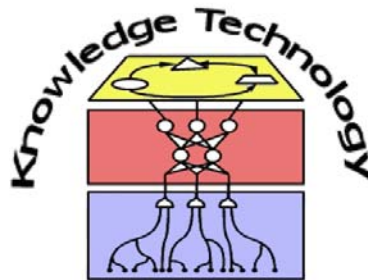


# Artificial Affective- and Self- Protective Actions RobotDoc Task 4.3

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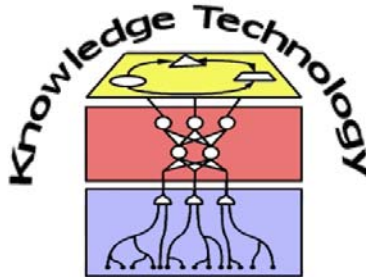


<http://www.informatik.uni-hamburg.de/WTM/>

October 25, 2010

# Supervisors Grounding

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# Why is this topic relevant ?

- Computational models of mammalian and human learning could contribute enormously to future robot generations.
- Affective mechanisms are important to understand cognitive processes and play a key role in the development of intelligence. [Arbib and Fellous, 2004]
- Many affective responses are hard-coded, but often humans and animals learn to associate neutral stimuli with emotionally charged stimuli to elicit affective responses. [Fellous, Armony and LeDoux, 2002]
- Stimulus detection-and-response organizing systems are building blocks of affective mechanisms. [Fellous, Armony and LeDoux, 2002]

# How does it relate to RobotDoc Task 4.3?

- Study of neural emotion-action integration based on animal and human affective evaluation of stimuli.
- Development of a stimuli-action associative architecture, integrating affective states, sensory inputs and actions.

