



# UAV-POWERED AND CYBER-SAFE SMART ROADS

FINAL PRESENTATION MEETING

28/05/2025

# Agenda

**01 Introduction**

**02 CONSORTIUM OVERVIEW**

**03 TECHNOLOGY**

**04 SECURITY**

**05 CONCLUSIONS**

**06 VIDEO**





# INTRODUCTION

# PROJECT OBJECTIVES



## Overview of the VESTA project and its vision

- **Enable real-time traffic monitoring**
- **Enhance road safety**
- **Ensure cybersecurity in UAV systems**
- **Support smart mobility infrastructure**

# WHY VESTA?



- **Traditional methods lack flexibility**
- **Drones offer aerial coverage**
- **Growing demand for secure smart road systems**



# CONSORTIUM OVERVIEW



## UAV, NESTS AND DASHBOARDS

- **AIVIEWGROUP specializes in innovative drone (UAS)-based services focused on safety and efficiency throughout the entire workflow.**
- **Offers support for UAV integration via customized software and cloud platforms (e.g., AI INSPECTION, AI CREW).**
- **Extensive experience in civil infrastructure monitoring, including national roadway inspections (Italy, 2020–2025) and railways inspections (2023-2025).**
- **Active in satellite navigation (PNT), leading BVLOS drone tests with 4G/5G navigation in partnership with Italy's Civil Aviation Authority and major companies.**





## Cybersecurity & Anomaly Detector

- **NEXT designs and integrates complex technological systems for space, defense, and government sectors.**
- **Holds ISO 9001 and CMMI Level 3 certifications.**
- **Specializes in Cyber Security with solutions such as Cyber Communication tools, End Point Protection, and Big Data Analytics for Cyber Intelligence.**
- **Operates two certified national security labs: Ce.Va. (assessment) and L.V.S. (product evaluations).**
- **Delivers cybersecurity projects using advanced tools for multi-source data analysis and actionable insights.**





## Security services & research

- **SecSI, founded in 2020, is a cybersecurity company linked to the University of Naples Federico II.**
- **Provides custom cybersecurity services with a proactive and preventive approach.**
- **Supported Oil & Gas military sector firms in achieving ISO/IEC 27001 compliance.**
- **Developed the Docker Security Playground for training, presented at BlackHat USA & Europe.**
- **Collaborated with a Japanese company to build an AI-powered ethical hacking platform for penetration testing and security research.**

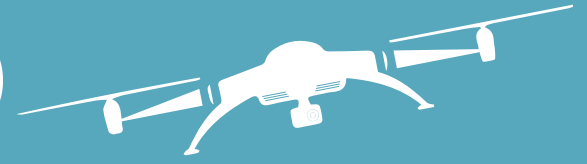


# END-USER INVOLVEMENT



- **Partnered with Italian highway operator**
- **Real-world tests and validation**

