



Plenary Address:

“Biological Immune System as a Defense System: Lessons Learned”

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The biological immune system is an elaborate defense system which has evolved over millions of years probably through extensive redesigning, testing, tuning and optimization process. While many details of the immune mechanisms (innate and adaptive) and processes (humeral and cellular) are yet unknown (even to immunologists), it is, however, well-known that the immune system uses multilevel (and overlapping) defense both in parallel and sequential fashion. Depending on the type of the pathogen, and the way it gets into the body, the immune system uses different response mechanisms (differential pathways) either to neutralize the pathogenic effect or to destroy the infected cells. Our body is continuously exposed to various pathogens (known/unknown/harmful/benign) and handles most of them in an amazing delicacy. Still this is not a full proof system; malaria, plague and other epidemics wiped out a large population at different times in history, and we are continually struggling to deal with new pathogenic challenges.

From the information processing point of view, several immunological principles make it very appealing, which include distributed processing, (partial) decentralized control, and self/non-self recognition. These principles provide various immune properties like learning, memory, adaptation, feature extraction, signaling, etc.

We can learn lessons from the biological system in order to build robust and adaptive cyber defense system. In this talk, I will discuss various works of Immunity-Based Computer Security Systems and describe our on-going research on developing Immunity-Based intrusion detection systems.