

Researchers unveil first real-time secondhand smoke sensor

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Dartmouth College researchers are going to market with the first-ever sensor that detects secondhand and thirdhand tobacco and marijuana smoke in real time.

The plug-in device will be marketed initially to hotels to enforce no-smoking rules, but it also is attracting interest from rental car companies, apartment buildings, public housing, condominium associations, dormitories, nursing homes, jails and other commercial and residential settings. A wearable version, which is smaller and lighter than a smartphone, will go to market in spring 2015.

"This is a big leap forward in [secondhand smoke exposure](#) detection technology," said Joseph BelBruno, a chemistry professor who invented the device.

Unlike ordinary smoke detectors that sense the physical presence of smoke, the new AirGuard device uses polymer films to detect, measure and record the presence of nicotine vapor molecules from secondhand and thirdhand smoke in [real time](#). The polymer is sensitive enough to pick up concentrations measured in parts per billion, making it possible to correlate how much nicotine there is in the air with an equivalent number of cigarettes. The device, which pinpoints when and where the exposure occurred, is more accurate and less expensive than other [secondhand smoke](#) sensors, which provide only an average exposure in a limited area over several days or weeks.

BelBruno's research on a prototype appeared in the journal [Nicotine and Tobacco Research](#) in March 2013. Its latest incarnation represents an evolution of his earlier proof-of-concept and now incorporates proprietary electronics and microprocessors. It has also been expanded to include two sensors. The prototype version incorporated just one sensor that recognized nicotine. The new commercial version has two sensors, one attuned to the nicotine in [tobacco smoke](#) and another that recognizes a chemical specific to [marijuana smoke](#).

BelBruno is co-founder of [FreshAir Sensors](#), the company marketing AirGuard, along with Jack O'Toole, [chief executive officer](#) of FreshAir. "Our [sensor device](#) will allow people to monitor unobserved areas and ensure they are not being smoked in. It sends a signal over Wi-Fi that immediately alerts customers to someone smoking in a prohibited area," O'Toole says.

Secondhand smoke increases the risks of cancer, cardiovascular disease and illnesses. Thirdhand smoke is nicotine off-gassing from clothing, furniture, car seats and other material.

Provided by Dartmouth College

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