# OPERATIONAL SCENARIO



- **How drones are deployed**
- **Real-time surveillance and data feedback**



**TECHNOLOGY**

# KEY TECHNOLOGIES



## HARDWARE

- **DJI Mavic 3 Enterprise (UAS)**
- **Hextronics Universal (Nest)**



## DJI MAVIC 3 ENTERPRISE SERIES

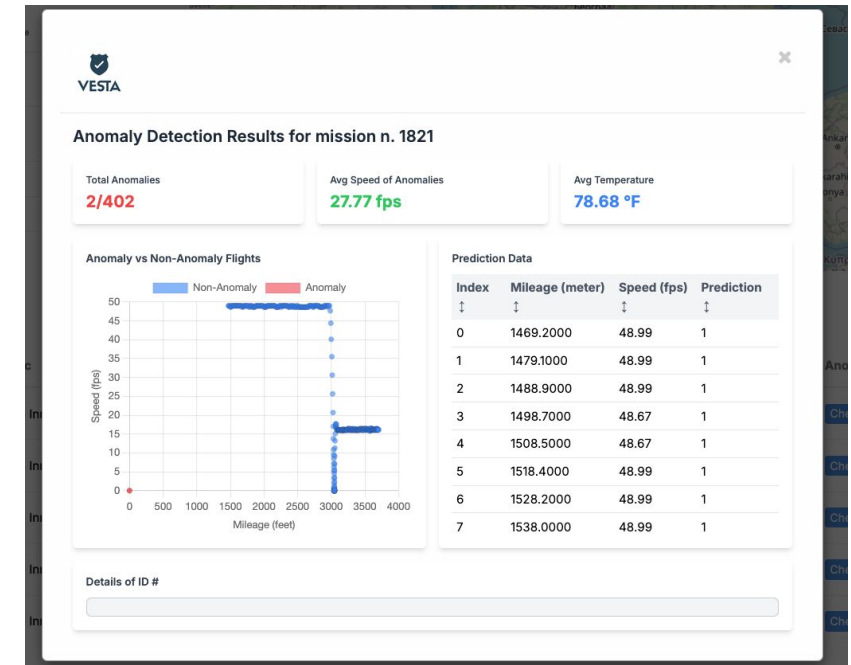
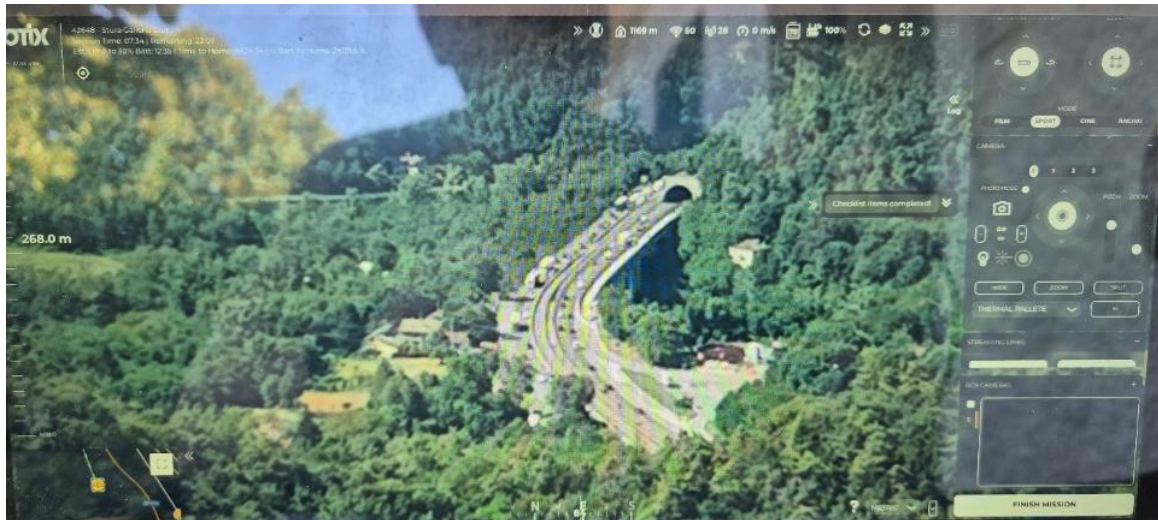


