



SPACE



SURVEY



RAILWAY
TRACK INSPECTION VEHICLE



**CYBER
SECURITY**



ANGEL



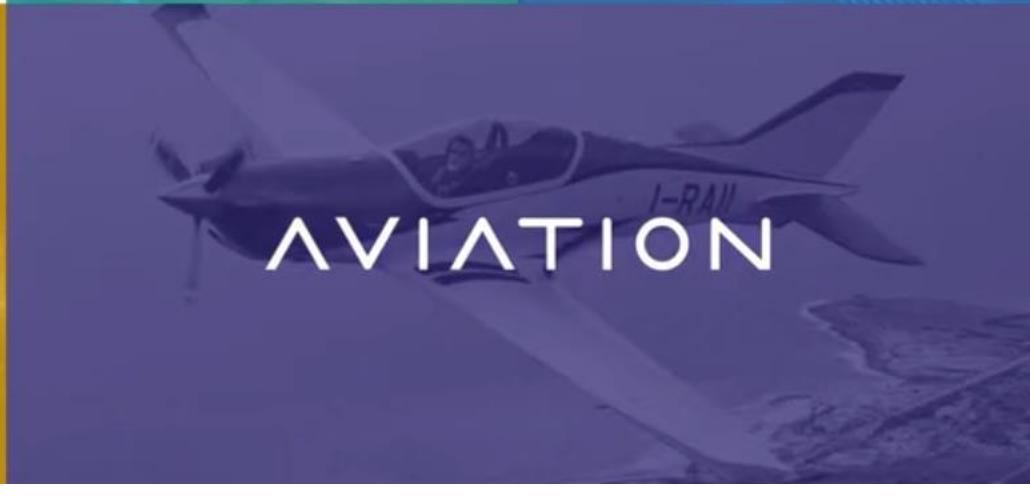
STEEL



**ARTIFICIAL
INTELLIGENCE**



IOT



AVIATION



SPACE



SURVEY



RAILWAY



CYBER
SECURITY



ANGEL



STEEL



ARTIFICIAL
INTELLIGENCE



IOT



AVIATION

International footprint

+1700 employees in +50 offices located in 20 countries



International Offices

- Abu Dhabi (UAE)
- Adelaide (Australia)
- Ankara (Turkey)
- Beijing (China)
- Casablanca (Morocco)
- Columbia (SC-USA)
- Helsinki (Finland)
- Madrid (Spain)
- Marseille (France)
- Milton Keynes (UK)
- Nuova Delhi (India)
- Oslo (Norway)
- Perth (Australia)
- Salonicco (Greece)
- Santiago (Chile)
- Singapore (Singapore)
- Skopje (North Macedonia)
- Sydney (Australia)
- Tokyo (Japan)
- Warsaw (Poland)

PIONEERING COMPANIES WHICH ARE GLOBAL LEADERS AND TECHNOLOGY INNOVATORS



ANGELSTAR

BLACKSHAPE



AN ANGEL COMPANY

SITÆL
AN ANGEL COMPANY

SkyComm
AN ANGEL COMPANY

vaimoo



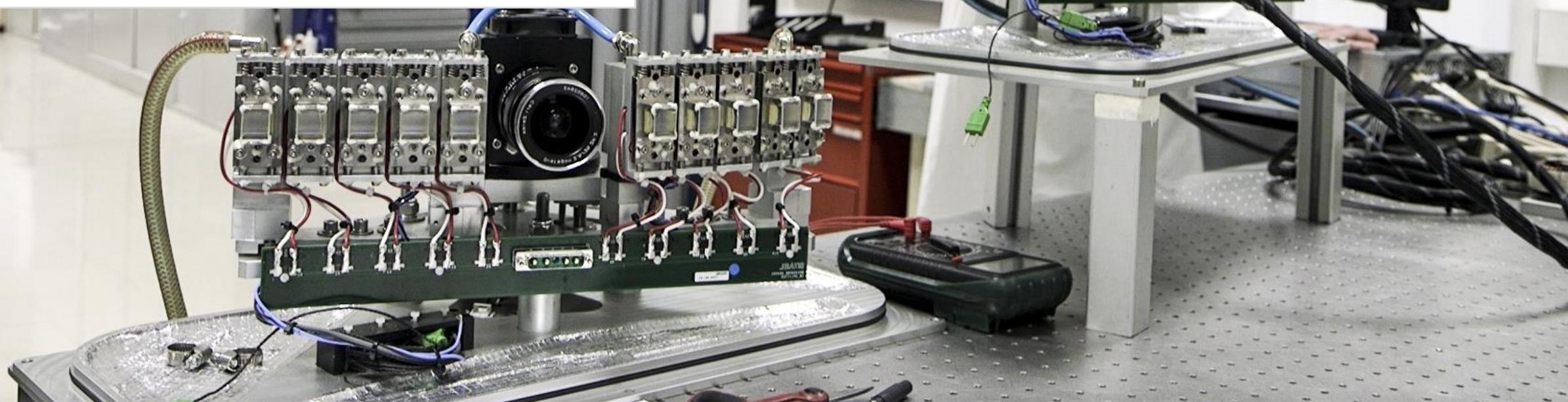
INNOVATION-CENTRIC APPROACH

Fully committed to meet the needs of the customer today and those that have yet to be imagined in the future

12% REVENUE INVESTED ANNUALLY IN R&D

+30 INTERNATIONAL RESEARCH PROGRAMS CURRENTLY IN EXECUTION

+15 UNIVERSITIES & RESEARCH CENTERS INVOLVED



UNIQUE SET OF COMPETENCES & CAPABILITIES...

- Electromechanics, Electronics, Optics, Photonics
- Material & Manufacturing (carbon fiber, etc.)
- Non-contact measurements
- Machine Vision
- Artificial Intelligence
- Cyber Security
- Internet of Things
- Big Data Analytics
- Software & Firmware
- Automation, Remote Control & Command
- RF & Microwave
- Safety-critical systems
- Propulsion
- Avionics & Power systems
- Special structure (airframe, railway carbody, etc.)
- Composite processing, structure manufacturing, final assembly, and painting

- User-specific Design & Engineering
- Complex Systems Integration
- Verification, Validation & Testing
- Global standard warranty systems
- Worldwide customer support
- International experience and deep knowledge in extremely demanding industries



OUR CUSTOMERS ARE ON THE FRONT LINE OF THE WORLD'S TOUGHEST INDUSTRIAL CHALLENGES:

- RAILWAY
- AVIATION
- SPACE
- RETAIL
- MOTORSPORT
- DEFENCE
- LAST-MILE MOBILITY
- LOGISTICS
- STEEL
- SMART CITY
- UTILITIES
- INDUSTRIAL PRODUCTION

- DIGITAL TRANSFORMATION
- COST REDUCTION
- INCREASE PRODUCTIVITY
- QUALITY ASSURANCE
- BUSINESS AVAILABILITY
- PREDICTIVE MAINTENANCE
- SAFETY ENHANCEMENT
- ADAPTING TO DEMAND
- DELIVERY PERFORMANCE

ON-BOARD SOLUTIONS

Highlights

**+1000 systems
installed**

**+200 Engineers
+25 Vision Specialists**

**Self-Propelled
Modified Coach**

**Vehicle design and
production**

**+500 Monitored
Parameters**



+ 30 MEASURING SYSTEMS: FULLY DESIGNED IN-HOUSE

AUTOMATIC TRACK INSPECTION

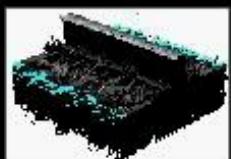
 **MERMEC**
AN ANGEL COMPANY

Display Parameters:

