Researchers discover way to coordinate different types of robots

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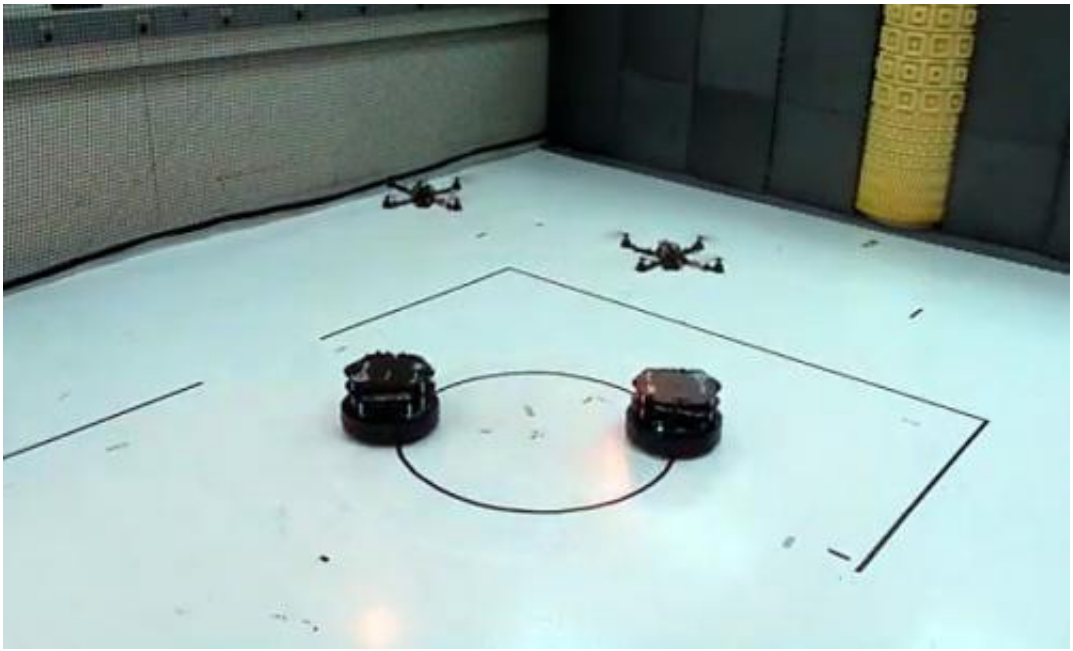

Robots working in coordination

(Phys.org) —Robots have great value in a wide variety of areas, and while robots acting alone can be helpful in collecting data, ones that "talk" to each other can yield endless potential. That's especially true when the robots are of different types.

University of New Mexico researchers have discovered a way to enable different types of small robots—ones that fly in the air and ones that stay close to the ground—to interact with each other in a coordinated

manner. The coordination could lead to improvements in areas such as search and rescue after a disaster, for example.

Francesco Sorrentino, assistant professor in the Department of Mechanical Engineering, said that having robots talk to each other has been done before, but what makes this research unique is that this communication is taking place between robots that are not the same. In the research, they are called "heterogeneous."

"This research is different because we are taking into account robots of different types," he said. "It has both a technological importance and a scientific importance because of the heterogeneity."

Rafael Fierro, professor in the Department of Electrical and Computer Engineering, said the team achieved the feat by developing "a controlled strategy that minimizes the differences in position between ground and aerial vehicles."

The work is being funded by grants from the National Science Foundation and the U.S. Army Research Laboratory. A paper on the finding, "Stable Formation of Groups of Robots via Synchronization," was presented in September at the IEEE International Conference on Intelligent Robots and Systems in Chicago.

"The Army needs fast deployment of microrobots," Fierro said. "In our case, we're using different types of robots, ones that are heterogeneous, for achieving the coordination. We're interested in how they will securely exchange information using novel optical communication systems."

Fierro explained one likely application of the research: finding missing people in a search-and-rescue setting.

"This would be useful in exploring places like a hole or a mine," he said. "You need to have some ground robots to crawl and climb, and then some aerial robots to help search and monitor places the ground robots cannot. The aerial robots can cover, sense and map an area much faster, areas where the ground robot cannot go."

Fierro said the idea is to help soldiers get an environmental assessment to give them information of what is there before they go in. And having groups of robots communicate with each other is key, as they can relay information from different perspectives.

"They can send the robots to investigate the environment, find victims, and communicate the location of the victims," he said.

Because this technology uses optical communications, it holds a lot of advantages over more traditional methods, such as wireless radio, especially in locations where there may not be Internet capability or in underwater environments.

"There are so many potential applications, because developing optical communications could be extremely beneficial in underwater exploration since in that environment, you cannot use radio," Fierro said. "You either use acoustics or optical, but acoustical methods are very slow and noisy. Optical communication is ideal for that environment."

Other possible ways this technology could be used is in transmitting high-definition video and images in space. Fierro said with traditional methods, this takes days, but using optical methods would take minutes.

Provided by University of New Mexico