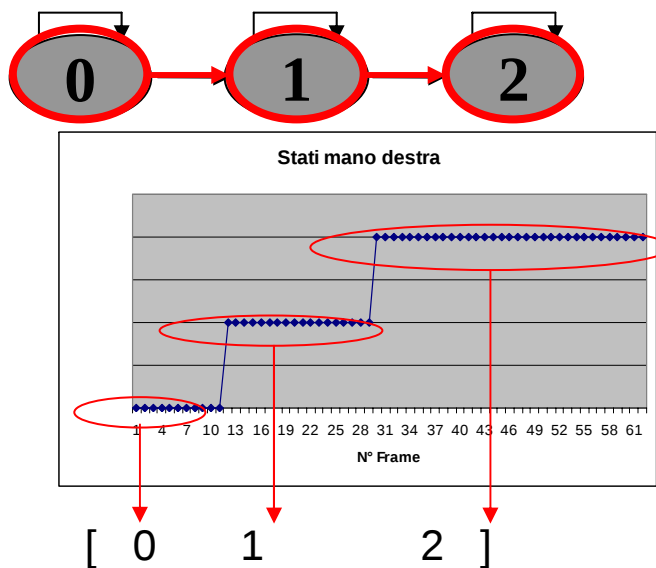
- People Detection
- Posture Estimation
- Temporal Posture Analysis
- Activity Recognition



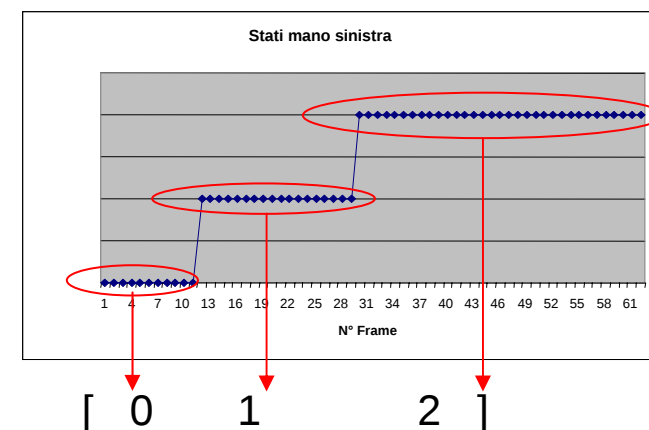
Activity Monitoring in public or private buildings



People detection and tracking
Human Body Component Segmentation
Gesture Modeling
Automatic Human Gesture recognition FSM



Finite State Machine



Environment Patrolling by moving platforms

People
Following



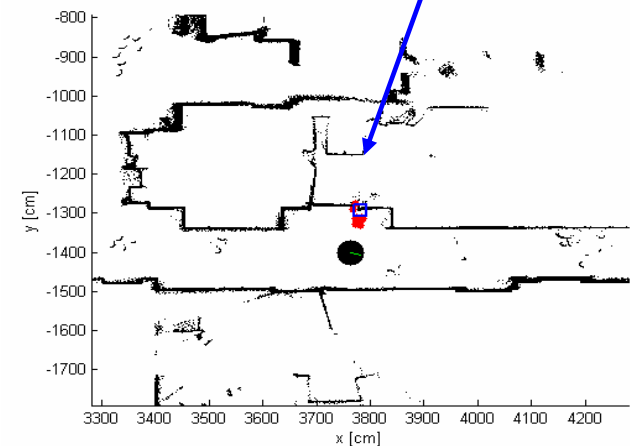
- Mapping
- Autonomous Navigation
- Object Detection and Localization
- People Detection and Following
- 3D Reconstruction

Multi-sensor System:
Visible Cameras
Laser Range Finder
Ultrasonic Sensors
RFID System

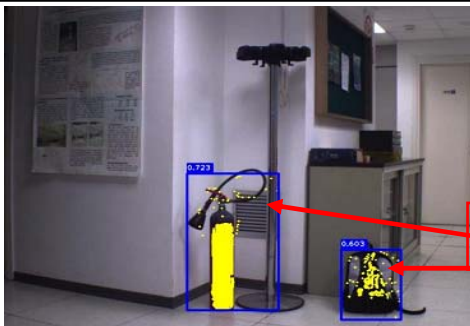
3D Reconstruction



Object localization



Object detection



Multirobot Cooperation

- Multi-robot task allocation
- Distributed Control of Heterogeneous Robotic Networks
- Decentralized Consensus-based Target Tracking
- Multi-Robot Distributed Perception and Decision Making
- Fault tolerance and Communication reliability

Distributed Control of Mobile Robot Networks

Global Network
(one leader)

