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M16A1 LAND MINE DETECTION USING BACKPROPAGATION NEURAL NETWORK

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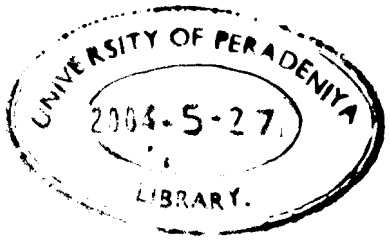

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M16A1 landmine detection system using backpropagation neural network is presented. The proposed system consists of a metallic detector coupled to a backpropagation neural network, which classified EM signals, reflected by hidden metallic objects under depth of 9cm of the earth and predicted about the reflected object.

Generally the landmine detection was done using metallic detectors. In this detection system the number of fault alarms due to some other metallic objects were the major problem for the deminers. The introduced detection system greatly reduced the number of fault alarms and increased the accuracy and efficiency of the demining process.

An Oscilloscope was coupled to a metallic detector and a web camera was placed in front of the oscilloscope so that the image of the signal plot captured. An M16A1 mine was placed under depth of 9cm of the earth. The circular inductance of the metallic detector was applied 6cm above and parallel to the surface of the earth. When it was right above the mine, the image of the signal, plotted in the oscilloscope was captured using the web camera and saved it in the computer. This procedure was repeated varying the height by 1/2cm towards the surface of the earth and obtained ten signal images. The same procedure was repeated using two different types of nail and the nut. The images were converted into gray scale and then into black & white images. Then the actual signal was regenerated from those images using Matlab-6.0.0.88. Next the energy spectrum of each signal was obtained. Out of ten energy spectrums for each object class only seven were used to train the neural network and the rest were used to test.

The test patterns were presented to the trained neural network that identified M16A1 mine among other 3 objects. Further signal patterns taken from a real land mine field which consisted different types of mine, were presented and the net identified only the M16A1 mine. That implies this net could be used to detect only M16A1 land mine. In this work only three classes of clutter objects were considered. Those three classes had three different energy spectrums. The frequency spectral varied due to the material, hardness and the shape. In real battlefields large number of metallic objects available. The net could be trained to detect M16A1 mine among those metallic objects.