## Towards a Theory of Layered Architectures for Communication and Control

## Sanjoy K. Mitter

## MIT

Architecture might be defined as the organization structure for distributed algorithms performing complex multiple functions embedded in hardware and software. Layered architectures are those where the organizational structure is layered in the sense that layers obey a partial ordering and, metaphysically, layers are conditionally independent given ``interfaces." ??A prime example of a layered architecture is the architecture of the internet and the distributed algorithms which achieve the functions it is required to fulfill.

In this talk, I discuss a theory for a layered architecture which arises from a universal variant of the Source Channel Separation Theorem of Shannon, both in a a point-to-point setting as well as a network setting. ??A similar result arises from the theory of partially-observed stochastic control problems.

In the second part of the talk, I discuss Dynkin's work on General Equilibrium Theory under uncertainty, and its role on architectural issues in control problems over networks.