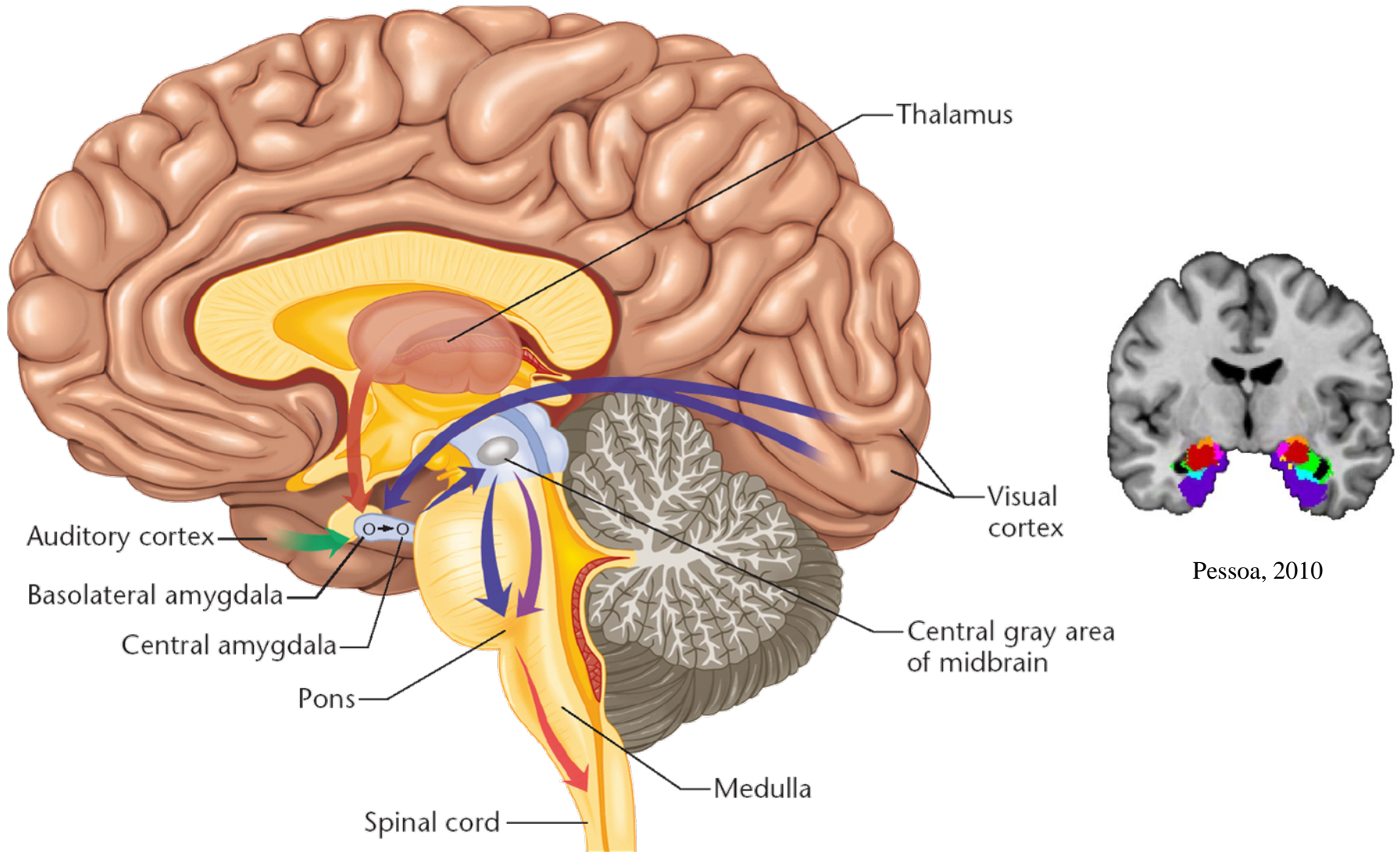
# Outline

- Research question
- Approach
  - Neuroscience
  - Computational Modeling
- Framework
- Initial experiment
- Expected results

# Research question

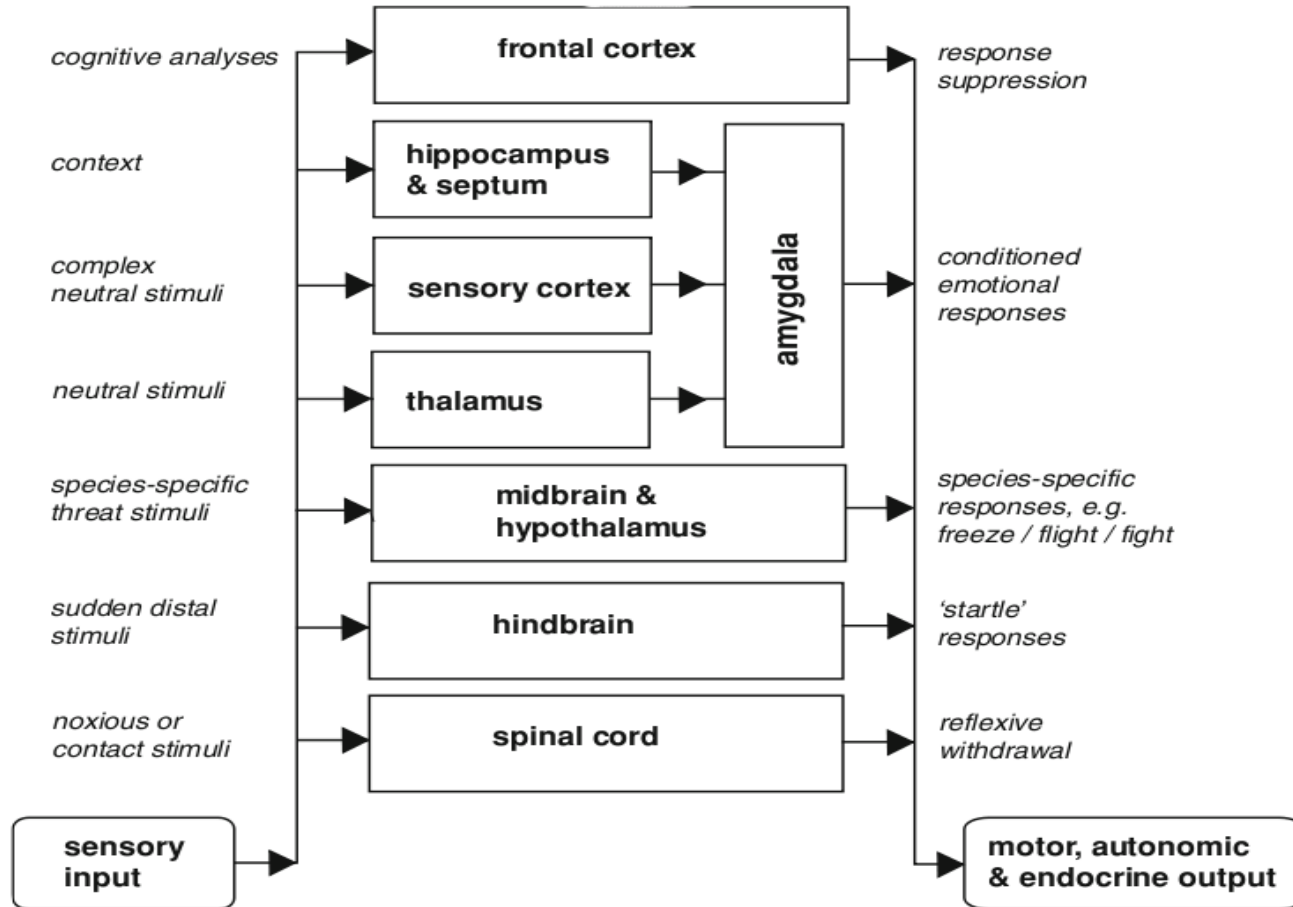
- Which innate responses of animals are important for an artificial organism?
- How can we build an embodied affective system able to identify harmful and safe situations?
- How can affective judgements of situations be learned?

