Electronic nose sniffs out false alarms

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An electronic nose is so sensitive that it can distinguish between cigarette smoke and smoke from an office or factory fire. Developed by a European research consortium the device will help to end the vast number of false alarms recorded by fire brigades each year.

The researchers developed a demonstrator of the new device and now hope to complete a viable commercial product by October 2006.

The Intelligent Modular, multi-Sensor (IMOS) and networked fire detection system was developed by a 9-member partnership from across Europe to tackle the critical problem of false alarms.

"Currently 90 per cent percent of regular fire alarms are false," says Florence Daniault, coordinator of the IST-funded IMOS project. "Fire brigades must investigate every alarm logged and it causes enormous

inefficiencies."

The false alarm rate can rise to 99 per cent. "In cargo planes, for example, you may have humidity in the hold which condenses once the airplane takes off. That condensate registers as a particulate and sets off the alarm," says Daniault.

Furthermore people lose faith in the alarm system and may delay evacuation because they believe there is no fire, with potentially disastrous consequences.

"We started off with the idea of developing a system using several sensors that could eliminate most of the false alarms," says Daniault.

The team first investigated a variety of sensor types, including gas, optical and conducting polymer sensors. Optical sensors detect light scattering as an indication particulates, while gas sensors detect gases like CO, CO2 or NOx. But conducting polymer sensors can detect a wide variety of volatiles because of their novel properties.

Conducting polymers are an exciting emerging technology because the electrical resistance in the polymer varies in the presence of gas. Even more interesting, however, is that once the gas disappears the polymers resistance returns to its 'resting' state.

The IMOS team identified the specific chemicals associated with the smoke emitted from various sources, including wood, cotton, paper, polyurethane (plastics) foam and cigarettes. "Isolating cigarette smoke is a breakthrough," she says. They developed dedicated polymer sensors to build an array able to identify these specific chemicals.

Their complete fire alarms system now combines a traditional optical detector, which uses light scattering to detect particulates in the air.

Once particulates are detected the optical sensors then recruits the conducting polymer sensor to 'smell' the type of smoke that's producing the particulate. If it senses any of a number of characteristic smoke types, it sets off the alarm.

"We tested a demonstration device in an office building and at a recycling centre. We used an employee smoking room for the office demonstration, and the recycling centre had a lot of dust and activity. Both were ideal locations to generate false alarms, but the IMOS worked perfectly," says Daniault.

Later the team again tested the device in a fire lab where it reacted appropriately to given fire situations.

"There is still some work to be done. We'd like to improve the response time on the conducting polymer sensors, for example. But we've started to design a product and hope to complete that in time for the Security 2006 exhibition in Essen next October," she says.

The security industry will certainly be very interested in a sensor that has a nose for fire.

Source: IST Results