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Cognitive Robotics

S&T Campaign: Human Sciences
Human-System Integration

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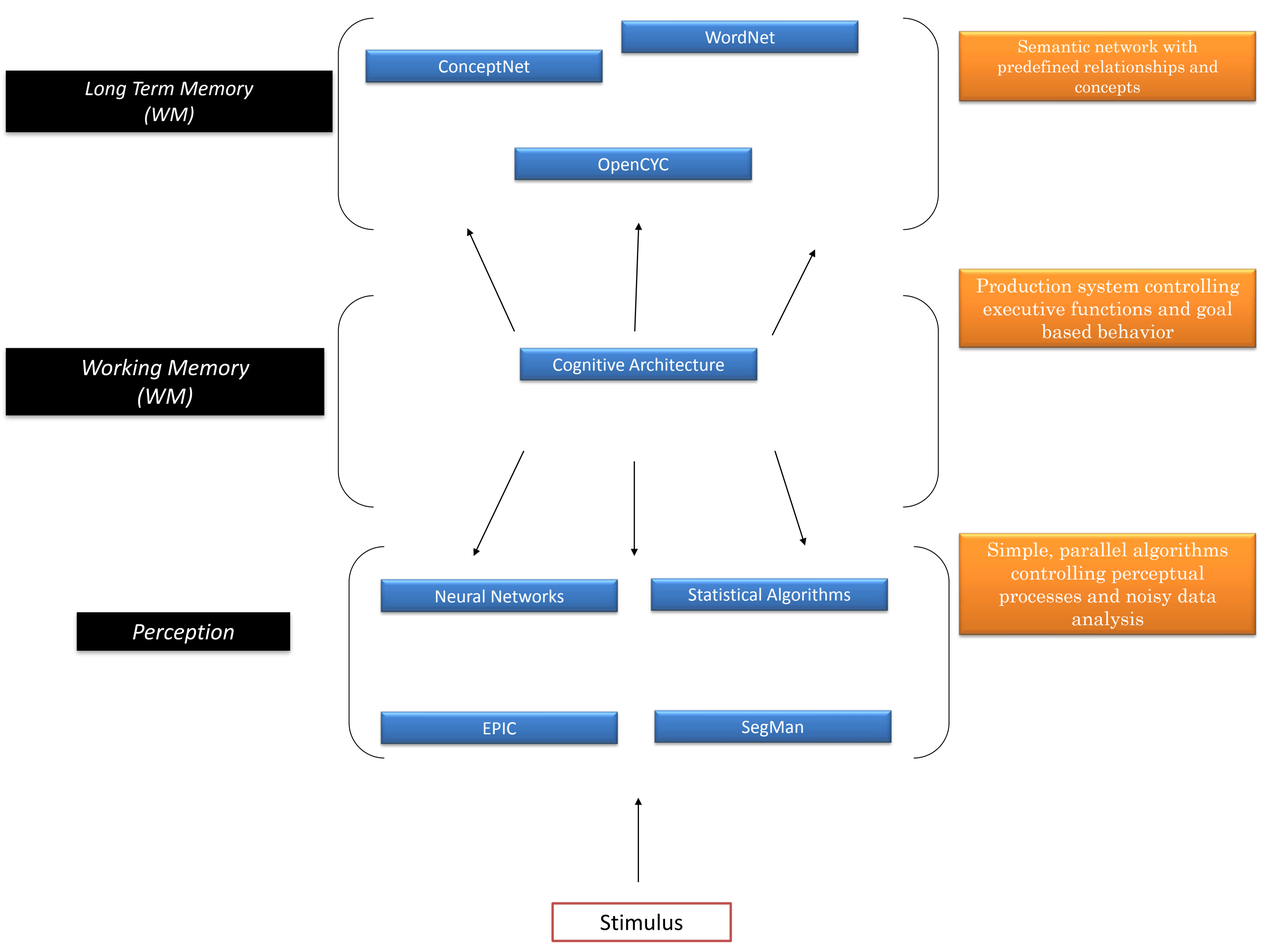
Research Objective

- To use cognitive architectures to improve robotics control and interactions with other humans
- Current robots abilities are scripted or task specific and do not generalize to new domains

Challenges

- Using episodic events to develop long term memory
- Identifying objects across a wide variety of domains and task scenarios
- Controlling attention, so as to not be too task specific, but focused enough to complete a goal



Interaction of major cognitive components for an intelligent system

ARL Facilities and Capabilities Available to Support Collaborative Research

- Cognitive Assessment, Simulation and Engineering Laboratory (CASEL) at APG, MD
- The Symbolic and Sub-symbolic Robotics Intelligence Control System (SS-RICS)
- We have defined a developmental process for automatically creating and intelligent system using novelty and the post-processing of episodic events
- Opportunities are in Human Robot Interaction

Kelley, T.D. (2014) Robotic Dreams: A Computational Justification for the Post-Hoc Processing of Episodic Memories. International Journal of Machine Consciousness. Vol. 6, No. 2 (2014) 1-15.

Kelley, T.D. & McGhee, S. (2013) Combining metric episodes with semantic event concepts within the symbolic and sub-symbolic robotics intelligence control system. In SPIE Defense, Security and Sensing (pp. 87560). International Society for Optics and Photonics.

Kelley, T. D., & Cassenti, D. (2011). Theoretical explorations of cognitive robotics using developmental psychology. Special issue: Cognitive robotics and reevaluation of Piaget concept of egocentrism. *New ideas in psychology*, *29* (3), 228-234.

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Recognition of specific items is easy, but generalization to a class of objects is very difficult
- Knowledge of how humans interact with the world from a cognitive perspective and the ability to translate that knowledge into computer algorithms is what is needed.

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