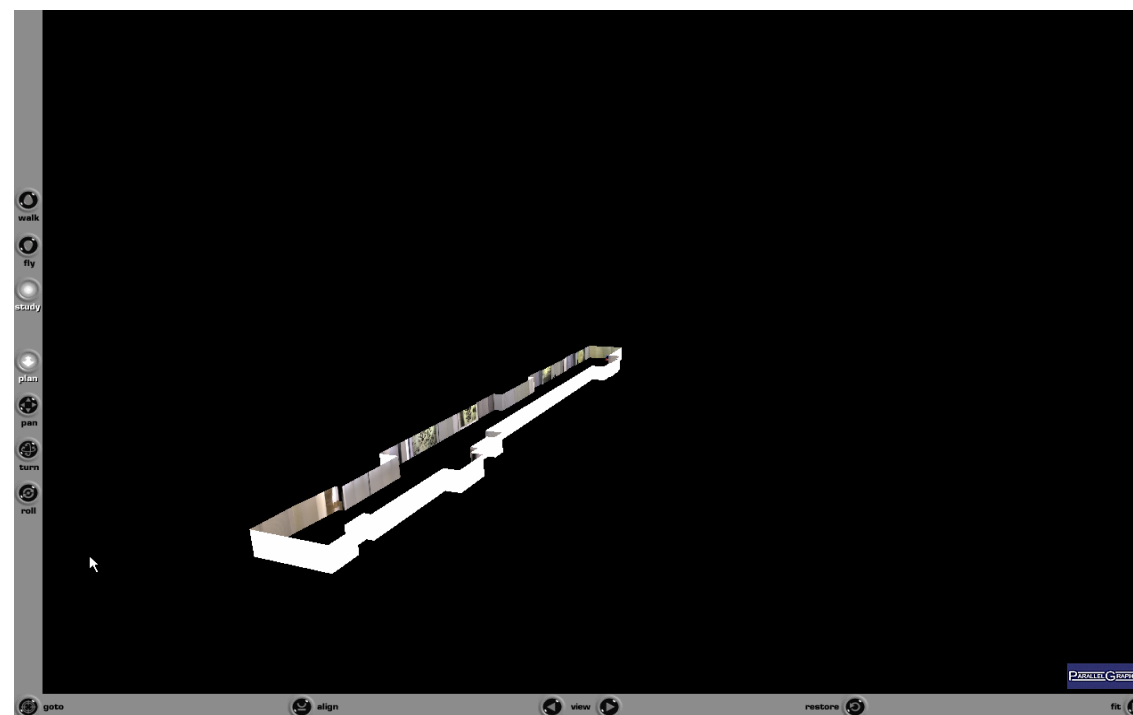
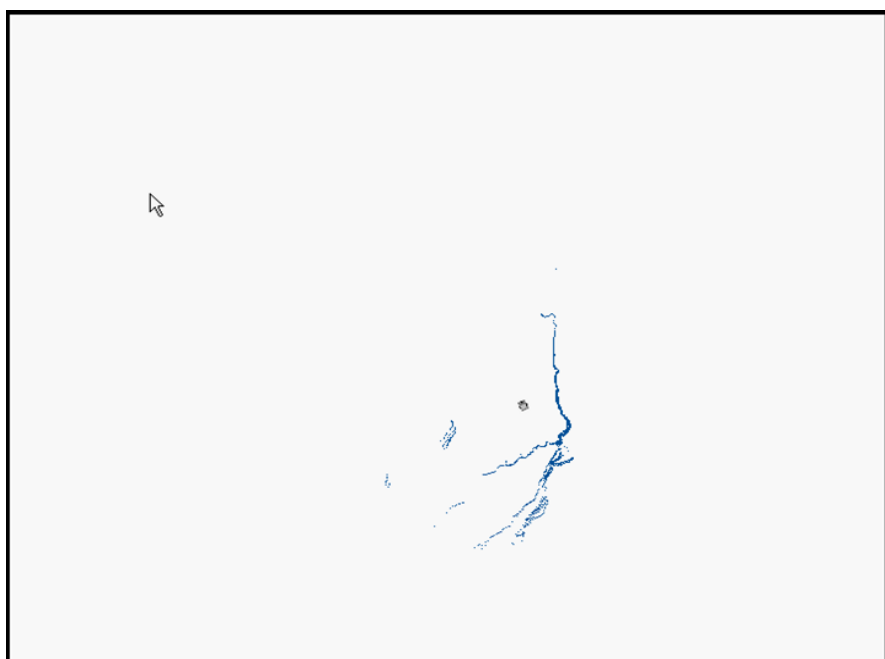
Application domains:

