

# Engineer creating more sensitive, safer landmine detectors

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Long after a conflict, landmines remain buried underground unless someone can locate and detonate them. According to the United Nations (UN), there are more than 100 million landmines buried in 68 countries around the world. The UN estimates that more than 2,000 people are killed or injured by landmine explosions each month. A University of Missouri engineer is working to enhance the accuracy of a landmine radar system while minimizing the number of false alarms it produces.

In a landmine radar system, ground-penetrating radar scans the surface for underground objects. Besides sensing landmines, the radar also has undesirable responses from clutter objects, such as scrap metal debris, plant roots and rocks. Dominic Ho, the Dowell Professor of Electrical & Computer Engineering in the MU College of Engineering, is working with Army employees and private defense contractors to enhance the system, and distinguish between true positive signals that are from landmines and false positive signals that are from clutter objects and can be ignored safely.

"The fewer false positives there are, the faster we can clear a mine-infected area," Ho said. "Each time there is a false positive, the military wastes time and money to investigate the positive signal. Our goal is to keep the rate of detection high, but reduce the number of false triggers."

Ho studies and compares how signals are reflected from landmines and clutter objects that produce false signals. He differentiates the signals and then develops radar signature patterns that can identify an

underground object. Ho's goal is to create consistent radar signature patterns for landmines so the detector will be able to discriminate between landmines and clutter objects. However, landmines can vary in shape and material making it a challenge to create consistent signature patterns. For example, landmines can be circular or square and made of plastic or metal. Plastic landmines are more of a challenge because they are light and do not create a strong signal, Ho said.

Ho has researched landmine detection for nearly 10 years. His recent grant will fund research of a detector that is mounted on a vehicle-based platform. Previously, Ho researched and helped enhance a hand-held detection device that is currently being used in Iraq and Afghanistan. His research, along with advancements in radar technology, has contributed to a reduction of false alarms from a rate of 100 per 5,000 square meters five years ago to the current rate of less than four per 5,000 square meters.

"We are chasing a moving target," Ho said. "People are still creating landmines. It's very important that we continue to refine our techniques and improve our detection methods."

Source: University of Missouri-Columbia

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