# Neuroscience approach

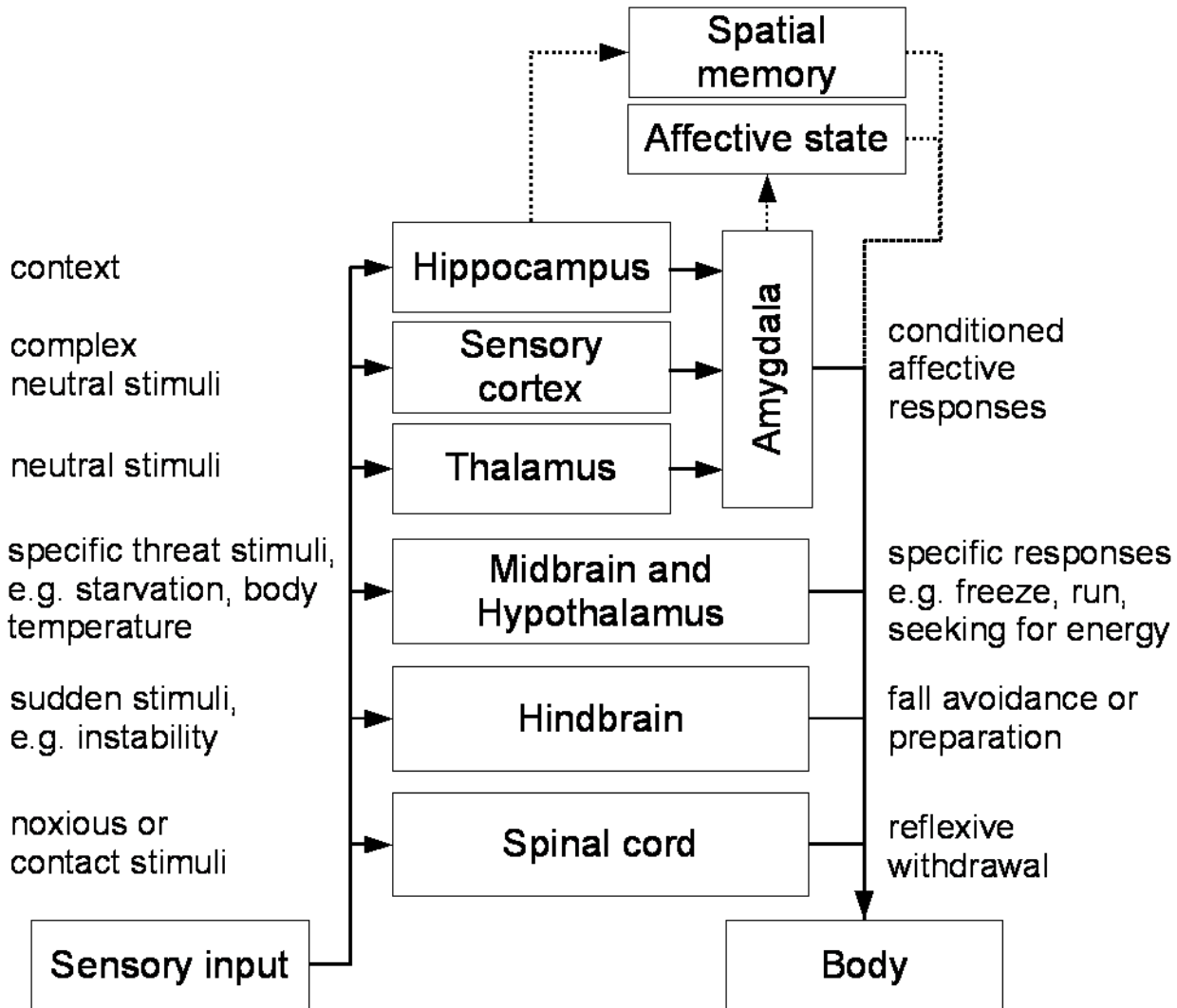


# Computational approach

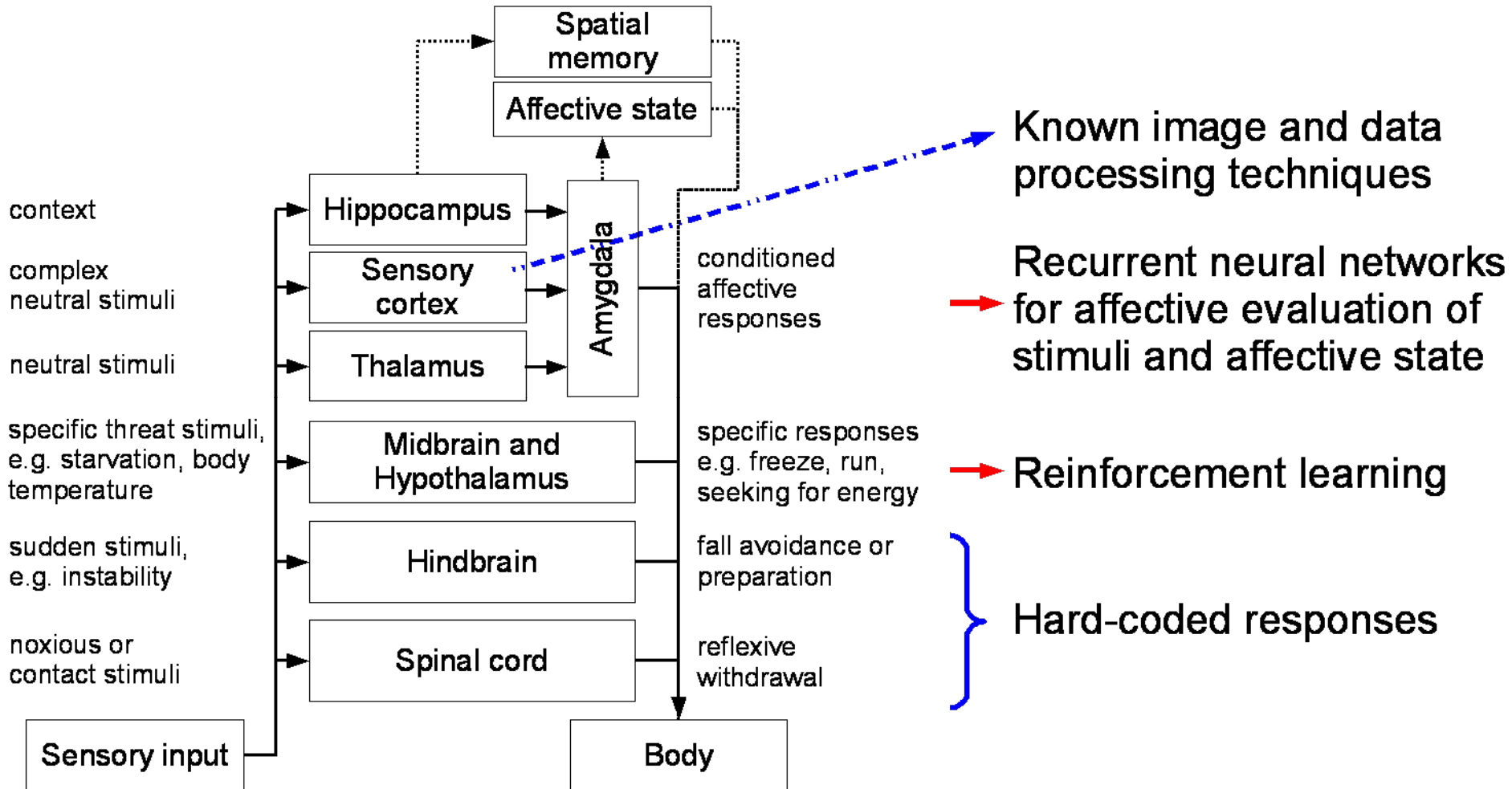
Prescott et al. 1999 - Layered organization of neural mechanisms of defense



