Finding Individuals for Disaster and Emergency Response (FINDER)

Homeland Security
Science and Technology

"HOLY GRAIL" OF SEARCH AND RESCUE

In the aftermath of a disaster, quickly detecting living 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 a large extent of debris. The ability to rapidly assess whether there are survivors at a particular site allows for effective allocation of search and rescue resources and helps first responders 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, hurricane, or tornado, look at a leveled building, and quickly determine whether anyone alive is trapped within the rubble.

Beginning in 2012, the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) teamed with the NASA Jet Propulsion Laboratory to develop one such technology: Finding Individuals for Disaster and Emergency Response, or FINDER. DHS S&T transitioned FINDER (now known commercially as X3 FINDER) in 2015, and it has since been enhanced and deployed during real-life disaster responses by partner SpecOps-Group Inc. (https://www.specopsgroup.com/finder)

HOW THE "X3" FINDER WORKS

First responders often refer to the window of time where a victim's rescue greatly increases their chance of survival as the golden hour. X3 FINDER uses low-power microwave radar to detect small movements from breathing and the heartbeat of a buried victim.

The unit (pictured above and to the right) quickly scans a scene and directs rescuers to victims, even if they are unconscious. And even when the signal must pass through rubble and building debris, X3 FINDER is able to distinguish between human, animal, and mechanical movement. It can also distinguish between multiple victims, since each person's breathing and heartbeat patterns are different.

SpecOps-Group has worked extensively with the first responder community to ensure X3 FINDER continues to meet their needs. Based on their feedback, the following upgrades have been made:

- For easier portability, X3 FINDER is smaller and lighter, reduced from 35 lbs. to only 13 lbs.
- Overall scan-to-results time has been reduced to 90 seconds, soon to be 30 seconds.
- A zone map has been added to narrow down target search location.
- X3 FINDER can now scan from up to 200 feet away in obstructed areas (i.e. rubble piles) and up to 450 feet away in unobstructed areas (i.e. tunnels and caves).

X3 FINDER OUT IN THE FIELD

Since X3 FINDER was commercialized in 2015, the technology has been deployed across the globe to assist with disaster response and recovery in places like Nepal, Mexico, and the Bahamas during Hurricane Dorian. DHS S&T and SpecOps-Group also demonstrated X3 FINDER to U.S. and international Urban Search and Rescue teams at the 2019 FEMA Shaken Fury Operational Exercise at the Muscatatuck Urban Training Center in Indiana (below).

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