A new infrasound sensors array system, based on optical fibre transmission, has been realized to monitor the explosive activity of the Etna volcano. The system is composed by an 8 channels receiver central station, recording data from 4 low power sensor nodes, measuring the following parameters:

1. Infrasound signal (16 bits)  
2. Temperature (1°C accuracy)  
3. Voltage of battery (8 bits)

The Etna infrasound network has a "star" configuration, organized in 4 stations, working like "antennas" to provide in real-time the propagation azimuth of the sonic beam. According to the geometry of the array it's possible to resolve the infrasound source position by grid searching algorithm calculating in real-time the cross-correlation between the single station. The infrasound signal, acquired by a microphone, is filtered by an active, low noise, 5 order, 20Hz low pass filter, then it is acquired by a 16 bit ADC at a rate of 50 samples/sec. The user can set an amplification factor of 0,1/0,5/1/10.

The infrasound monitoring system includes a full diagnostic functionality that performs an exhaustive test without use of other device; this is a very important function because the array is installed on the volcano flanks at 3000 meters altitude. The diagnostic system shows the integrity of the optical fibre communication line, and the battery charge status of each connected node. One of the new feature of this system is the low power consumption of the single node which allows to collect data continuously for one year at least, using only a 60 Ah gel battery as power supply. The sensor nodes transmit data to the receiver central station by means of an optical fibre, electrically insulated from the others, guaranteeing the correct system working even if one or more sensor nodes break down.

All the data collected by the receiver are sent via radio modem link to the acquisition centre in Nicolosi, 16 km away from the volcano summit. Finally the information are forwarded in the Web to the Department of Earth Science of the University of Florence, where are processed in real-time, in order to detect overpressure and origin site of the infrasonic events. Infrasonic array are quite important when a daily report about the volcano activity, is needed to Civil Defence purposes. Moreover, infrasonic array are now always more often used by the World Meteorological organization and by the International Civil Aviation Organization as the most appropriate monitoring tool to promptly detect volcanic eruption worldwide.

Other typical Infrasonic Applications:
- Volcanic Activity: volcanoes emit powerful pulses of infrasonic energy near the moment of eruption
- Meteor detector: meteors generate infrasonic waves during their entry in the Earth's atmosphere
- Avalanche detection: before an avalanche happens there is an infrasonic emission, most likely this comes from deep down movements in the snow
- Nuclear explosion: the nuclear tests generate intense infrasonic waves, it's possible to reveal these explosions both under the water and under the ground
- Aircrafts flying and missiles launch: all these events generate infrasonic waves that can be revealed at long distances, giving useful information about them