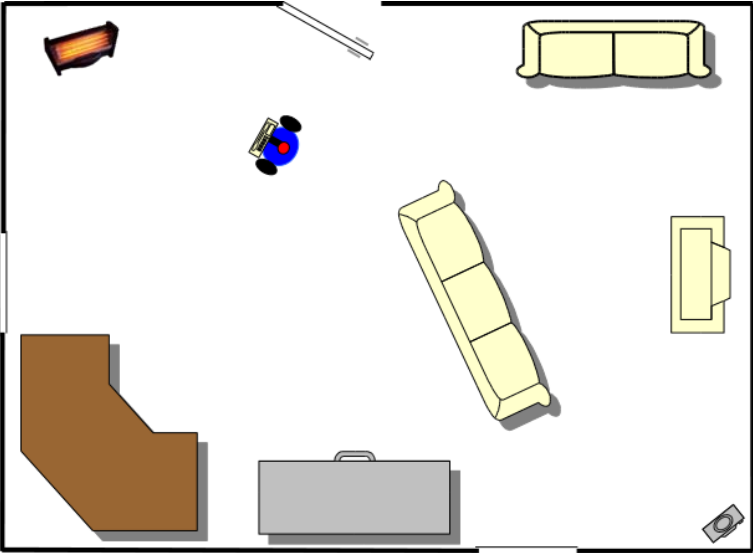
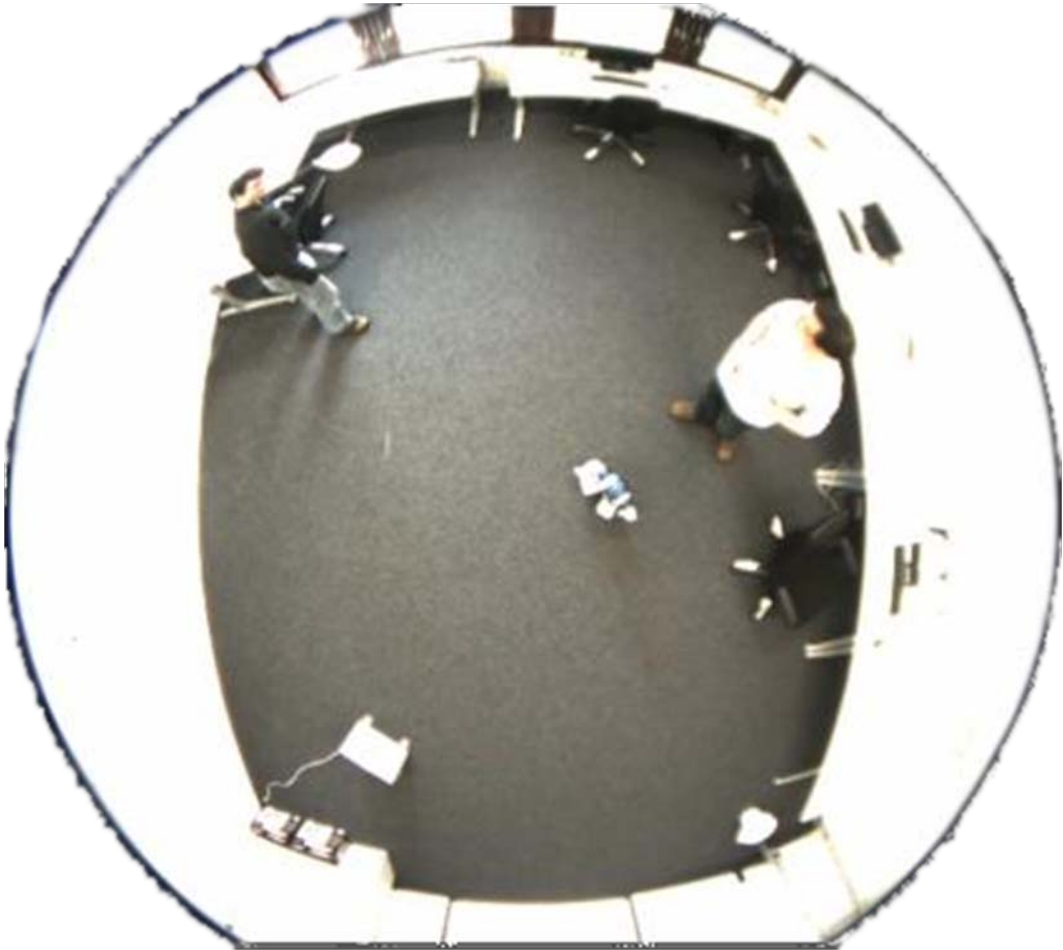
# Computational approach



