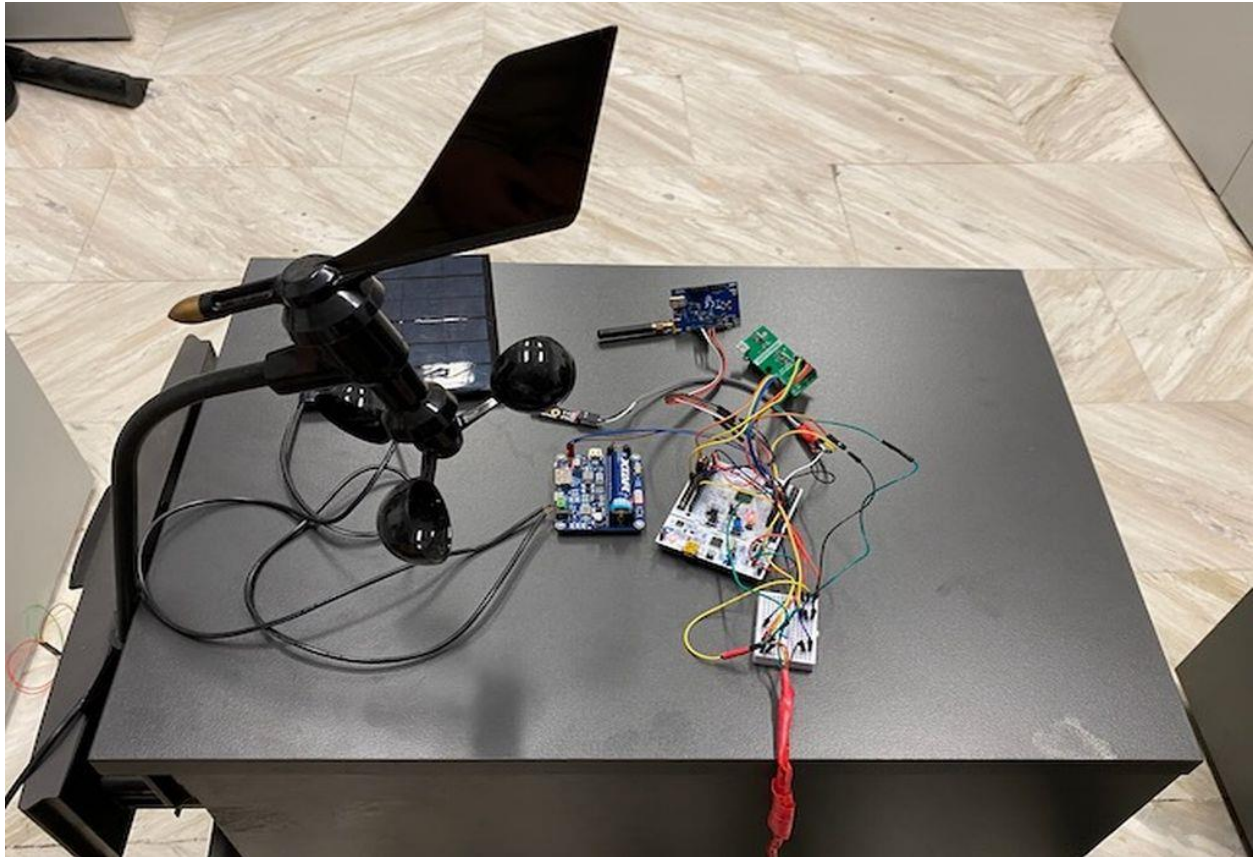# AUTH: "First" for the "Maestro" system, which predicts the spread of forest fires in real-time

This is the "Maestro" telemetry system, which supports the prediction of fire risk in forest areas based on measurements of weather conditions, which are collected by wireless networks (nodes) of sensors, placed in the forest areas.

Its advantage over the systems from which civil protection derives information for issuing fire risk prediction maps is that it provides real-time geographically localized information through the forest, while in the event of a fire, the sensor nodes operate in state of emergency with more frequent measurements to predict fire spread and effectively manage firefighting forces and population.

"Maestro" was developed by the Laboratory of Networks and Communication Systems and the Software, Hardware and Foundations Sector of the Department of Informatics of AUTH and the Hardware Laboratory of the Department of Forestry and Natural Environment of AUTH in collaboration with the company Pragma IoT.

The Maestro research group of the AUTH Software, Hardware and Foundations Sector with the Director of the Sector Prof. P. Katsaros

"We started three years ago. We have proceeded with the design and development of the system, which consists of sensor nodes placed in forested areas. "Each sensor node is a device that collects and sends over the Internet measurements of temperature, humidity, wind speed and direction, flame and smoke detection," said the senior. professor of the Department of Informatics of the AUTH, Panagiotis Katsaros, noting that the data is sent at regular intervals to a central server, where it is converted into information available for business plans and the preventive planning of civil protection.

"Today there are forecast maps, based on weather forecasts, there are efforts to monitor forest areas with aerial vehicles. What the system we developed can additionally help is risk prediction with much more geographically localized measurements, as we can know at any time in an area the conditions of humidity, temperature, wind, correlate with the data e.g. for periods of drought, all of which give a much more specific forecast in terms of risk.

Also, as the system has a wind speed and direction sensor, we can get information from the geographic location of the node on how the wind is changing, so with this data we can run mathematical models that predict the spread of each fire in real time." explained Mr. Katsaros.

"Field test with controlled fire at the Farm of AUTH"

The first application of Maestro in the field is going to take place at the Farm of AUTH in the coming weeks, where after a relative permit from the Forestry Department and once the suitability of the weather conditions is finalized, a controlled fire will be caused to study the sensitivity of the sensors.

The experimental application of the system on the farm of AUTH will be supervised by the professor of Forestry and Natural Environment of AUTH, Alexandros Dimitrakopoulos. "The exact degree of sensitivity of the sensors will be tested.

We want to see how many meters from the node the flame and smoke sensors send measurements that there is a fire", explained Mr. Katsaros, noting also that the sensor nodes are a low-cost solution for reliable surveillance of forest areas, as the the cost of each node ranges from 150-200 euros.

The Maestro telemetry system will be presented at a special conference that will take place on Thursday, September 28, 2023, at 11:00 a.m., at the Department of Informatics of the AUTH, at the Faculty of Science.

The Maestro sensor hub (includes PV, rechargeable battery, LoRa communication and weather, fire and smoke sensors)

*The photos were provided to APE-MPE by Mr. Professor of Informatics of AUTH, Panagiotis Katsaros.

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