Multi-Target Observation
Area Coverage
Multirobot mapping
Exploration

Especially in hostile or complex environments

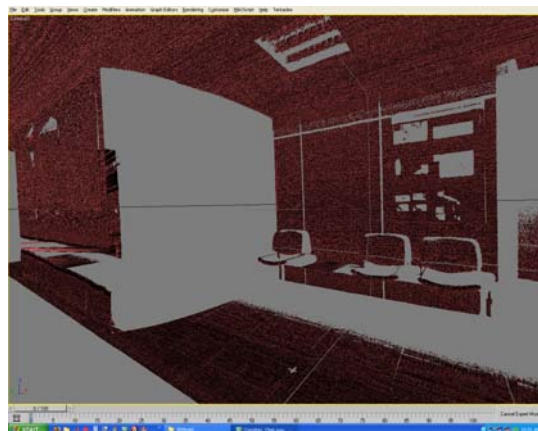
Environment Modeling

- 2D Mapping
- 3D Environment Reconstruction
- 3D Scene Reconstruction



Environment Modeling

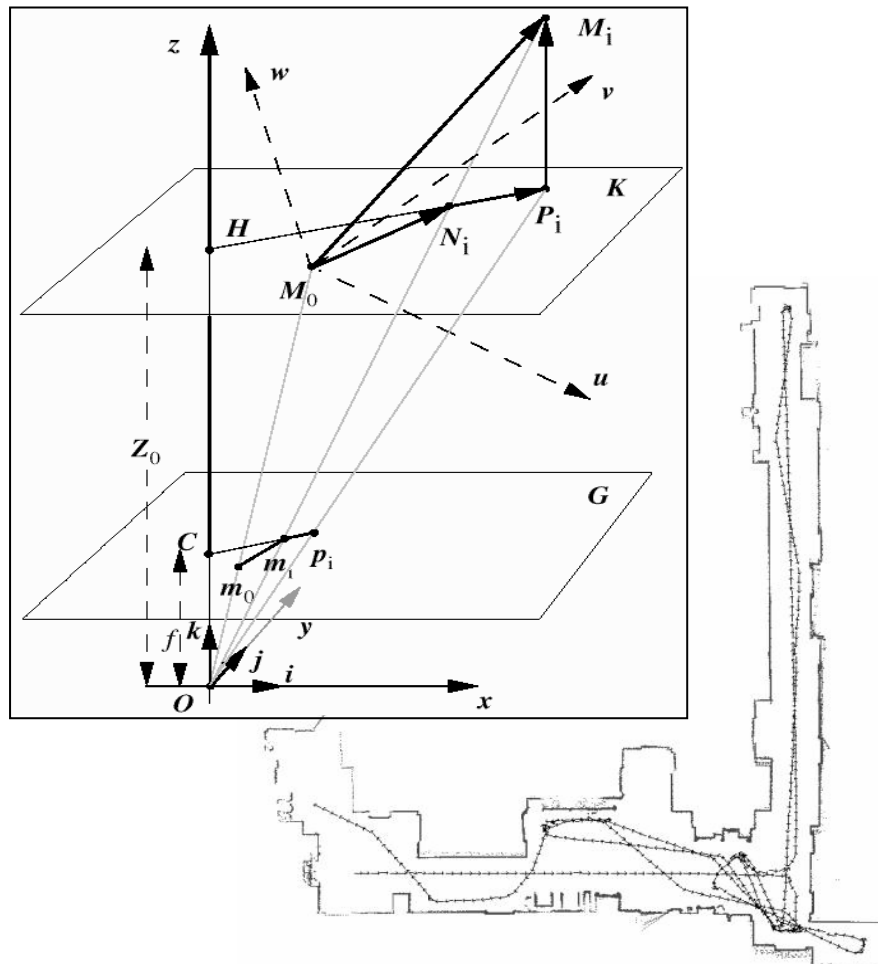
- 2D Mapping
- 3D Environment Reconstruction
- 3D Scene Reconstruction