# KEY TECHNOLOGIES



## Software Platform

- **Votix mission control**
- **AI-INSPECTION by AIVIEWGROUP**

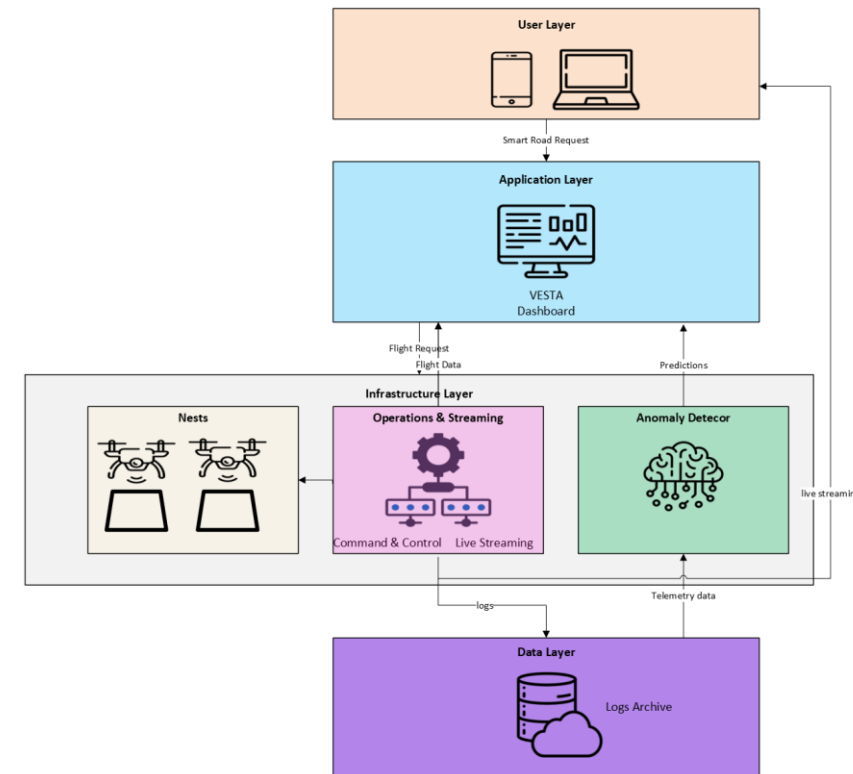
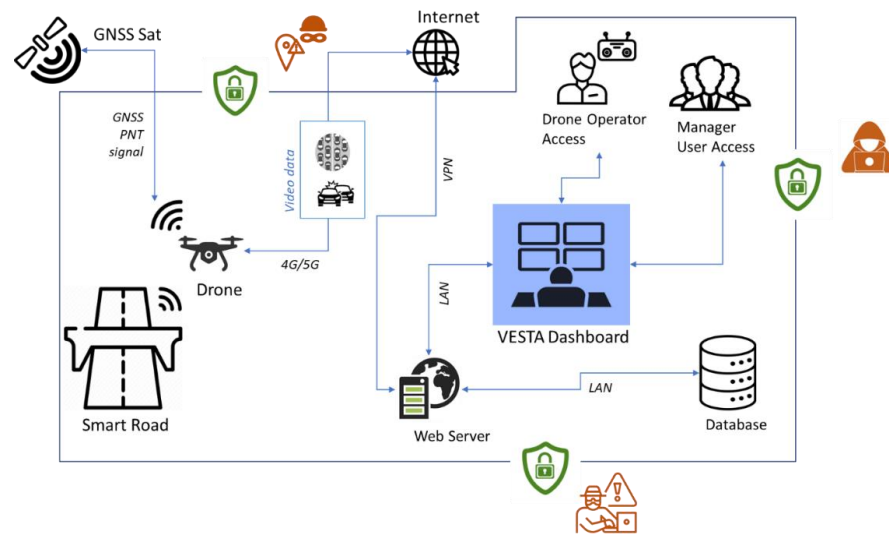


# SYSTEM ARCHITECTURE



## VESTA Diagram

- 4-layer architecture: User, Application, Infrastructure, Data
- Component interaction





**SECURITY**

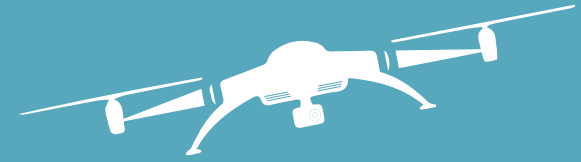
# SYBERSECURITY STRATEGY



- **Threat modeling**
- **Layered defenses and compliance**



# DRONE PROTECTION



## MEASURE

- **VPS & obstacle avoidance**
- **Access control and remote command safety**

# DRONE PROTECTION



## Communication Security

- **Encrypted links between drone, GCS, dashboard**
- **Server hardening and resilience**
- **Lightweight Fire-wall**

