



WatchEDGE Experimentation Begins: Artificial Intelligence Serving Nature for Wildlife Monitoring

Milan, 13 May 2025 – The experimental phase of the **WatchEDGE project under the RESTART programme** has begun. Wild boar, fallow deer and wolves were placed under observation at the San Rossore Park (Pisa) for the use case focused on monitoring wildlife by combining artificial intelligence, next-generation sensors and innovative connectivity solutions.

The aim is to equip companies and workers in rural areas — from farmers to national park managers — with tools to control phenomena ranging from forest fires to plant pests. **In fact, WatchEDGE is developing a technology infrastructure capable of supporting surveillance applications based on AI image processing** to create an efficient and sustainable system with potential uses in agriculture, forestry and environmental protection. **In particular, the management of wild animals is a growing need**, especially in rural areas, where they tend to damage agriculture and spread diseases among livestock. They can also damage the environment. For example, overabundant fallow deer can slow down or even halt the regeneration of the flora they need for food.

The project focuses on integrating processing, storage and communication to create intelligent networks capable of processing data in real time as it travels over the network. **The first tests took place** in the Pineta and Torre Riccardi areas of **San Rossore Park between 3 and 5 March**. Large mammals have been continuously monitored here for decades with censuses based on traditional methods. The park is very interested in the new tools and methods studied by WatchEDGE, as they could be used in the future to facilitate such operations. For the first tests, WatchEDGE placed **photo traps based on prototype smart cameras** equipped with artificial intelligence for immediate animal classification and counting both during the day and at night. The animals' speeds and movements were analysed using **multi-frequency Doppler radar**, and they were monitored from above as well using **drones equipped with multispectral and thermal cameras**, which were also used to examine the vegetation below.

A **5G Nomad solution** was chosen for **wireless connection in the field between edge computing nodes and smart sensors**. Since private 5G networks require an authorised operator, Wi-Fi alternatives were tested for the time being, and thousands of videos were collected and analysed during the tests to better train the AI algorithms. In addition, **nomadic edge computing prototypes** were tested (one integrated in the 5G Nomad system and one developed by Italtel). One focus of WatchEDGE is **testing SD-WAN technology, which enables stable connections even in remote areas** by integrating different types of networks (Wi-Fi, 4G, 5G, satellite). This makes it possible to collect and transmit large amounts of data reliably and cost-effectively.

For the experimentation, the varied know-how of partners in the consortium was brought together under the aegis of the **NRRP RESTART programme**, which is coordinated by the **Politecnico di Milano** and includes three other universities (**University of Pisa, University of Catania, University of Milano-Bicocca**), three companies (**Italtel, Nextworks, Sensor ID**) and a research centre (**CNIT RaSS in Pisa**), in collaboration with the Tuscany Region **Migliarino, San Rossore, Massaciuccoli Regional Park Authority**.

In the coming months, the development of the service orchestration system is expected to be completed, which will enable distributed training of AI models (for example, Federated Learning and Continual Learning) to improve performance without transferring large numbers of images across the network. The final integration of the system will allow new experiments to

be carried out in the San Rossore Park. **The ultimate goal of WatchEDGE is to transform research into technological solutions that can also be applied in industrial settings.**

'WatchEDGE was designed to direct basic research towards high-impact solutions for a specific and important economic sector,' says **Guido Maier**, coordinator and Professor of Telecommunications at the Politecnico di Milano, 'All eight partners shared this approach. The three industrial partners were able to identify opportunities in the project to transfer technology to potential new products. The academic partners, meanwhile, are studying advanced engineering solutions that can be integrated and tested in the proposed system. The Politecnico di Milano, the project leader, is engaged in developing AI for image processing and elements of SD-WAN programmable networks. Our collaboration with the San Rossore Park is essential both for testing our solutions in the field and for the mutual exchange of ideas and experiences. The first experimental campaign will be followed by other on-site activities until the end of the project and hopefully beyond.'

'The development of artificial intelligence applications for environmental monitoring cannot disregard interaction with the network,' explained **Stefano Giordano**, Professor of Telecommunications at the University of Pisa. 'However, the network infrastructure consists of a variety of technologies that must increasingly be able to integrate and interact with each other. As part of the WatchEDGE project, the University of Pisa oversaw the interaction between the satellite network, 5G network, edge computing and low-energy peripheral networks for remote camera communication in the field. In the future, the goal of our research is to make these functions — which have now been tested statically — more and more dynamic, striving for what we have called completely fluid artificial intelligence.'

'Our park is open to science and experiments that lead to greater environmental awareness, and to the development of new techniques to improve coexistence between human activities and nature,' says **Claudia Principe**, vice-president of the Migliarino San Rossore Massaciuccoli Regional Park Authority. 'This cutting-edge activity joins other ongoing projects relying on NRRP funds that help us to design a better, eco-sustainable future.'

'Under the RESTART programme, the experimentation in the WatchEDGE project is an important example of what we aim to achieve by the end of three years of activity,' says Professor **Nicola Blefari Melazzi**, president of the RESTART Foundation. 'Turning research into concrete technological solutions, with real impacts for key economic sectors such as agriculture, is what RESTART aims to ensure by putting technology at the service of a safer and more sustainable future.'

WatchEDGE (Wide-area Agile and flying neTwork arCHitecture for AI-surveillance processing at the EDGE), an industry-focused project and part of the NRRP 'RESTART' programme, began in January 2023 and is scheduled to last three years. It is funded by the European Union's **NextGenerationEU** instrument, with a **budget of €1 million** out of a total €116 million under the RESTART programme.

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