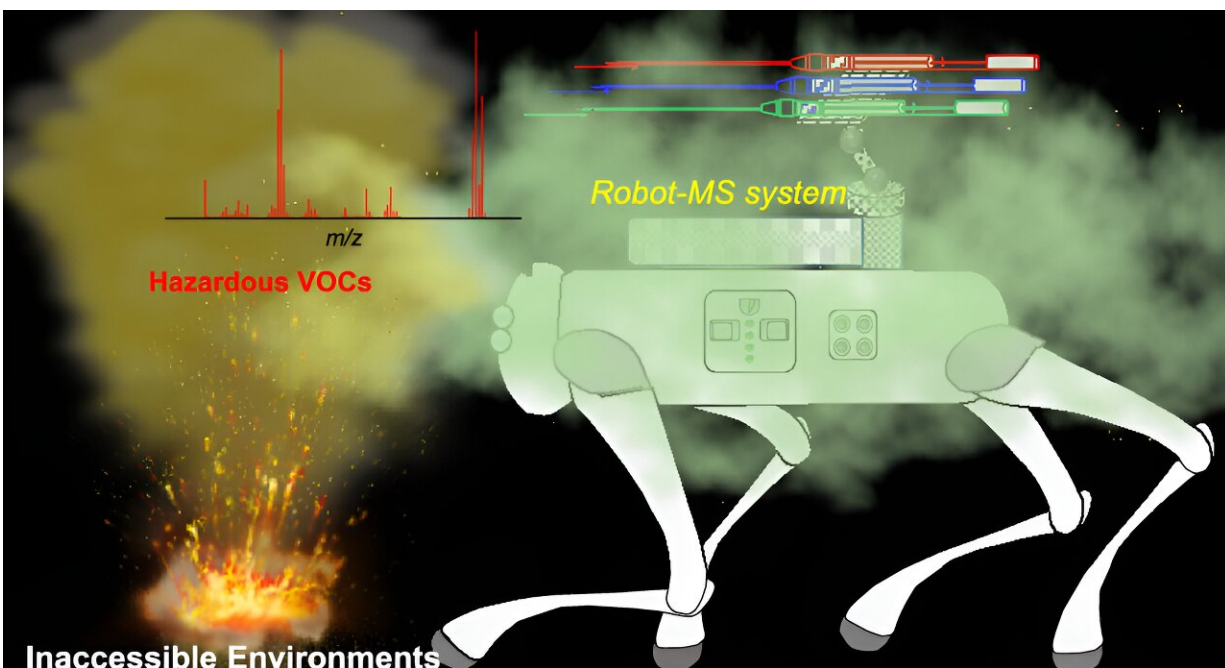


Four-legged, dog-like robot 'sniffs' hazardous gases in inaccessible environments

June 10 2024



This quadruped robotic air sampler can navigate through fire and other potentially dangerous situations to test for hazardous volatile organic compounds.

Credit: Adapted from *Analytical Chemistry* 2024, DOI:

10.1021/acs.analchem.4c01555

Nightmare material or truly man's best friend? A team of researchers equipped a dog-like quadruped robot with a mechanized arm that takes air samples from potentially treacherous situations, such as an abandoned building or fire. The robot dog walks samples to a person

who screens them for potentially hazardous compounds, says the team that [published](#) its study in *Analytical Chemistry*. While the system needs further refinement, demonstrations show its potential value in dangerous conditions.

Testing the air for dangerous chemicals in risky workplaces or after an accident, such as a fire, is an important but very dangerous task for scientists and technicians. To keep humans out of harm's way, Bin Hu and colleagues are developing mobile detection systems for hazardous gases and [volatile organic compounds](#) (VOCs) by building remote-controlled sampling devices like [aerial drones](#) and [tiny remotely operated ships](#).

The team's latest entry into this mechanical menagerie is a dog-like robot with an articulated testing arm mounted on its back. The independently controlled arm is loaded with three needle trap devices (NTDs) that can collect air samples at any point during the robot's terrestrial mission.

The researchers test-drove their four-legged "lab" through a variety of inaccessible environments, including a garbage disposal plant, sewer system, gasoline fireground and chemical warehouse, to sample the air for hazardous VOCs. While the robot had trouble navigating effectively in rainy and snowy weather, it collected [air samples](#) and returned them to the portable mass spectrometer (MS) for onsite analysis in less time than it would take to transfer the samples to an off-site laboratory—and without putting a technician in a dangerous environment.

The researchers say the [robot-MS](#) system represents a "smart" and safer approach for detecting potentially harmful compounds.

More information: Ximeng Liu et al, Portable Mass Spectrometry for On-site Detection of Hazardous Volatile Organic Compounds via Robotic Extractive Sampling, *Analytical Chemistry* (2024). [DOI:](#)

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Provided by American Chemical Society

Citation: Four-legged, dog-like robot 'sniffs' hazardous gases in inaccessible environments (2024, June 10) retrieved 15 July 2024 from

<https://techxplore.com/news/2024-06-legged-dog-robot-hazardous-gases.html>

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