

FIRESENSE: New system could be best protection for cultural heritage monuments against fire, other hazards

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The village of Olympos, located near the ancient city of Rhodiapolis, in the Antalya region of Turkey, escaped a wild fire, on 2 September 2012. This happened thanks to a network of cameras coupled to an intelligent video-based smoke detection algorithm that raised the alarm. This automatic early warning system is being tested as part of a multi-sensor fire detection network developed by an EU funded project called [FIRESENSE](#). Its aim is to protect ancient heritage sites, such as the ancient Olympia in Greece. In the absence of such detection system, the

birthplace of the Olympic Games, was only just saved from forest fires, on 26 August 2007, after a three-day fire fight that cost 60 lives.

In addition, to Rhodiapolis, "the system is currently tested in the Galceti Park, in Italy and in Dodge Hall, located in Bogazici University, [Istanbul, Turkey]", explains Nikos Grammalidis, scientific director of the project, based at The Centre for Research & Technology, Hellas, in Thessaloniki, [Greece](#). The system was also tested in the archaeological site of Kabeirion in Thebes, Greece and is currently being installed in the Temple of Water, in Zaghouan, Tunisia.

The automated warning signal generated through the project takes advantage of recent advances in multi-sensor surveillance technologies. It is using wireless sensor networks capable of simultaneously measuring temperature and humidity, collecting information through optical and infrared cameras and local weather stations. Intelligent computer vision and pattern recognition algorithms as well as multi-sensor data fusion techniques automatically analyse the sensor data, according to Grammalidis.

Some experts believe that this automated [fire](#) surveillance system may, however, not yet be mature enough. "The replacement of human observation with wireless [sensor networks](#) will take some time due to insufficient autonomy and robustness of such devices, although extensive research activity is observed in such networks by the European Union and national governments", Nikos Komninos, a visiting assistant Professor of network security, at the University of Cyprus, tells [youris.com](#).

The issue of cost of such automated surveillance may also prohibit further use of the technology. "When constant human surveillance is not feasible, then a wireless sensor network becomes a valuable alternative. Its operational cost, however, has to be compared against the cost of

human surveillance," says Martin Hasler, Professor of nonlinear systems at the École Polytechnique Fédérale de Lausanne, Switzerland. "The specific costs are initially the deployment and afterwards maintenance. I would guess that these costs will decrease as more and more [wireless sensor](#) networks are deployed."

Grammalidis argues that it is not only a cost issue: "Since, the loss of a heritage site is irreversible, there is great significance in adopting new technologies for the protection of these sites." He adds: "The cost of damages and losses caused by wildfires cannot be compared to the cost of using a multi-sensor [early warning system](#)."

Detecting the ignition point of a wildfire is only the first step in fire fighting. What matters next is estimating the fire propagation direction and speed in order to facilitate fire management. "Firesense approximates fire and other phenomena evolution with a representation in 3D [Geographical Information System]. A concrete model, if developed, will enhance the efficiency of the system," comments Panayiotis Vlamos, associate professor of informatics, at Ionio University, Greece. "For sure, [this] is a serious attempt in the right direction."

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