

FINDER: Detecting Heartbeats in Rubble and Rescuing Victims of Disasters

Saving time saves lives

Quickly detecting victims buried under rubble or other debris greatly increases their chances of rescue and survival. This is especially true in situations where there are multiple rubble piles or masses of debris. The ability to rapidly assess whether there are survivors at a particular site allows first responders to target their efforts and save more lives.

During these types of search and rescue scenarios, responders are looking for the “holy grail”—a tool that will allow responders to walk down a street after an earthquake or tornado, look at a leveled building and quickly determine whether anyone alive is trapped within the rubble.

The Department of Homeland Security Science and Technology Directorate (S&T), in partnership with NASA’s Jet Propulsion Laboratory (JPL) is developing one such technology: Finding Individuals for Disaster and Emergency Response or FINDER.

Using microwaves to detect unique heartbeats

First responders often refer to the window of time where a victim’s rescue greatly increases their chance of survival as the *golden hour*. Using low-power microwave radar to detect small movements, from breathing to the heartbeat of a buried victim, FINDER quickly directs rescuers to survivors—thereby allowing additional victims to be identified who might have otherwise been lost.



FINDER tested at the Virginia Task Force I (Fairfax County Urban Search & Rescue Team) Training Facility in Lorton, Virginia.

Even when FINDER’s signal must pass through several feet of rubble and building debris, it is able to distinguish between human, animal, and mechanical movement. FINDER can also distinguish between multiple victims, since each person’s breathing and heartbeat patterns are different. Cueing on heartbeat and breathing allows unconscious victims, who are unable to communicate, to be found.



FINDER’s microwave radar complements search dogs and sound tools to detect the heartbeats of victims from up to 100 feet away.

FINDER can be set up from as far back as 100 feet from a rubble pile and provide search results in less than a minute. FINDER can then be moved to a new location and used to conduct another search—thereby allowing large areas to be searched quickly.

Adding new location capabilities to FINDER

S&T and JPL conducted several tests of FINDER prototypes with Virginia Task Force One, a Federal Emergency Management Agency Urban Search and Rescue team known for its global disaster response efforts. As a result of these tests, task force members identified a need to add a locator feature to enhance FINDER’s current detection capabilities. With this new feature, FINDER is not only able to tell responders that a victim is trapped but will guide them to the individual’s actual location. FINDER units were deployed in spring 2014 for additional field testing. Following these tests, S&T will partner with industry to commercialize an affordable FINDER product for federal, state, local and tribal first responders.