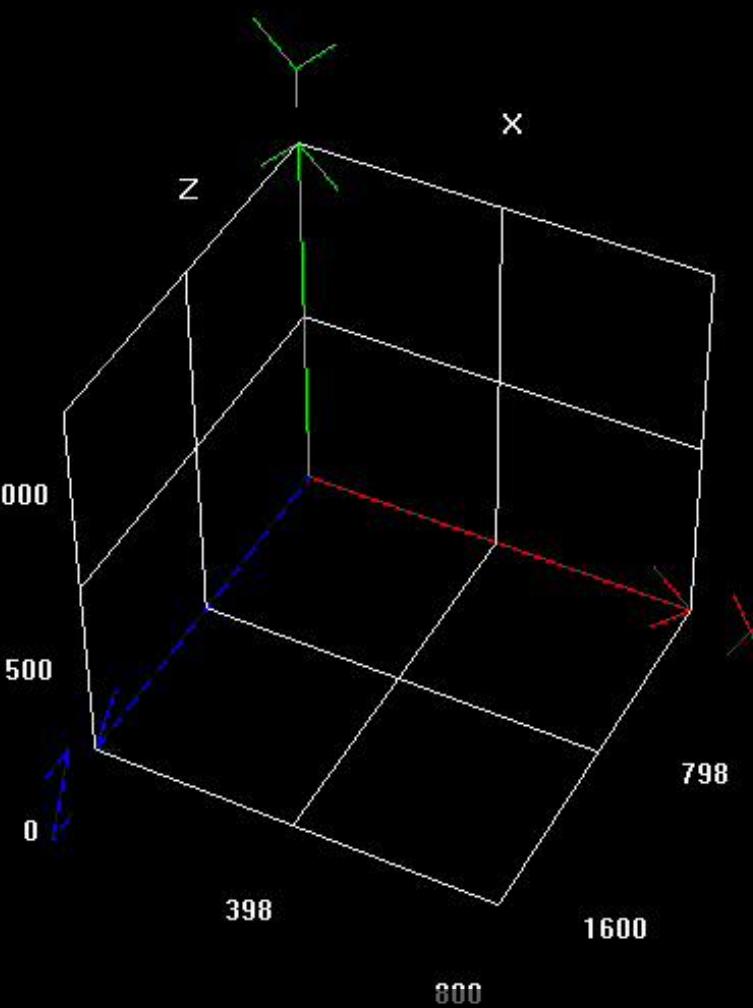
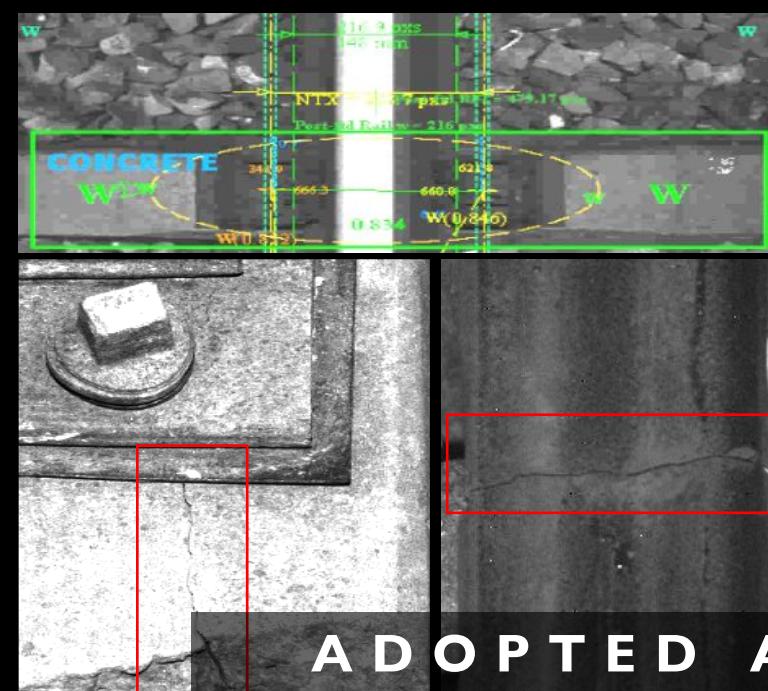
Scroll Step:	400
Offset Meas:	-50
Lines To Display:	400

Draw Inspection Image

Set View:

Move	
	

- Up to +20000 laser lines per second
- Up to 0.1mm resolution
- 2D + 3D Scan combined
- +60 Different Automatic Checks
- Deep Learning... if needed!



ADOPTED ALSO ON SHINKANSEN LINE IN JAPAN

SENSORS

INTEGRATING AND (OFTEN) INVENTING

SENSOR TECHNOLOGY



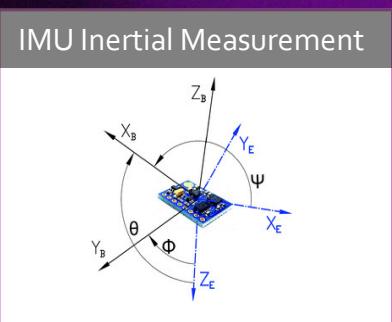
All in-House designed LED illuminators for 300km/h automatic track inspection

 **MERMEC**
AN ANGEL COMPANY

SITAEI
AN ANGEL COMPANY



Optic Sensors & Cameras



IMU Inertial Measurement



Ground Penetrating Radars



Ultrasound Testing Sensorics



Data collection boards



LIDAR



Custom Lenses / Optics



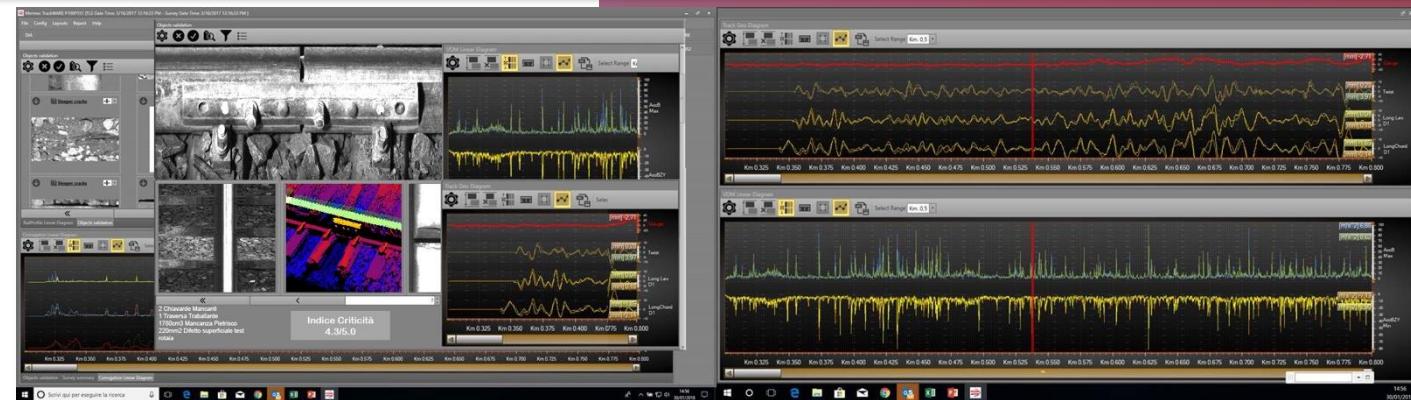
Laser & LED + Drivers

SOFTWARE SKILLS



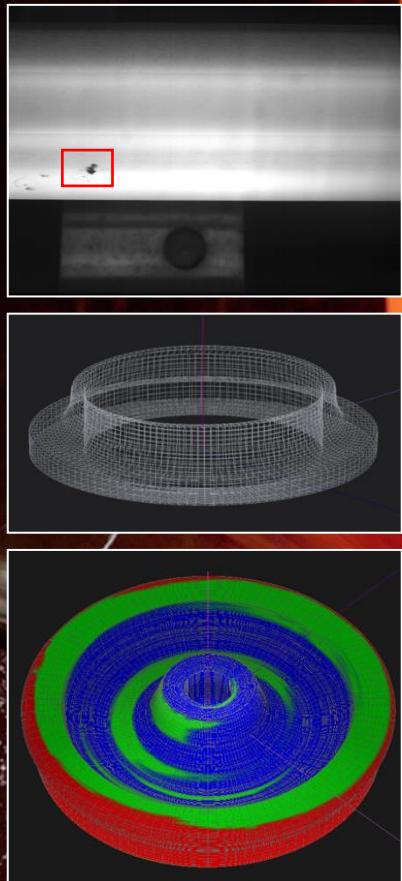
- +3000 deployed SW applications
- +60 developers
- Cloud & MicroServices Architecture (Azure and AWS)
- Desktop and Web applications (.Net C#, Angular, WPF, JS)
- Database Development and Management
- Data Science, Machine learning & AI
- HW Interaction

A screenshot of a software application interface. At the top left is the Mermec logo and an RFI logo. The top bar includes navigation icons and the text "CAMPAGNA : Mercoledì 13, Maggio, 2020". Below this is a red box labeled "Grafico Tipi di Set" with the number "13" and the text "Difetti Rilevanti !". To its right is a yellow box labeled "659" and "Difetti di Attenzione 🔥". Further right is an orange box labeled "0" and "Difetti di Intervento 🚧". The main area contains several components: a table with columns like Options, Validation, Acquisition Date, System, Category, Km Max, Max Value, and Latitude; a map of Italy with major cities and roads; a horizontal bar chart titled "Grafico Categorie" showing various categories with their values; a donut chart titled "Grafico Date Acquisizione" with the date 05/13/2020 08:17:07 - 672; and a bottom row of four colored boxes labeled 641, 12, 18, and 1, each with a corresponding icon.