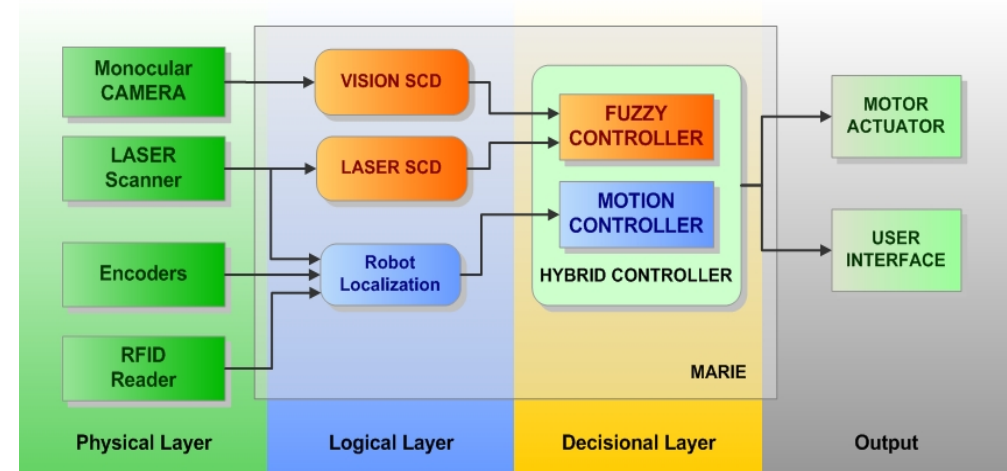
Contesti applicativi

Prevenzione ed analisi del rischio di eventi naturali (frane,...) o accertamento di mutamenti nella morfologia della scena dovuti all'uomo.

Autonomous Robot Navigation



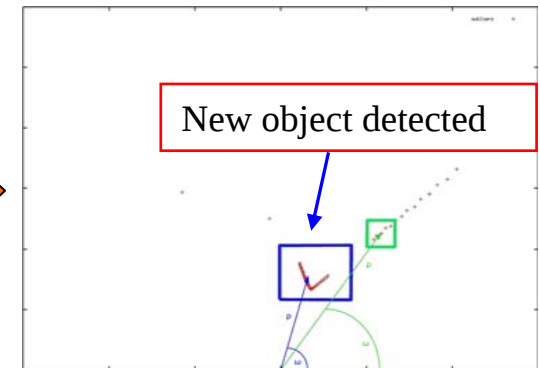
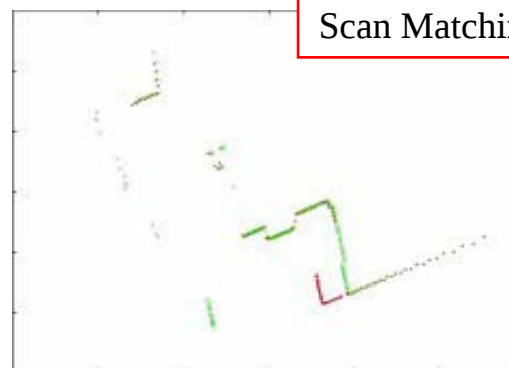
- Control Architecture
- Self-Localization
- Scan Matching
- Map Building
- Obstacle Avoidance
- Visual Odometry
- Path Planning
- Goal Reaching



Environment Patrolling by moving platforms



- Mission Control
- Laser-based people detection and tracking
- Visual-based Scene Change Detector
- Laser-based Scene Change Detector
- RFID for object localization

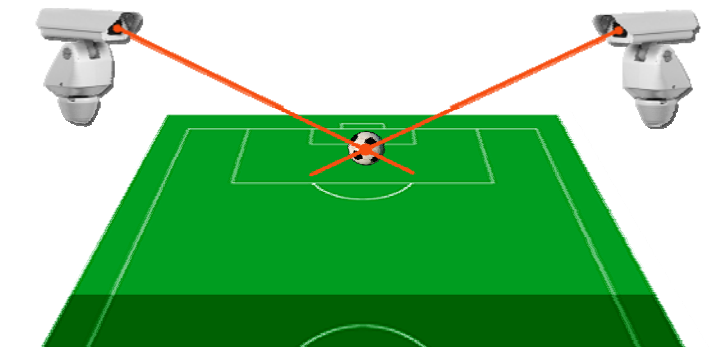
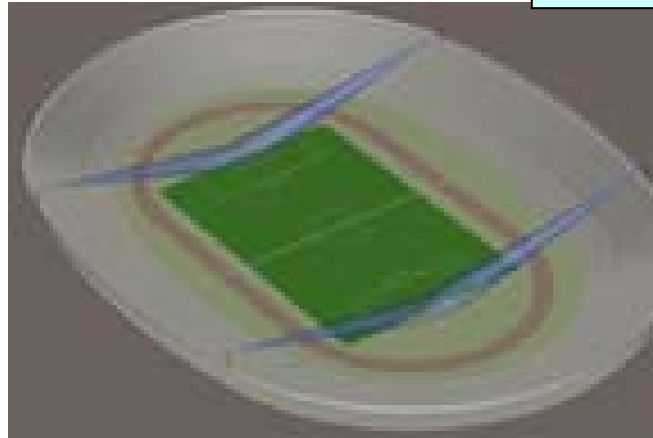


