Cognitive Dynamic Systems: An Integrative Field that will be a Hallmark of the 21st Century

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ABSTRACT

The integrative field of Cognitive Dynamic Systems is inspired by the human brain, hence the four defining principles of what we mean be cognition:

1. The perception-action cycle, which provides for information gain attained by processing environmental observables from one cycle to the next.
2. Memory for predicting the consequences of actions taken by the system on the environment.
3. Attention for the allocation of available resources.
4. Intelligence, which builds on the previous three principles for decision-making aimed at intelligent choices in the face of unavoidable environmental uncertainties.

In this lecture, I will elaborate on each one of these four principles. In particular, I will briefly describe Cognitive Radio and Cognitive Radar that have established themselves as two fast-emerging example applications of cognitive dynamic systems. I will conclude the lecture by describing the vision for a new generation of Cognitive Energy Systems inspired by the human brain.

About the Keynote Speaker

Simon Haykin is professor of electrical and computer engineering, FIEEE, FRSC, Distinguished University Professor. He is director of the Cognitive Systems Lab in Dept. of Electrical and Computer Engineering at McMaster University, Canada. Prof. Haykin is a pioneer of cognitive radio/radar and adaptive signal processing, as well as an expert in cognitive systems and communication/information systems.