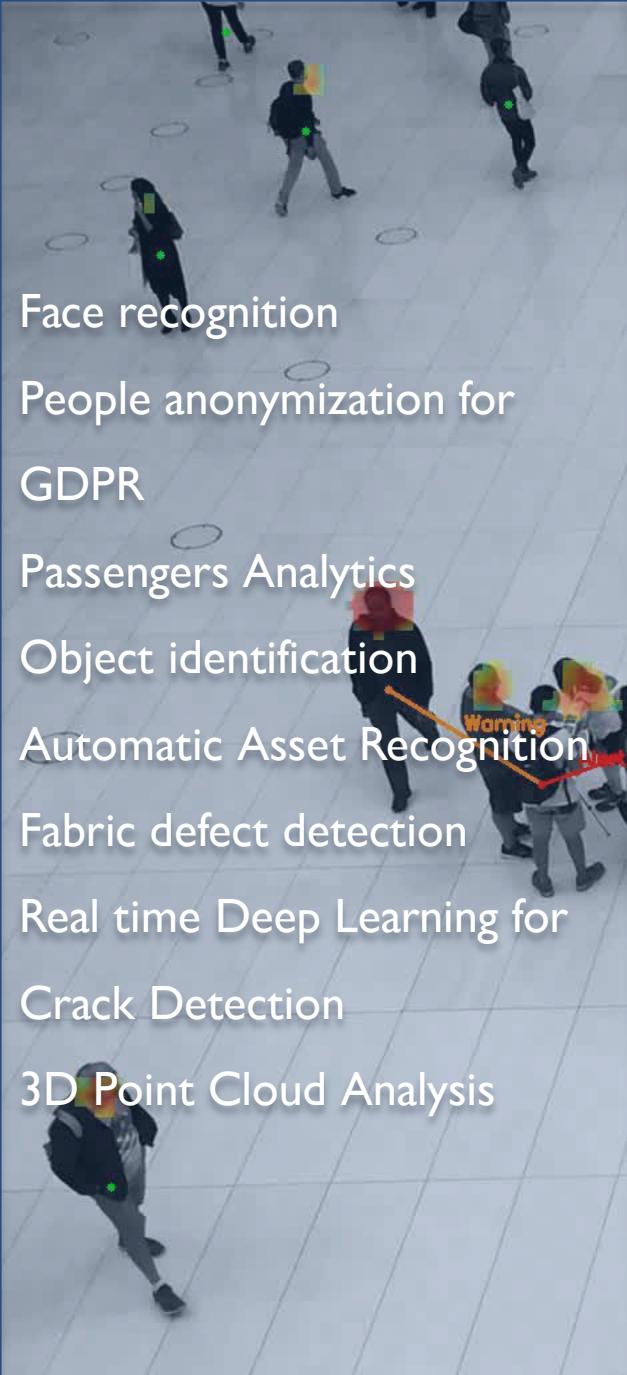


INDUSTRIAL APPLICATIONS

- 1200°C Incandescent metal inspection with AI
- 0.3mm accuracy in 1m diameter checks
- 0.1mm resolution in single profile check



HIGH PERFORMANCES IN HARSH SCENARIOS



HI-END DEEP LEARNING

Complex deep learning applications, high demanding performances



WHO WE ARE

ICT professionals coming from **R&D depts** in Aerospace, Defense and Naval fields

20+ years experience

Holding a degree/PhD in Math, Physics, SW and Telecom Engineering

TEAMS SKILLS



**Problem
solving**



**Algorithm
design**



**Quest for
Innovation**



Politecnico
di Bari



UNIVERSITÀ
DI PISA



UNIVERSITÀ
DEGLI STUDI
DI TORINO



SCUOLA
NORMALE
SUPERIORE



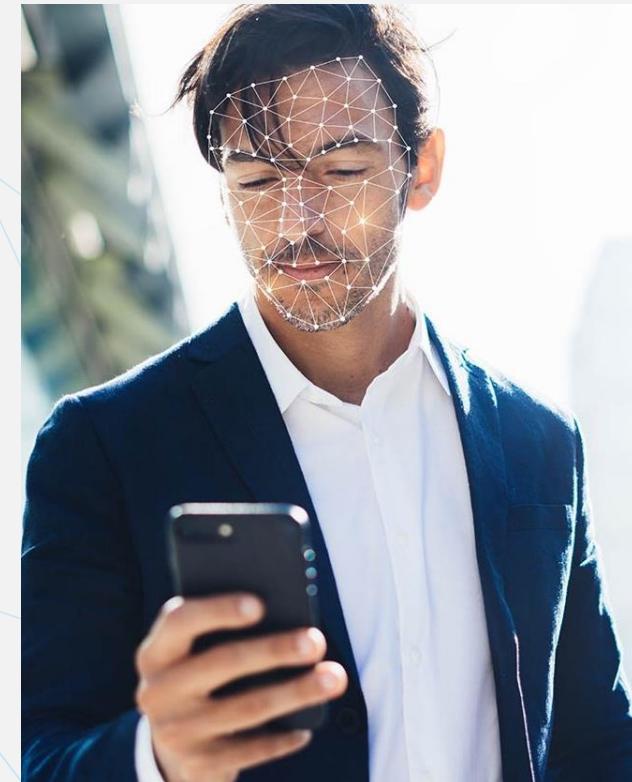
POLITECNICO
MILANO 1863



Sant'Anna
Scuola Universitaria Superiore Pisa



Associazione
Italiana per
l'Intelligenza
Artificiale



D
PoloTecnologico

HOW WE ARE ORGANISED

Computational Science

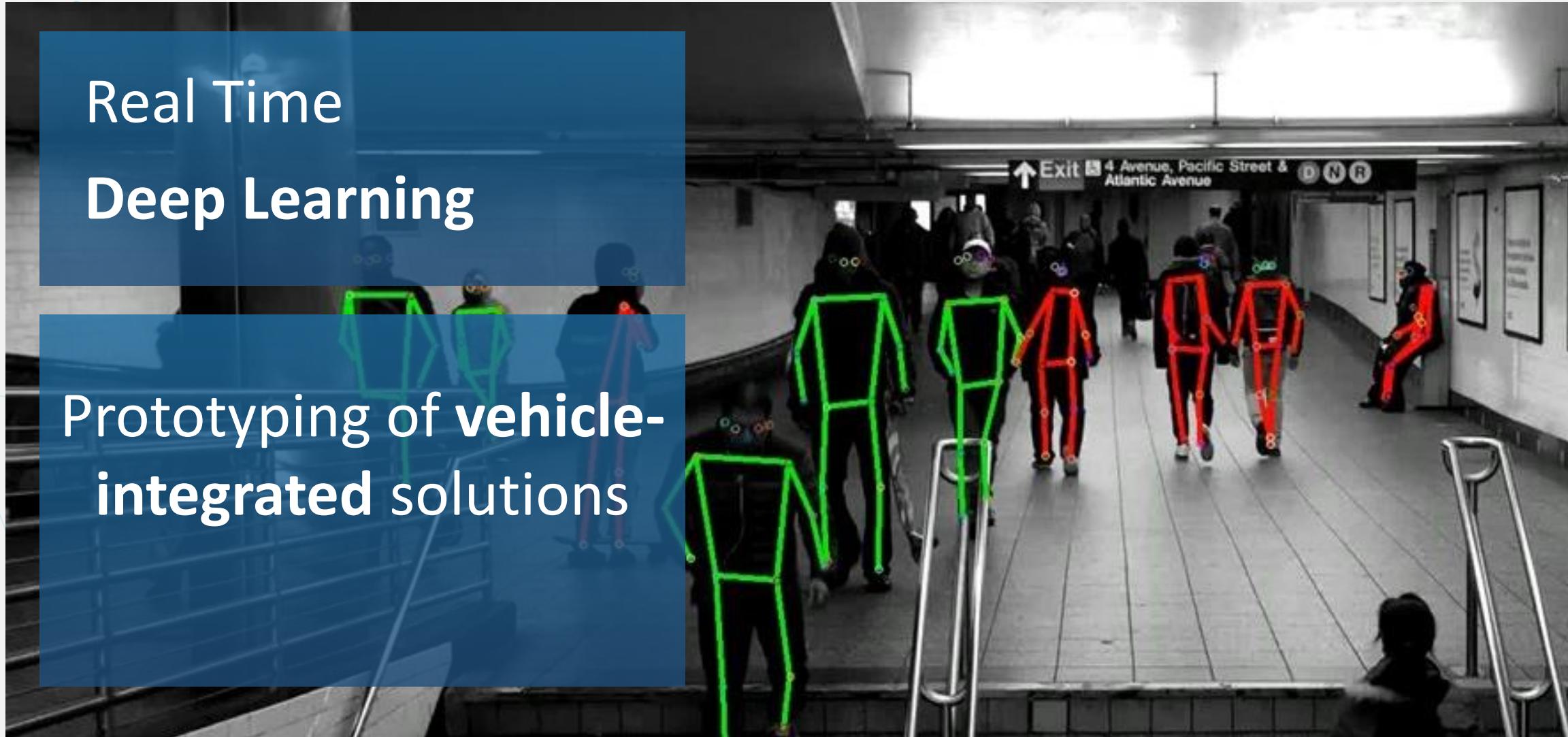
- Artificial Intelligence apps
- Augmented/Virtual Reality apps
- 3D modeling and GIS apps
- Autonomous navigation & self-localization
- Swarm distributed control
- Automatic control systems
- Full stack web development

