

Keynote Lecture – IST distinguished lecture

Toward Cognitive Integration of Prosthetic Devices

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We are at the brink of a revolutionary technology stage, where machines may be “cognitively integrated” in the human experience, manipulated and controlled through direct brain processes in virtually the same way as we see, walk or grab an external object. But unlike the current generation of brain machine interfaces, this is done through a dialogue that requires the transfer of goals between the machine and the user. The vision is a new kind of implanted prosthetics that senses intentional brain processes (e.g. moving an arm) and translates the spatio-temporal neural signals into models that control external devices. Through the perception-action-reward cycle the brain is made aware of the machine existence and actions, which will provide the basis to be considered a body extension. Several key technological and scientific developments will be discussed to implement this vision.

Jose C. Principe (M’83-SM’90-F’00) is a Distinguished Professor of Electrical and Computer Engineering and Biomedical Engineering at the University of Florida where he teaches advanced signal processing, machine learning and artificial neural networks (ANNs) modeling. He is BellSouth Professor and the Founder and Director of the University of Florida Computational NeuroEngineering Laboratory (CNEL) www.cnel.ufl.edu. His primary area of interest is processing of time varying signals with adaptive neural models. The CNEL Lab has been studying signal and pattern recognition principles based on information theoretic criteria (entropy and mutual information).



Dr. Principe is an IEEE Fellow. He was the past Chair of the Technical Committee on Neural Networks of the IEEE Signal Processing Society, Past-President of the International Neural Network Society, and Past-Editor in Chief of the IEEE Transactions on Biomedical Engineering. He is a member of the Advisory Board of the University of Florida Brain Institute. Dr. Principe has more than 700 publications. He directed 87 Ph.D. dissertations and 65 Master theses. He wrote in 2000 an interactive electronic book entitled “Neural and Adaptive Systems” published by John Wiley and Sons and more recently co-authored several books on “Brain Machine Interface Engineering” Morgan and Claypool, “Information Theoretic Learning”, Springer, and “Kernel Adaptive Filtering”, Wiley.