Playful Acquisition of Basic Behavioral Skills

FIAS Winter School

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Homeokinesis is trying to **actively investigate the perturbations** rather than canceling them out

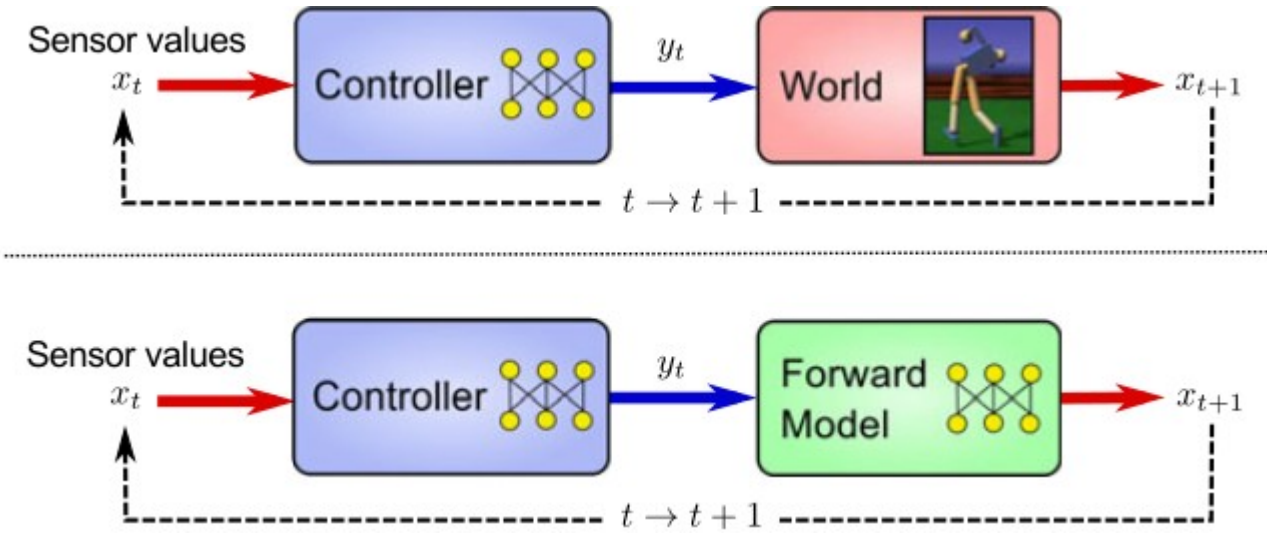
This is an **exploration heuristic**

What Ralf showed Monday **was not** homeokinesis

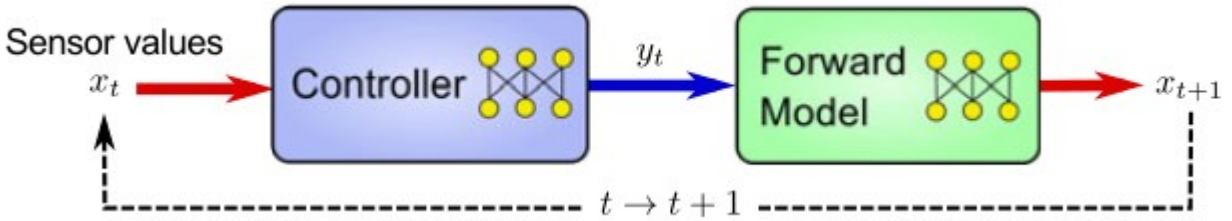
But it is **close enough** to be considered the same in the context of this presentation

Homeokinesis in **4 slides***
and **4 equations**

*this one not included



Sensorimotor Loops
the **reality**, the **model**



K matrix ***M*** matrix

$$\psi(x) = M(x, K(x)) \quad \text{(one)}$$

$$x_{t+1} = \psi(x_t) + \xi_{t+1} \quad \text{(two)}$$

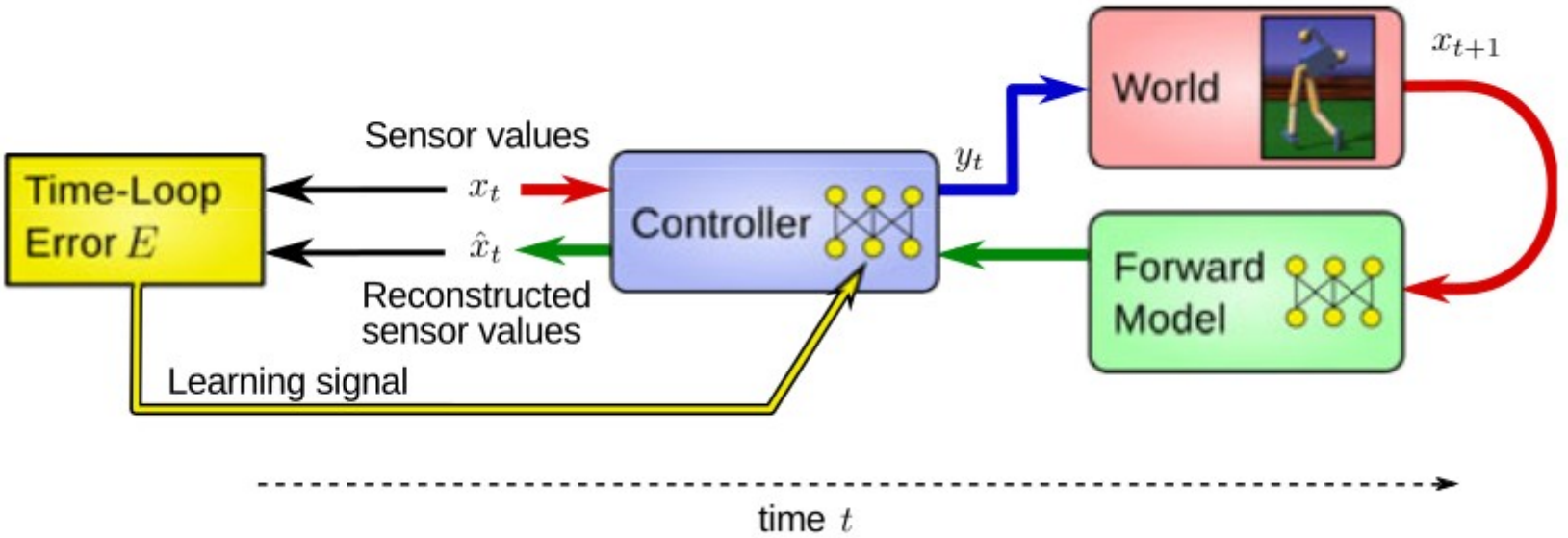
Homeokinesis : find ν_t such that

$$x_{t+1} = \psi(x_t) + \xi_{t+1} = \psi(x_t + v_t) \qquad \text{(three)}$$

with the constraint that

$$v_t = \arg\min_v \left|\left| x_{t+1} - \psi(x_t + v) \right|\right| \qquad \text{(four)}$$

The norm of ν_t is the **time-loop error**



Where to go from there ?

Homeokinesis is an **exploration heuristic**

A. It **does not retain** aquired skills
B. It **does not try to learn** anything

First idea

Clustering

also known as “the back-up plan”

Learning

1. Run a homekinesis simulation
2. Capture the state of the controller at regular interval
3. Put that in a database
4. At the end of the simulation, clusterize.

Reuse

1. Deactivate learning
2. Pick a cluster center
3. Set it as the current controller.
4. Observe

Live Demo