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Design of Web-Based Software for 3D Geoelectrical Prospection Optimization Using Genetic Algorithms and Particle Swarm Optimization & Building a Worldwide Distributed Cyber-Attack Early Warning System

Abstract

In this seminar two important evolving methods to better analyze complex data will be discussed. The first involves improved methods for soil prospecting using three dimensional (3D) geo-electrical soil data, which is the subject of my dissertation research. The second involves building a world-wide distributed cyber-attack early warning system. Further details on these two topics are now presented.

Geo-electrical prospection, or soil stratification, is a technique used to estimate soil parameters, such as the amount of layers, and thickness and resistivity of each layer. There are many deterministic methods that can be used to find soil, but the estimated error introduced by these methods can compromise geo-electrical prospection when performed for complex soils. Hence this talk will detail a novel web-based system for reducing geo-electrical prospection estimated error and present some related results using tri-dimensional graphics. Overall, 3D geo-electrical prospection gives more realistic knowledge of the ground, thereby improving grounding grid design and reducing material costs.

Despite all the efforts against cyber-attacks, the statistics show that digital crime is continuing to grow. In response, a new paradigm is being proposed to counter these threats, termed as the "Cyber Attack Early Warning System". However, related efforts in this area, e.g., such as the Incident Detection Data Analysis Center, are developing systems to collect and analyze data from companies. Hence the goal of this talk is to present a broader grid system that uses personal computers to act as Honeypots and IDS sensors, i.e., which can share attackers' information between themselves via a centralized system.

Biography

Diogo Oliveira has an Associate Degree in Computer Networks, a Masters in Computer Engineering, and he is currently pursuing a Ph.D. in Electrical Engineering at The University of Brasilia (UnB), Brazil. Currently, he is a visiting research scholar at in the Electrical Engineering Department at the University of South Florida, working under the supervision of Dr. Stephen Saddow as part of a Brazilian government program called Science Without Borders. Mr. Diogo has been working as a network analyst since 2005 and as a college professor since 2007. In particular, he has taught various courses in the areas of Computer Networks and Information Security.