

© A new software tool for first responders provides detailed information on the chemicals most commonly associated with hazmat incidents. That helps first responders make decisions about aiding victims and decontaminating a spill.

TOP RIGHT: Georgia Tech Research Institute researchers Christina Baxter and Ben Medlin helped develop the "Chemical Companion" software tool that runs on personal digital assistants.

A First Responder's Best Friend

The Chemical Companion helps hazmat teams make critical decisions.

When dealing with hazardous materials — whether from a truck spill or a terrorist attack — information is critical. Before first responders can begin to aid victims and decontaminate a scene, they must determine what substances are present and understand the inherent risks to humans and the environment.

To help first responders and hazardous materials (hazmat) teams, researchers at the Georgia Tech Research Institute (GTRI) have developed the "Chemical Companion." This software tool, which operates on Windows CE-based personal digital assistants, provides detailed information on 130 of the most common chemicals associated with hazmat incidents.

"Knowing the characteristics of a chemical, such as its boiling point or density, tells us different things about how to approach the scene," says project co-director Christina Baxter, a senior research scientist in GTRI's Health and Environmental Systems Lab (HESL). "Suppose there's a fire. With some flammable substances, water might make the fire burn even hotter, and foam is needed to suppress the blaze."

Sponsored by the federal government's Technical Support Work Group, the Chemical Companion helps first responders make decisions about:

- *Protective equipment.* Different chemical agents require different protective clothing and respirators.
- *Chemical reactivity,* which can result in toxic fumes, fires and explosions. For example, if bleach (sodium hypochlorite) and ammonia come into contact with each other, they can create a deadly gas.
- *Isolation and protective zones.* Distances will vary depending on chemicals involved, the size of a spill, weather conditions and time of day. For example,

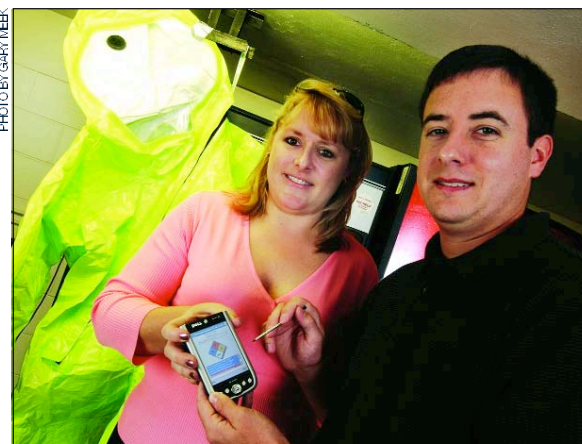


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cloud cover doesn't allow a chemical substance to travel as well, and heat will hold it closer to the ground.

- *Appropriate medical aid,* ranging from basic to advanced life support.

"With some chemicals like Orthene® which is a fire-ant killer, administering oxygen to a victim would have a detrimental effect," notes Amy Cook, a chemist in GTRI's Electro-Optical Systems Lab (EOSL).

First responders may be able to identify chemical agents from the shape of containers, shipping papers or signs posted at the hazmat scene. But if there are no solid clues, the Chemical Companion enables responders to identify an unknown chemical by entering details about the substance's physical appearance, such as color or state.

Another option for pinpointing unknown chemicals is to report medical symptoms displayed by victims. For example, twitching, constricted pupils, excessive sweating and confusion might indicate the presence of the nerve gas sarin.

BY T.J. BECKER

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ABOVE LEFT:
The "Chemical Companion" software tool runs on personal digital assistants to help first responders obtain the information they need to make critical decisions.

LEFT: *Firefighters Paul Smith and Ron Larsen secure a simulated leak on a chlorine bottle during a training exercise at the Naval Station in San Diego.*

"The Chemical Companion makes it easy for first responders to access information quickly from multiple paths," says Gisele Bennett, director of EOSL and co-principal investigator. "The system is also very robust and easy to update so we can continue to add more chemicals."

Although there are existing software tools for hazmat teams, these programs can cost as much as \$2,000 per license. In contrast, the Chemical Companion will be free to the military, law enforcement officers and fire departments.

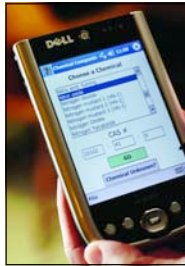
Besides price, other hallmarks include greater depth of information on chemicals and more detailed medical advice. What's more, the Chemical Companion features a calculator to help responders determine "stay times" — how long they can remain in a contaminated zone — based on what type of protective equipment they're wearing.

"Being able to accurately project stay times saves money as well as lives," says Baxter, noting that hazmat suits are expensive — about \$1,000 each. "These suits can only be worn once. If we pull a first responder from a hot zone after 15 minutes when he or she could have remained safely for 45 minutes, that's a considerable cost."

Hazmat equipment also presented a design challenge for GTRI researchers. "The whole concept of user design changes dramatically when you're dealing with this kind of environment," Bennett explains.

Indeed, to get a taste for the conditions that first responders work under, GTRI engineers donned protective gear and

PHOTO BY GARY MEEK



participated in training exercises at the Douglas County Fire Department.

"When you're in a hazmat suit, even simple tasks, like picking up a penny can be very difficult," says Benjamin Medlin, a GTRI software development specialist. "So you can imagine how difficult it might be to

use personal digital assistants — which aren't the easiest devices to use under normal conditions."

To minimize the amount of typing required to use the Chemical Companion, the GTRI team incorporated lots of dropdown menus and automatic fill-ins in the software. The program also features large lettering and shading between columns to make numbers and words easier to read from under bulky hazmat masks.

Beta-testing for the Chemical Companion began in the fall of 2005 with a number of fire departments around the country, including units in New York City, Los Angeles, Seattle and Douglas County, Ga. Researchers expect the Chemical Companion will be ready for distribution later this year.

@ Listen to a podcast on this project at: gtresearchnews.gatech.edu/podcast/chemical_companion.mp3



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