

Teaching drones to hear screams from catastrophe victims

June 8 2021



During the 180th ASA Meeting, Macarena Varela from Fraunhofer FKIE will describe how a system using an array of microphones and advanced processing techniques could be a lifesaver for disaster victims. Credit: Macarena Varela, Fraunhofer FKIE



In a disaster, time is of the essence when searching for potential victims who may be difficult to find. Unmanned aerial vehicles make the perfect platform for state-of-the-art technology allowing emergency crews to find those in need and provide situational awareness over a large area.

During the 180th Meeting of the Acoustical Society of America, which will be held virtually June 8-10, Macarena Varela, from Fraunhofer FKIE, will describe how a system using an array of microphones and advanced processing techniques could be a lifesaver for disaster victims. The session, "Bearing Estimation of Screams Using a Volumetric Microphone Array Mounted on a UAV," will take place Tuesday, June 8, at 10:35 a.m. Eastern U.S.

During a disaster, every minute counts in finding missing and injured people. UAVs can cover a larger area than rescuers on the ground, so mounting small microphones on the drones can let emergency crews potentially hear screaming from someone in need of saving.

"Our project is an ongoing project, so we are still doing a lot of testing. We have already successfully detected and angularly located impulsive sounds very precisely near distances with the presence of <u>drone</u> noise," Varela said. "We will be testing the system on a flying drone to measure impulsive sounds, such as screams, and process the data with different methods to also estimate the geographical positions of the sounds."

The array of microphones, called Crow's Nest Array, is combined with advanced array processing techniques, such as beamforming. The number and distributions of microphones placed on the drones have a crucial influence on the listening capabilities. Varela said environmental noises can also play a part in the effectiveness of the microphones.

"We have a lot of experience in filtering noise, such as wind noise, extremely loud helicopter noise, ground vehicles noise, and more,"



Varela said. "We use different types of filters to be able to reduce <u>noise</u>, and we use diverse detection procedures to extract the signals of interest, such as impulsive sounds or screams."

Varela envisions the listening drones saving lives by hearing sounds of survivors that may be buried under rubble from an earthquake or in a collapsed building.

More information: Macarena Varela et al, Bearing estimation of screams using a volumetric microphone array mounted on a UAV, *The Journal of the Acoustical Society of America* (2021). DOI: 10.1121/10.0004448

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