The detection of landmine has been an active research area over the past few years. The research is driven mainly for humanitarian purposes to clear up mine fields left after wars that claim more than 30,000 deaths and injuries every year. Metal detector is an effective sensor to detect metal mines. However, it cannot detect plastic mines or mines with low metal content. Ground penetrating radar (GPR) is an alternative sensor that is gaining popularity for landmine detection. GPR sends out signal that penetrates to the ground and measures the returned signal to detect landmines. An advantage of GPR is that it can detect plastic mines or mines with low metal content. On the other hand, GPR signal return is very susceptible to ground bounce and interference, and signal processing is indispensable to improve detection and reduce false alarms.

This seminar begins with an introduction to the problem of landmine detection, and proceeds to describe novel signal processing techniques for GPR in vehicle mounted and hand-held based mine detection systems. In the vehicle mounted system, the feature based hidden Markov model (HMM) technique to detect landmines will be presented. The HMM technique is able to handle different sizes and variations in the mine signatures and provides much better detection accuracy compared to the residual energy detector. In the hand-held based system, the statistical based linear prediction detector will be presented. The linear prediction detector is able to minimize the undesirable variations in the GPR signal from the operating environment and human operator effect, and provides significant improvement in performance compared to the baseline technique. Experimental results for data collected at several government test sites will be presented to demonstrate the performance of the proposed techniques.

Biography:
Dr. Ho received his Ph.D. degree in 1991 from the Chinese University of Hong Kong. He was a research associate at the Royal Military College of Canada from 1991 to 1994, a member of scientific staff at Bell Northern Research (Nortel Networks) from 1995 to 1996, and a faculty of the Electrical Engineering Department at the University of Saskatchewan, Canada from 1996 to 1997. Since September 1997, he has been with the University of Missouri-Columbia, where he is currently an associate professor in the Electrical and Computer Engineering Department. Dr. Ho has published over 30 journal papers and 60 conference papers in the areas of adaptive signal processing, communications, landmine detection and statistical signal processing. He has made over 20 contributions to the International Telecommunications Union (ITU) for international standard development. He is the inventor/co-inventor of 3 patents in the United States. Dr. Ho is an associate editor of the IEEE Transactions on Signal Processing and the IEEE Signal Processing Letters. Dr. Ho received the junior faculty research award from the College of Engineering at University of Missouri-Columbia in 2003.

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