ELECTRA REX

A Researcher Exchange Programme for Smart Grids

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WOC LABORATORY EXPERIMENTS USING BDI AGENTS AND CARTAGO ENVIRONMENT

Diego Issicaba*, *Member*, *IEEE*, Alexander M. Prostejovsky**, *Member*, *IEEE* and Henrik W. Bindner**, *Membe*r, *IEEE*

* INESC P&D Brasil, Rua José Caballero, Santos, São Paulo (Brazil).

**Center for Electric Power and Energy, Technical University of Denmark, Risø (Denmark)

ELECTRA introduced a grid control architecture, the so-called "Web-of-Cells (WoC)", with the paradigm to solve local problems locally, where the grid is split in cells which are connected through tielines and can span at multiple voltage levels. The concept itself copes with the agent modeling paradigm, so that the development of agent-based approaches to WoC proof-of-concept and validation is a field of research to be exploited.

In this collaborative work, Belief-Desire-Intention (BDI) agents have been modeled to operate on Syslab (see Fig. 1), which is a smart grid laboratory designed as a testbed to advanced control and distributed solutions to power systems. BDI agents have been implemented in JASON, while an agents and artifacts application [1] has been developed using CArtAgO, as shown in Fig. 2.

Fig. 1. Exchange researcher D. Issicaba at Syslab.

The research activities included: (a) familiarization with research facilities and infrastructure; (b) familiarization with Syslab coding, protocols, and applications; (c) definition of an agent control scheme using the WoC philosophy; (d) specification of experiments to test the scheme; (e) devising of preliminary experiments in Syslab;
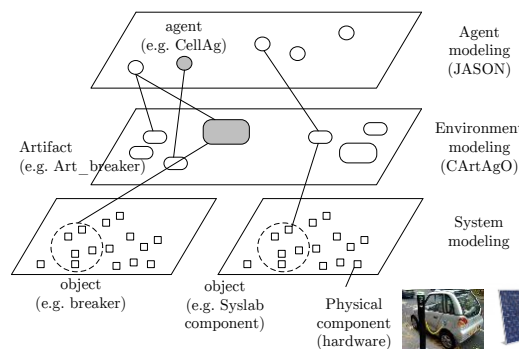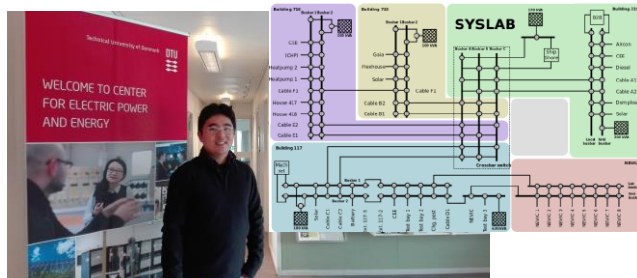

Fig.2. Implementation layers.

Experiments where a group of cells negotiate to control tieline power flow have been successful, even by emulating equipment failures. Future work will exploit the developed framework to validate other properties of the WoC paradigm.

REFERENCES

[1] D. Issicaba, "Block-Oriented Agent-based Architecture", PhD thesis, Faculty of Engineering of Porto University, Portugal, May 2013.