

Smart Metal Detectors for Landmine Detection and Classification

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Numerous countries around the world suffer from landmines as a persistent and threatening result of wars. Although sophisticated tools have been employed to localize the buried explosives, many of these still suffer from high detection error rates, have high costs, and require special training and experience of the operators especially at the level of target discrimination.

The goal of this work is to design a low-cost and automated detection and classification system based on the widely used metal detector. The conventional metal detector is enhanced to:

1. Take and record the response signals at precise coordinates in a designated part of the suspected field,
2. Extract a pattern of the taken readings,
3. Compare this pattern to a database of the patterns of known landmines and other non-threatening objects, and
4. Based on the above comparison classify the detected object as harmless or as a land mine.

To implement the above solution, the conventional metal detector is equipped with acoustic sensors for determining its exact coordinates, and a Raspberry PI computer to record the metal detector responses and extract the detection pattern. A client-server program is developed, which interfaces the Raspberry PI with the classification database.



Figure 1: Raspberry PI

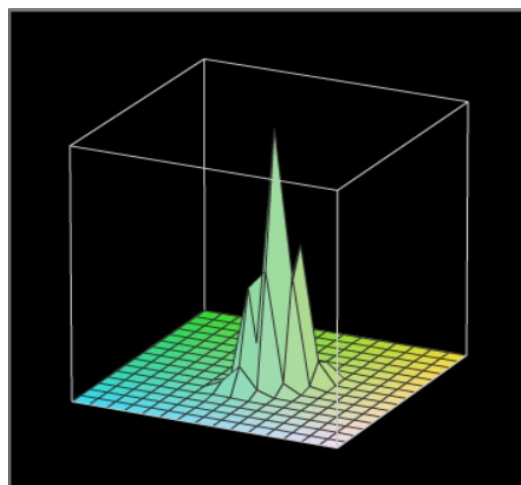


Figure 2: Curve fitting for a real mine response