Antennas & Comm. Systems

- Custom Antenna Design:
 - *Multiband GNSS,*
 - *Drone conformal C&C and data link,*
 - *Directive antennas,*
 - *S-band up to 77 GHz radar,*
 - *Ka Active Phased Arrays*
- EM radiation interaction (EMC/EMI)
- Software Defined Radio (SDR)
- Radio-Communication link analysis
- Secure Radio Transmission

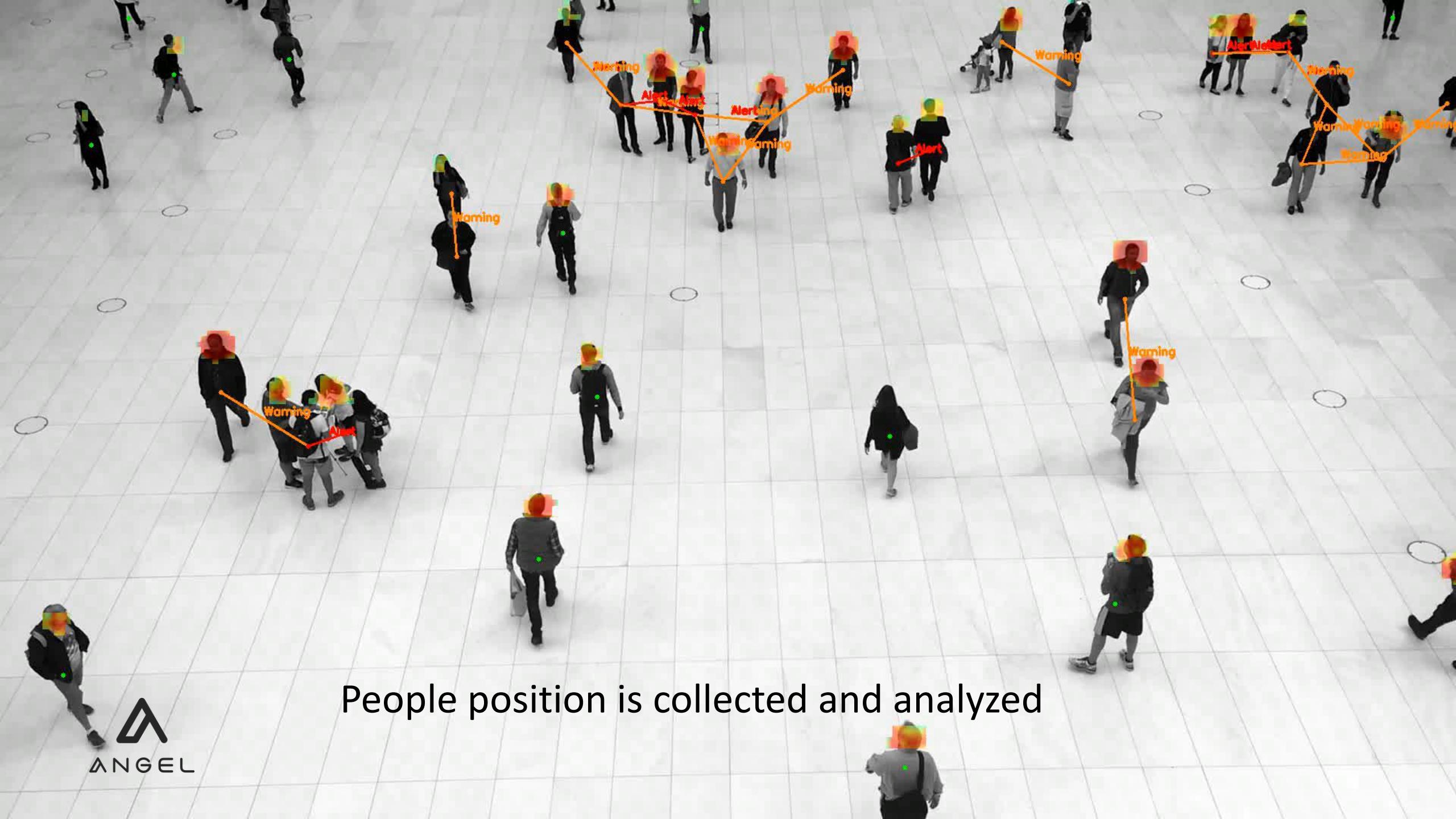
Real Time
Deep Learning

Prototyping of vehicle-
integrated solutions



People are monitored from parking areas
and assigned to parked cars





People position is collected and analyzed





Automatic GDPR Compliancy

The entirely in-house developed **GDPR Anonymizer software** automatically processes high resolution spherical and flat pictures (up to 10000 x 5000 pixels spherical images).

It identifies in real-time all the people and license plates in each image and consequently blurs them, in order to anonymize the shot while preserving the general content of the image.

LATEST AI PROJECTS

Defects (cracks) identifications by semantic segmentation

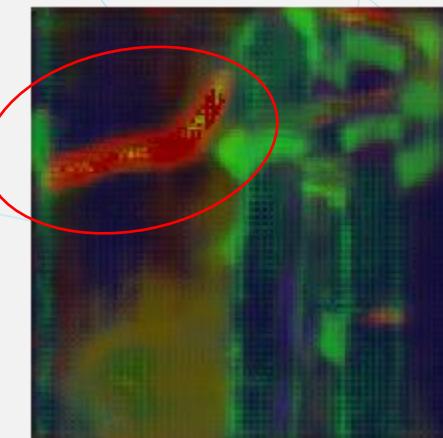
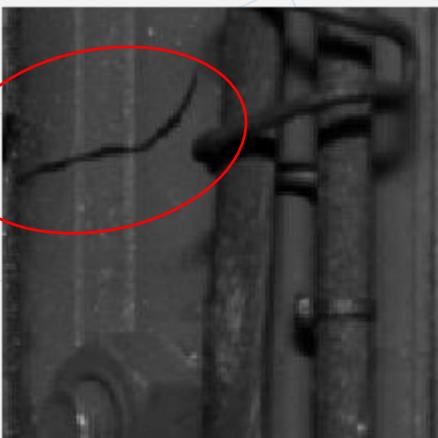
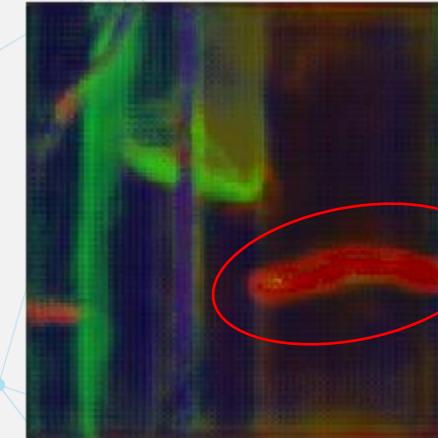
Image from sensors