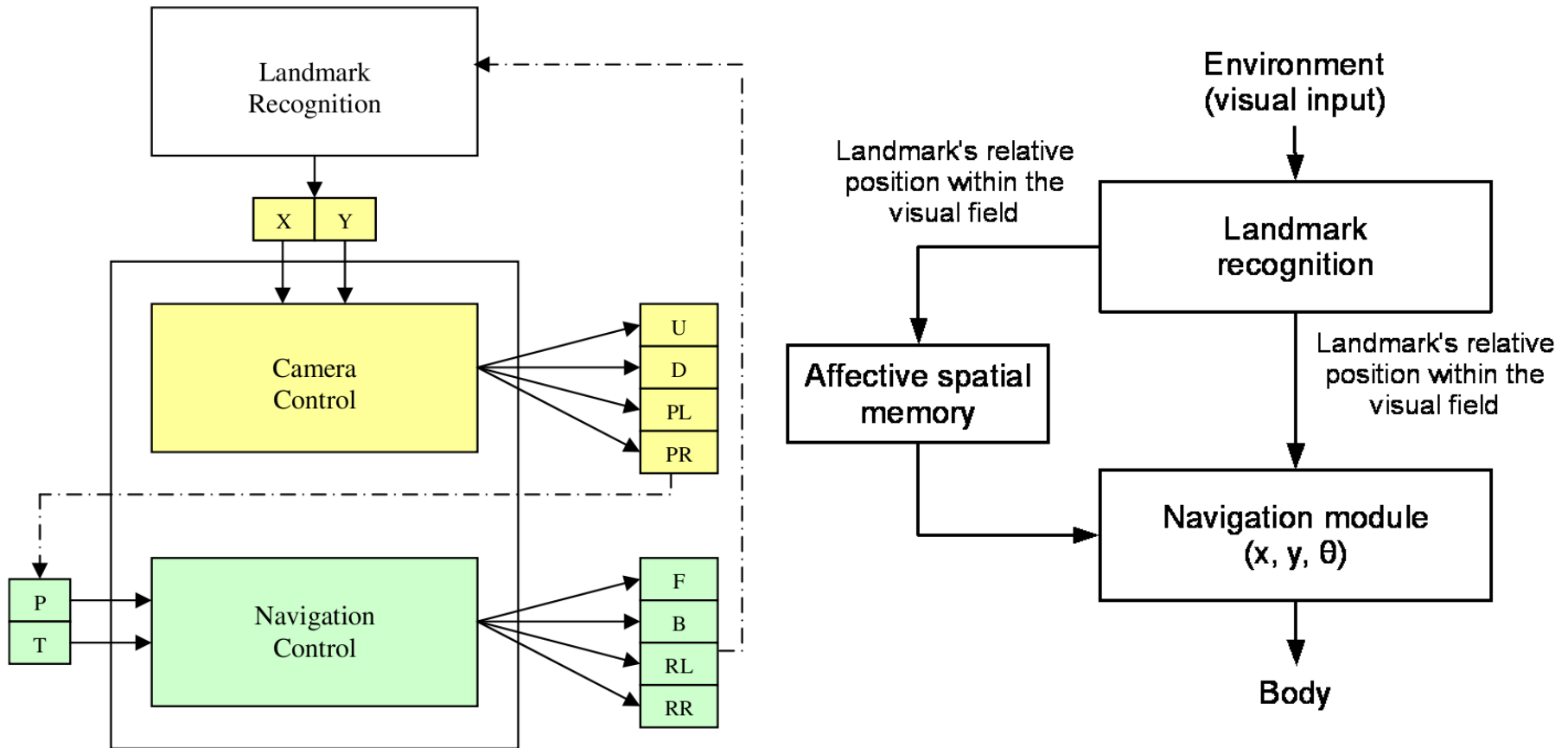
# Computational approach



# Framework



# Initial experiment – Seeking for energy



David Muse and Stefan Wermter. *Actor-Critic Learning for Platform-Independent Robot Navigation*. Cognitive Computation. Vol. 1, Issue 3, pp. 203-220, 2009.

# Expected results

- Implement robust, reliable and scalable artificial affective protection mechanisms tested on a simulated and a real humanoid robot.
- Time-varying behaviors, i.e. basic behaviors modified or overwritten by superior artificial cognitive processes.
- Develop an API of the model to be used on other intelligent systems, not only as an input-output module.

# The end

Thank you for your attention.  
Any question?

## Literature:

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