NatSec’2014 Tutorial
Nature-Inspired Cyber Security
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Tutorial Abstract
Biological systems intelligently handle adversaries with intrinsic highly-evolved defense systems that are pervasive, multi-level and exquisitely resilient. For decades nature was a source of inspiration, shaping the language of cyber security. From viruses and worms to immune systems, behavior-based threat detection, and self-healing systems, nature provided many examples of what to avoid and what to imitate. From these examples we can identify key pillars supporting the biological defenses insuring its resilience against threats and attacks: namely diversity, pervasive dynamic autonomous elastic responses, and self-healing/Fast-recovery. We claim that modern cyber defenses relying on these pillars would have the asymmetric advantage and the capability to insure the resilience of their targeted platforms. This tutorial discusses practical examples for nature-inspired cyber-defenses designed to realize the aforementioned pillars.

Speaker’s Biography
Dr. Mohamed Azab is assistant professor at The City of Scientific Research and Technological Applications, Alexandria, Egypt. Azab received his Ph.D in Computer Engineering at Virginia Tech in 2013 in the area of Cyber Security. Azab's current research crosscuts the areas of trustworthy engineering, networking architecture and protocols, cloud computing, and distributed systems for large-scale ubiquitous Cyber-Physical systems (CPS). Azab's contributions include Cooperative Autonomous Resilient Defenses platform for CPS, Software Behavior Encryption approach for Moving-target Defense, and an Evolutionary Sensory System for CPS Monitoring, Analysis, Sharing and Control. Azab has multiple patents and book chapters among other publications in archival journals and respected conference proceedings. Azab’s work was selected twice as one of the top ten security projects in the domain of Homeland Security in 2012, and 2013, in a nationwide prestigious completion hosted by The Department of Homeland Defense Foundation, USA.