# SYSTEM PROTECTION



## Anomaly Detection

- **AI-based anomaly recognition**
- **Low false-positive design**

# SYSTEM PROTECTION

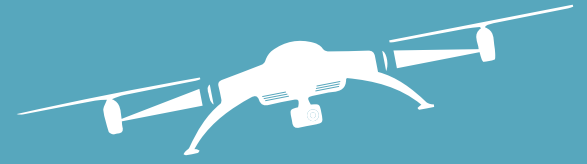


## Anomaly Detection

### Main feature verified and Checked:

- **Altitude**
- **Speed**
- **Acceleration**
- **Direction**
- **Battery level**
- **Signal strength**

# DASHBOARDS FEATURES



## User Interface

- **Real-time alerts**
- **Operator control interface**
- **Traffic & incident mapping**



# CONCLUSIONS

# KEY OUTCOME & IMPACT



## SUBTITLE

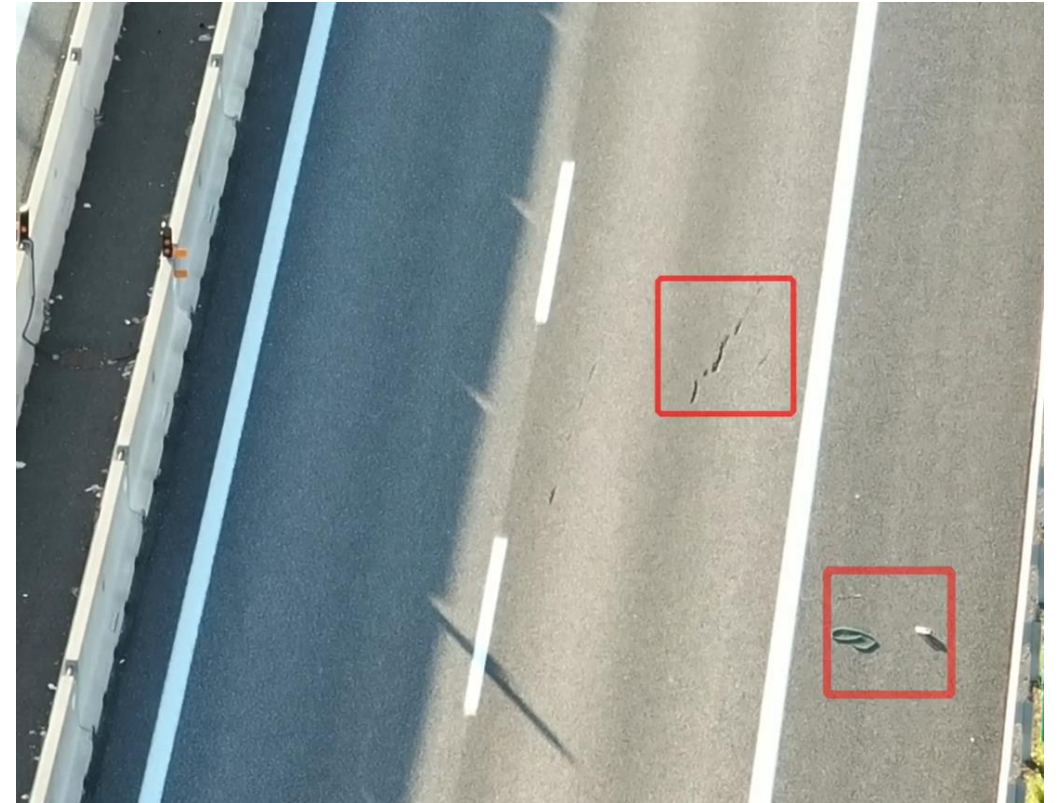
- **Goals achieved**
- **Real-world interest and future applications**

