I will describe recent results in a long-going project to build a humanoid robot with a control system modelled after the human brain. The system includes low-level reflex systems as well as more higher-level memory components that interact with central emotion and activation systems.

The talk will focus on the interaction between activation systems and memory processing. The basis will be a memory model for robots that can account for many aspects of an inner world, ranging from object permanence, episodic memory, and planning to imagination and reveries. It is modeled after neurophysiological data and includes parts of the cerebral cortex together with models of arousal systems, the effect of which also can be seen in pupil dilation.

The three components of the memory system are an identification network, a localization network, and a working memory network. Attention serves as the interface between the inner and the external world. It directs the flow of information from sensory organs to memory, as well as controlling top-down influences on perception to allow external sensations to be compared to internal expectations.

The system has been tested in a number of computer simulations that illustrate how it can operate as a component in various cognitive tasks including perception, the A-not-B test, delayed matching to sample, episodic recall, and vicarious trial and error. It can also support action mechanisms in
manipulation tasks and reproduce a large number of emotional and cognitive effects on pupil dilation.