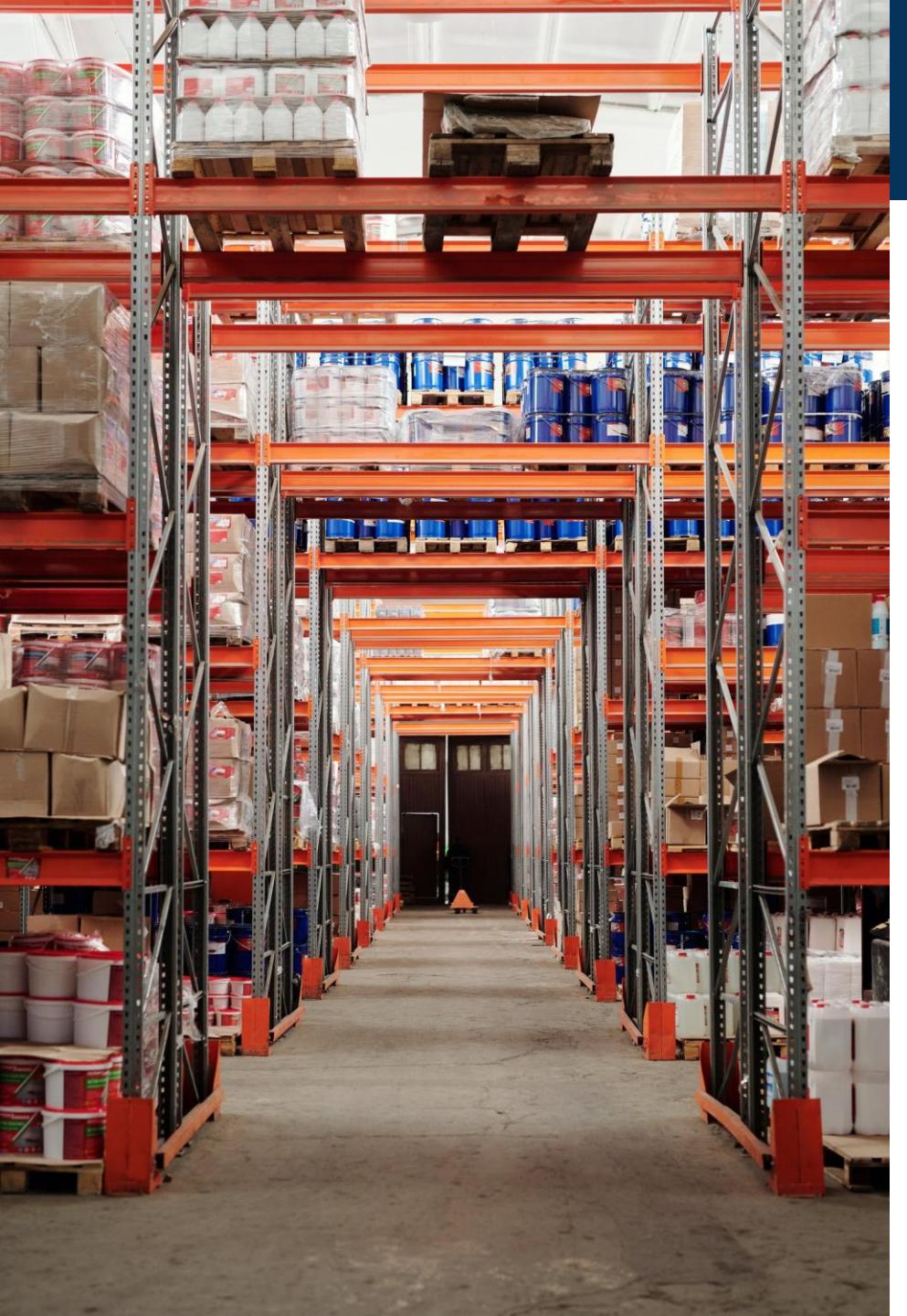


Ground truth



Inference by the model





AGILE FACTORIES

- **Quality Management** AI systems to detect quality defects through image recognition and other parameters
- **Modeling & Simulation** to top optimize production processes across the production plant & validate system reconfiguration before committing to layout changes
- **Industrial IoT Intelligence** to warn and alarm in real time, enabling shortened time for effective response, reduced unplanned downtime, and maximized overall productivity
- **Predictive Maintenance** preconfigured tool to predict points of failure and reduce unplanned downtime, shortened asset life cycles, and unoptimized equipment performance



Sistema per la **misura automatica**
in movimento dei pallet.

patent pending

CARATTERISTICHE GENERALI



STEEL MEASURING AND INSPECTION SYSTEMS



Seamless Rolled Rings and monobloc Wheels (Hot and Cold)

Automatic laser dimensional measurement during forging



RINGCHECK: EXAMPLE OF COLD MEASUREMENT APPLICATIONS



In-line application for large rings



Off-line application for medium rings



Off-line application for large rings



Off-line station for medium size pieces.



Special application for finished wheels



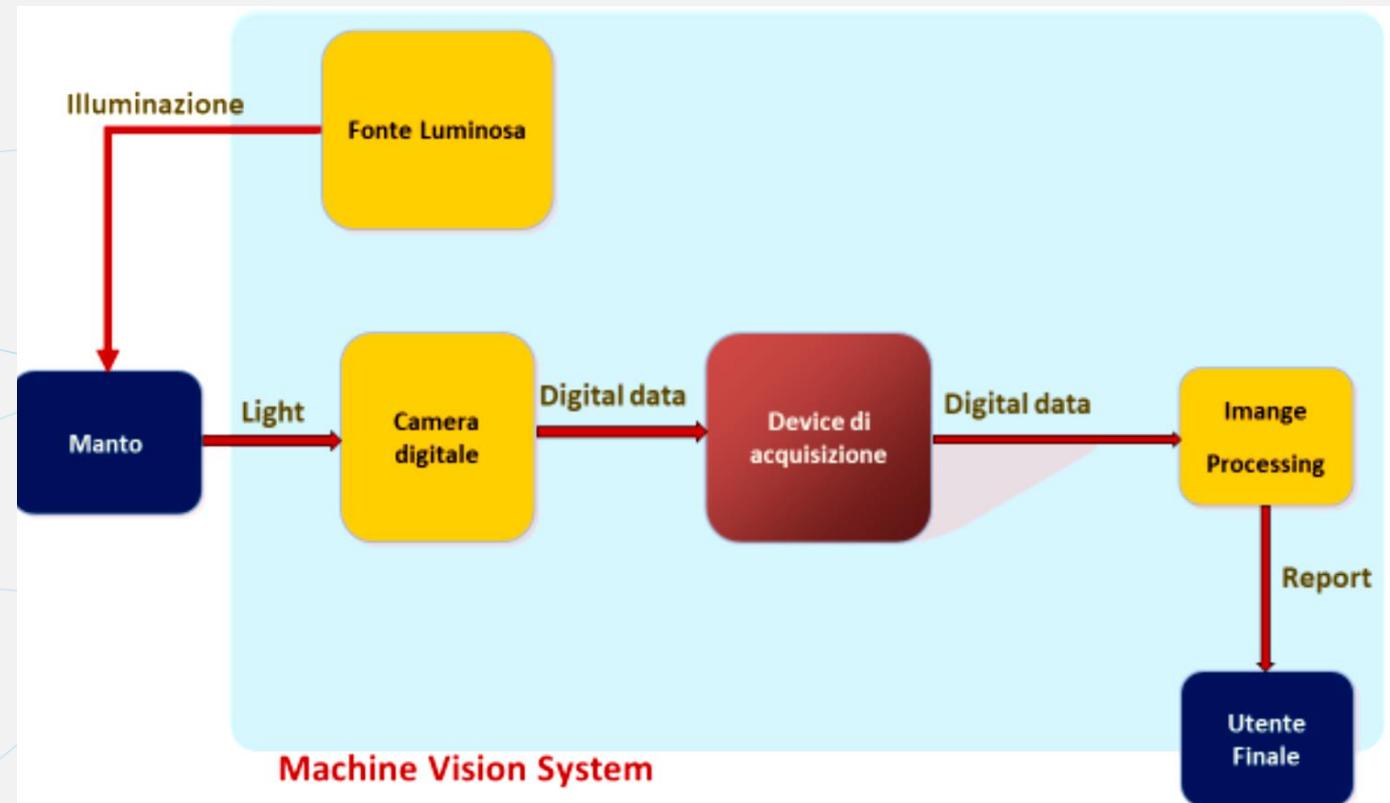
In-line application for small rings

Processo di rilevazione e classificazione del pellame

SETUP DI ACQUISIZIONE

L'intera catena di rilevazione dei difetti superficiali del pellame si basa su operazioni di **ispezione portate avanti da operatori umani** che, anche basandosi sulle passate esperienze, identificano il grado di un manto.