Detection of new or
removed objects

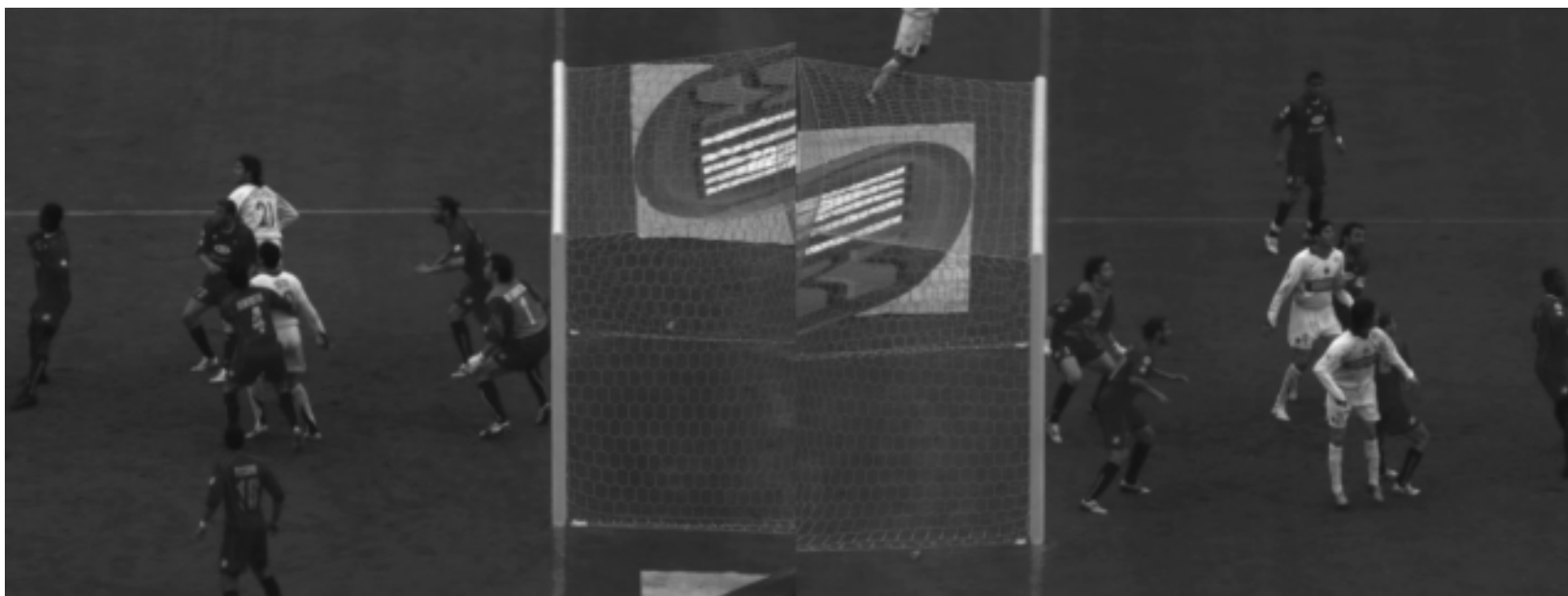
Goal Line Monitoring

Multi-camera System:
4 synchronized cameras
with high temporal
resolution (200 fps
640x480)

- Ball Detection and Tracking
- Data Synchronization
- Goal Event Decision Making



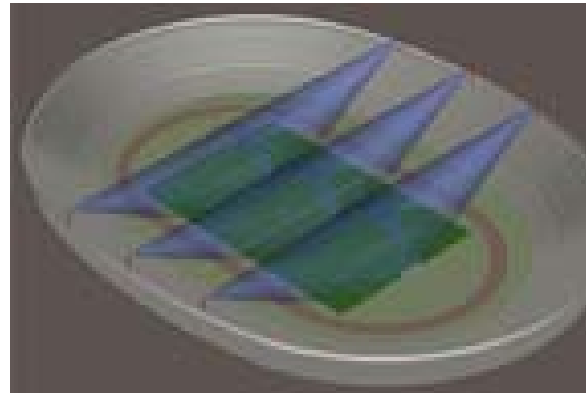
Goal Line Monitoring



Offside Detection

Multi-camera System:
6 synchronized color
Cameras
(30 fps 1920x1080)

- Player Detection and Tracking
- Ball Detection and Tracking
- Data Synchronization
- Offside Event Decision Making



Sistemi multisensoriali intelligenti per la sicurezza

Offside Detection



Penalty area Monitoring





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