# KEY OUTCOME & IMPACT



## New features and updates tested during trials

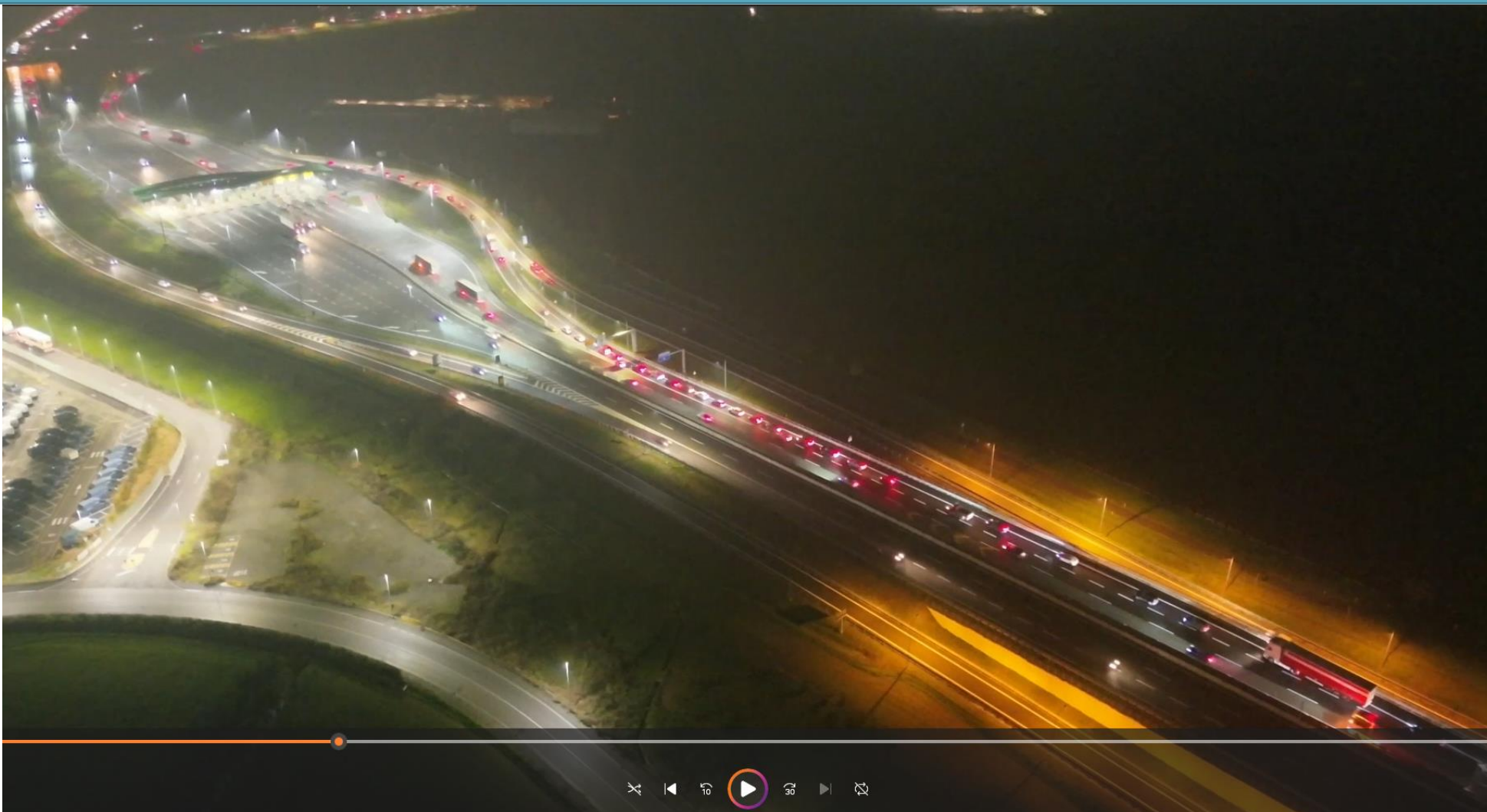
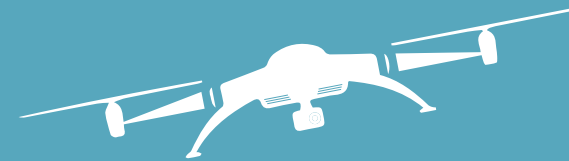
- **Automatic detection of road surface defects using machine learning**
- **Identification of small obstacles (e.g., tyre fragments, lost cargo parts)**
- **Potential extension to railway operators**
- **Interest in automatic detection of criticalities along rail lines and infrastructure**





**VIDEO**

# VIDEO





**Thanks for your attention**