Utilizzando un approccio di ispezione non a contatto di tipo **Machine Vision**, è possibile **standardizzare il processo di rilevazione e classificazione** considerando l'affidabilità e l'obiettività di tali sistemi.



NORME PER LA CLASSIFICAZIONE DEI MANTI

- La norma ISO 11457 stabilisce le norme per la classificazione dei manti caprini ed ovini allo stato Wet Blue.
- I difetti possono essere riassunti per natura (causa) del difetto e ad ogni tipologia corrisponde una diversa conformazione del difetto

Difetti naturali

Parassiti/malattie ed altre difettosità diretta conseguenza dell'ambiente

Difetti meccanici

Marchi/abrasioni anche questi dovuti all'ambiente

Difetti di sporcizia

Es. letame

Di scuoimento

Derivanti dal processo di macellazione

Di processo

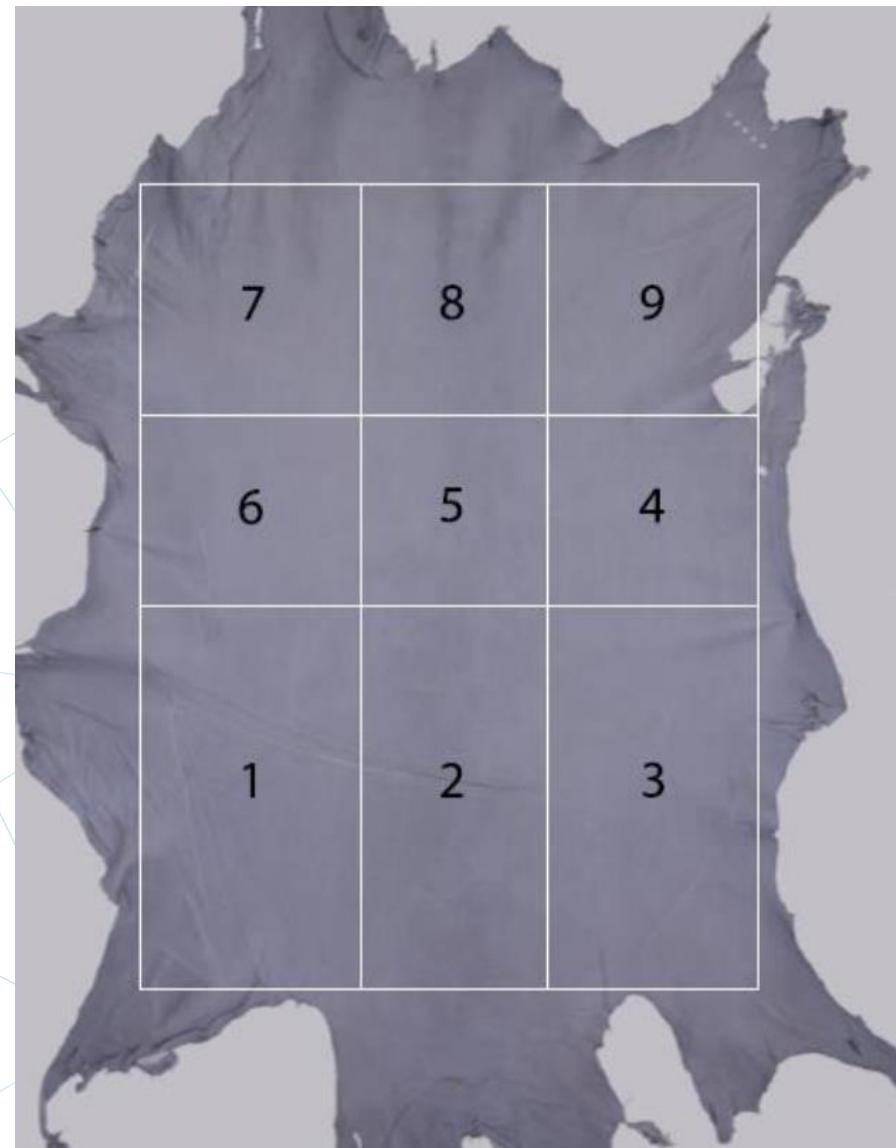
Introdotti nel Processo di concia

PROTOTIPAZIONE DEL SETUP OTTICO



ANALISI EMPIRICA DEI DIFETTI

L'analisi empirica dei difetti è stata condotta da addetti esperti alla rilevazione dei difetti sui manti campione di pelli ovine ed ha evidenziato, nello stato Wet Blue, una buona gamma di difettosità introdotte sul manto in varie fasi del ciclo di lavorazione. Difettosità pre-macellazione come cicatrici, parassiti e malattie dovute all'habitat dell'animale, difettosità di macellazione come scuoiate e buchi e, infine, difettosità introdotte dalla concia del manto causate principalmente da processi putrefattivi.



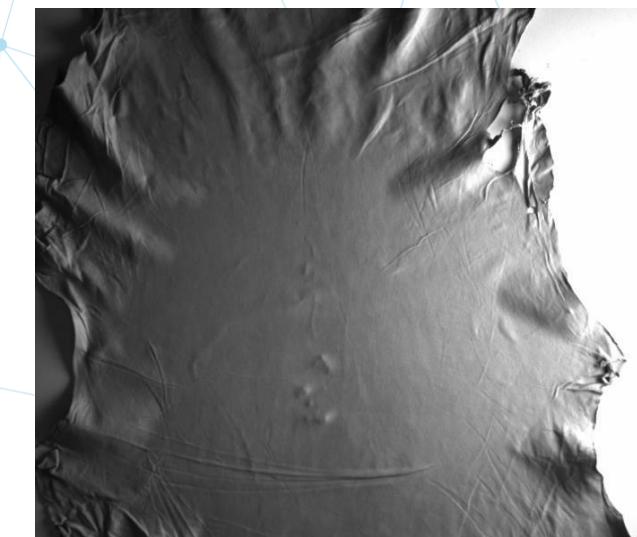
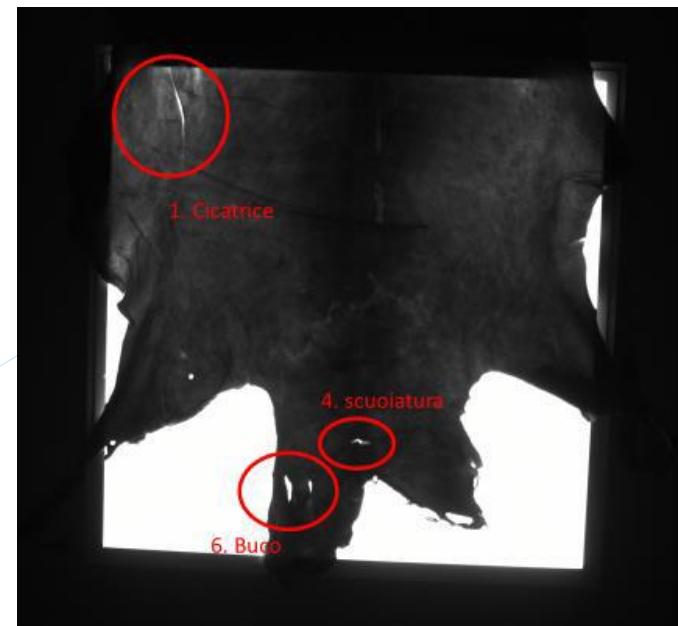
PROTOTIPAZIONE IN RETROILLUMINAZIONE

La sperimentazione per l'individuazione automatica dei difetti presenti sui manti ovini nello stato wet-blue è focalizzata sulle seguenti tipologie di difetti:

- Cicatrici
- Scortico/Scuoatura
- Fori/Tagli
- Punture d'insetto

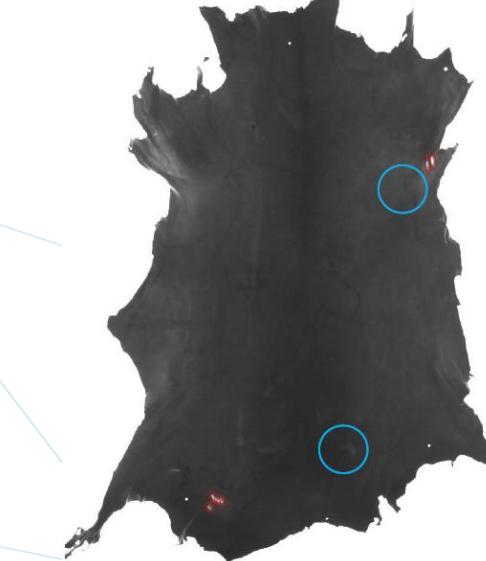
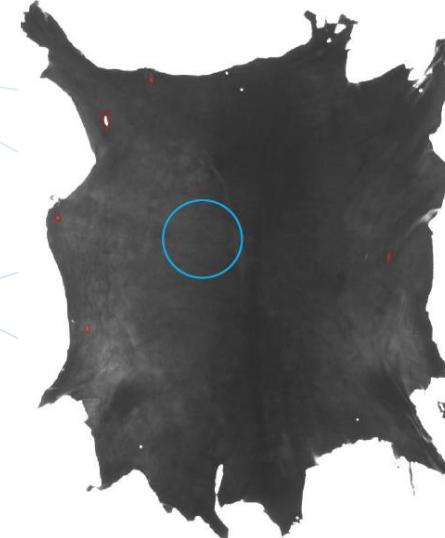
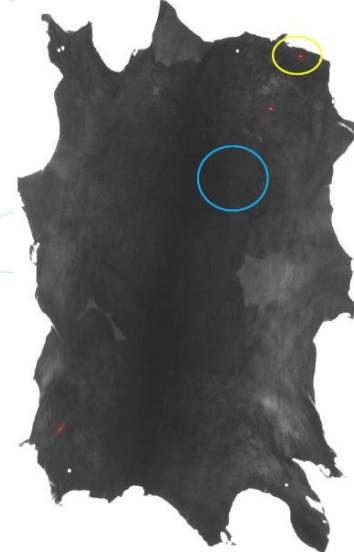
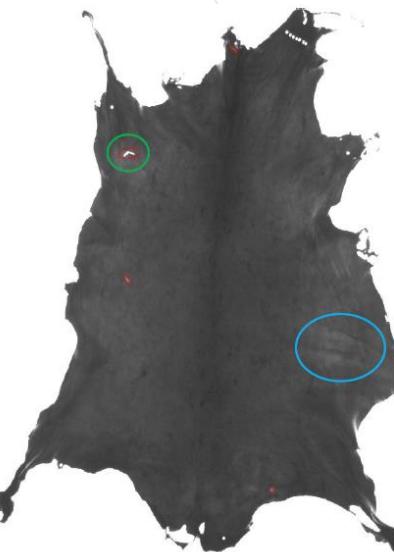
Al fine di individuare sui manti le prime tre casistiche di difetto, il setup ottico più opportuno che è stato individuato è quello caratterizzato dalla retroilluminazione.

Al fine di individuare le punture d'insetto, il setup ottico più opportuno che è stato individuato è quello caratterizzato dalla **illuminazione radente** in quattro quadranti.

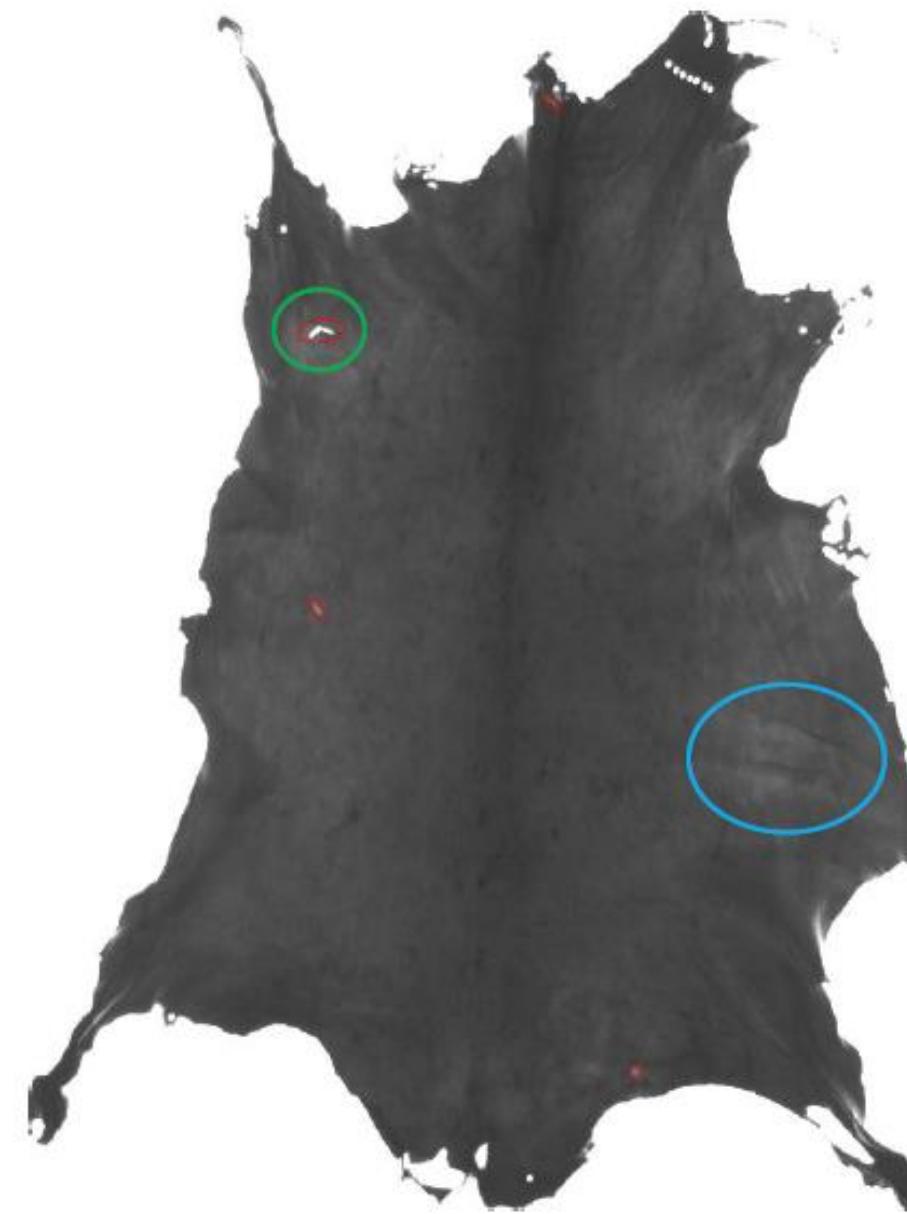


METODO: APPLICAZIONE

Applicando tutti i criteri sopra descritti, il software sviluppato è in grado di determinare posizione e tipologia dei difetti come riportato nelle immagini, i difetti rilevati automaticamente sono quelli di colore rosso.



