Notes on various lines of inquiry (and deliverables) on the Homeostat project (with tasks when appropriate).

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1 General

This documents lists the various lines of inquiry possibly to be pursued in the Homeostat project. It mainly serves as a reminder to myself of the various open possibilities, as well as a document tracking the open tasks and the scheduling of jobs.

2 Specific lines of inquiry

2.1 Main philosophical point

2.11 Passivity versus activity as the basic interpretation of the Homeostat's operations

Various points to consider

- Freud's interpretation (*Triebe and Triebeschicksalen*) of drives ("pulsions") and the psychic apparatus's function as minimizing the incoming stimuli (the *constancy* principle, to see in the context of the pleasure principle) DONE
- Spinoza's doctrine of the *conatus*, recently reinterpreted (DiPaolo following Varela), as an alternative viewpoint to be considered and rejected.
- Jonas's criticism of classic cybernetics, and Varela's recover of a different kind of cybernetics (Ashby/British inspired) as escaping Jonas's criticism and being instead aligned with his philosophy of biology (i.e. teleologism) DONE
- Contingency as the twin brother of passivity (the passive is contingent, the active is teleological)

2.2 Technical/Simulations

- Redo (my own redo of) Ashby's seven experiments on the basis of the newly redesigned Homeo package (with Newtonian units, etc).
- Some experiments on connectivity on large-scale homeostats with n units to test Ashby's original hypothesis about low connectivity as necessary to stability (and necessarily mediated by the environment).
- Experiments on "biological" simulations with the homeostat. This will require input and/or output (motor) units. Thus, either a simulated environment (explorations needed) or an embedded Homeo package.

2.3 Theoretical explorations

Following the notes of 3/22-26/08, explore the Homeostat in more general term as a "differential machine" of sorts, i.e. as a simulator of various families of biological simulators distinguished by the differential equation descriptions of the basic unit.

3 Papers

This are very preliminary ideas on 4 papers to write on the Homeo experience (or perhaps it is 4 categories of papers, with at least (and at most?) one instance per class)

3.1 A semi-technical paper (*Constructivist Foundations*) describing:

- The reasons suggesting the development of a homeostat general simulator (i.e. the Ashby's renaissance, the strange convergence between very different strands of philosophy (Jonas's Phenomenology, naturalistic-inspired Phil of mind, AI, etc) around the Homeostat, as well as the generally "shallow" (from my point of view, of course) *overall* discussions of the Homeostat
- The package itself, emphasizing its very general approach as prerequisite to a broad range of experiments that start from Ashby's original experiences, but are meant to go beyond them
- The results of the replication of Ashby's experiments, perhaps a first sample of the DiPaolo-like experiments
- A conclusion on further work

3.2 A Non-Technical, but "heavy" philosophical paper (for *Archeo of AI*) *DONE*

- This is a paper expanding in much greater detail the first of the bulleted item in the semi-technical paper described above. The main focus is on Varela/DiPaolo revival of the Homeostat in the context of Jonas's philosophy of biology vs. a

different interpretation of the Homeostat as a fundamentally passive machine (a *machina sopora*) that actually forces a deep reconceptualization of the conception of passivity and the associate notion of the contingent

3.3 An application and/or study of the theses above to a real environment

- The move here is from a general discussion limited, at best, to Ashby's experiments as example of practical implementation, to a more concrete set of tests in "real" environments. The real environments could actually be "real real" (requiring real robots) or "real simulated" (requiring a simulation platform)

3.4 A discussion of a generalized Homeo platform for the exploration of various homeostatic "implementations"

- See **??** above. This of course can only be done after the actual explorations have been carried out.

4 Details

5 Work to do

5.1 General

1. Complete unit testing of Homeo Package
2. Carry out Ashby experiments
3. Explore robotic simulation packages DONE
4. Explore khepera packages DONE