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Better robots could help save disaster victims

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- Kurt Kleiner

In the wake of the tragic accident that killed 12 trapped miners in West Virginia, US, roboticists are saying that a new generation of search-and rescue-robots could help save lives in future disasters.

The miners died in the Sago Mine in Talmansville, West Virginia, after an explosion on Monday. The cause of the blast is not yet known – state and federal mining experts opened their investigation of the explosion on Wednesday.

The miners are thought to have died of carbon monoxide poisoning, as their bodies were found, as if sleeping, behind a makeshift barricade. In a further harrowing twist shortly after the explosion, victims' families received news that their loved-ones had survived, only to learn several hours later that all but one of the trapped miners had in fact died.

Rescue teams, which took more than 24 hours to reach the sole survivor, were hampered by fears of structural damage and unbreathable air. Although they tried to use a robot to move ahead and test conditions, the robot, a commercial model usually used for bomb disposal, was not specifically designed for mine work and became bogged down after moving just 21 metres into the tunnel.

"They're slow [robots]. They won't cause an explosion, but they don't do much," says Robin Murphy, director of the Center for Robot Assisted Search and Rescue at the University of South Florida, US.

Voice link

But new robots, designed to squirm through rubble, or crawl through boreholes, or clamber over obstacles on legs, could someday go into mines quickly ahead of rescuers. They could not only monitor conditions and tell rescuers if it is safe to enter, but also provide survivors with a way to talk to their rescuers, and possibly even carry in food, oxygen and medicine.

Howie Choset, a roboticist at Carnegie Mellon University in Pittsburgh, US, is working on a robot that can squirm snake-like through small spaces that might be left after a mine or building collapses. He said he and his students look to the way real snakes move for inspiration, and then try to program that movement into their robots. But he estimates that his group is five to seven years away from building a robot dependable enough for real use.

William L Whittaker, also at Carnegie Mellon, is working on robots designed to create detailed maps of the insides of mines using laser rangefinders and other instruments. After an accident, the inside of a mine can be altered radically. Whittaker and colleagues have demonstrated robots that can navigate by themselves through mines, and return with detailed three-dimensional maps of the tunnels.

Funding issues

Murphy believes the greatest promise comes from small, light robots that can be carried to a disaster site in the trunk of a car, or even on the back of a rescue worker. After the World Trade Center attacks, Murphy and colleagues worked at the site with shoebox-sized robots on treads that could navigate through small spaces.

"Whenever you have to get a trailer, or start measuring in fractions of tonnes, the robot is too big to effectively be used," she says.

The main barrier to more effective search-and-rescue robots is not technical, but monetary, Whittaker notes. "There's no mystery to it. It's not like there is some leap of physics that has to occur or some grand invention that has yet to be done. The agenda now is to refine it and package it."

But he says government and industry are reluctant to fund specific research on search-and-rescue robotics.

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