

**ADVANCED FEATURE BASED TECHNIQUES
FOR LANDMINE DETECTION USING
GROUND PENETRATING RADAR**

ZHENHUA MA

Dr. K.C. HO, Thesis Supervisor

ABSTRACT

Landmine detection is an important and yet challenging problem that remains to be solved. It is not only a problem for military, but also for humanitarian concern. The goal of this research is to propose some techniques for landmine detection. Two advanced feature based techniques are developed. One algorithm applies the clustering method based on the spectral feature vectors formed by the energy density spectra of return sensor signals, the idea behind is to find out whether there are some “hidden patterns” among the spectral feature vectors. The other one is the subspace detector technique that utilizes the energy density spectra of return signals directly. These techniques are tested in various testing data sets collected from the vehicle mounted ground penetrating radar to evaluate their ability to improve the detection result and reduce the false alarm rates. Both of them are proved to be useful in improving the detection of landmines.