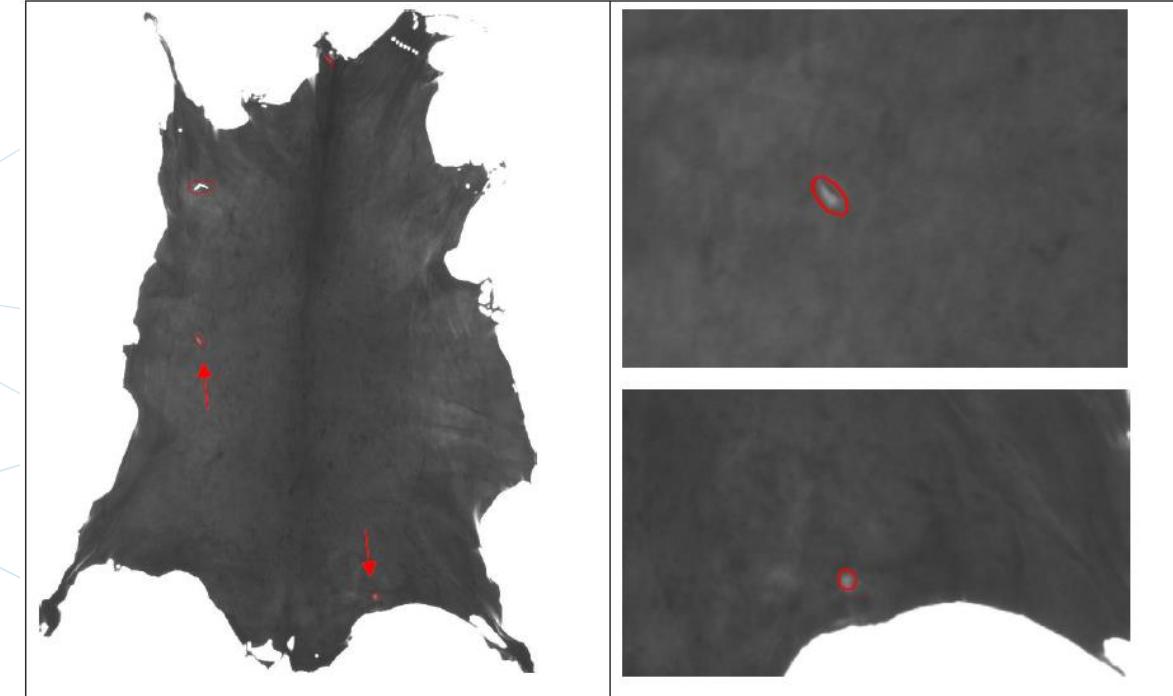
ESEMPIO



DIFETTI NON SEGNALATI DALLA CONCERIA MA INDIVIDUATI DAL SOFTWARE

L'applicazione dello stesso algoritmo utilizzato per l'individuazione dei difetti segnalati, **ha rilevato anche altri difetti che non erano stati segnalati** ma che presentano le stesse caratteristiche di quelli segnalati.

È stata inoltre, **individuata una ulteriore tipologia di difetto non segnalato**, che probabilmente consiste in un assottigliamento della pelle, o più probabilmente trattasi del difetto di basso di fiore.



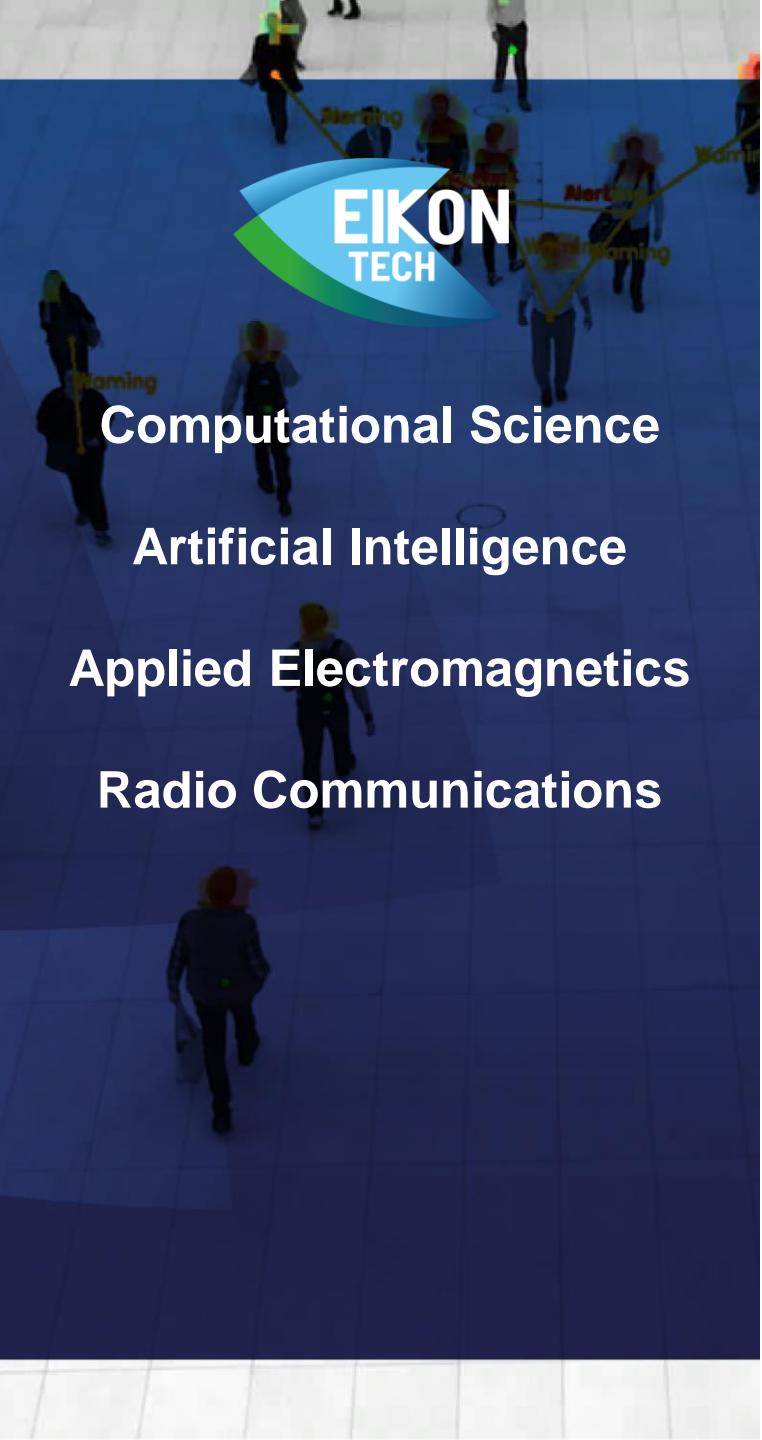
CONCLUSIONI

Nelle condizioni in cui un difetto presente nello stato **wet-blue** permane anche nello stato finito, il sistema è in grado di rilevarlo, inoltre il sistema è in grado di rilevare eventuali nuovi difetti comparsi nello stato finito.

Il sistema implementato, si rivela molto efficace sui difetti di foro, scorticò e cicatrice ossia su quei difetti con caratteristiche meccaniche che modificano la normale consistenza del manto anzi, si è rivelato persino più efficace del contributo offerto da un operatore esperto.

Per difetti di minore dimensione e conformazione come le punture di insetto, invece, è stato utilizzato un setup ottico differente e più risoluto dove l'approccio **Image Processing con analisi in frequenza** ha dimostrato di essere in grado di rilevare le punture di insetto.



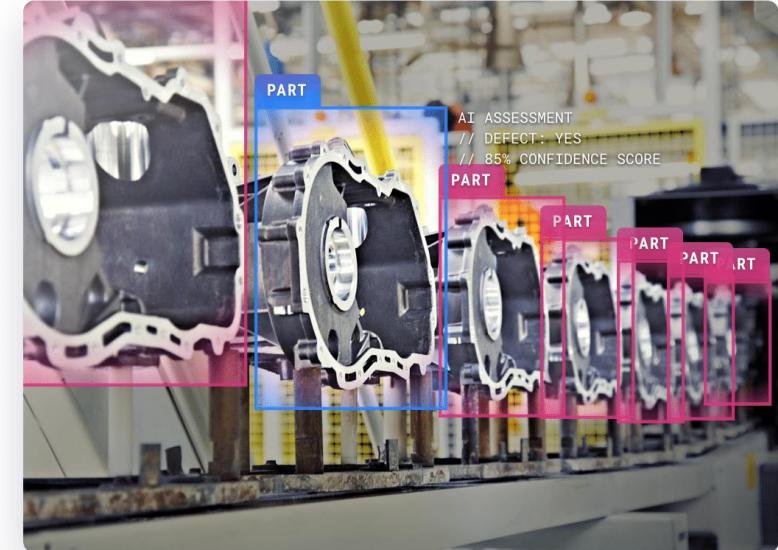


Smart Anomaly detection in real time

Eikontech offers turn-key solutions (hardware and software) for the diagnostics and the analysis of defects as part of the industrial quality process in the Manufacturing sector.



anomaly detection example



- Artificial Intelligence frameworks to improve quality and defect detection
- Implementation of deep learning algorithms for image processing
- Self-learning algorithms to keep improving production efficiency and return on investment

ANGEL

excellence integrity solidarity