Agents for the Living-Room

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Abstract. Citizens will be spending more and more time in their apartments, especially in their living rooms. Modern agent technology will turn these living rooms into centers of information gathering, shopping, entertainment, learning and social activities with distant real and virtual characters.
The full version of this paper can be found on the World-Wide Web at http://www.ai.univie.ac.at/oefai/agents/ist98/

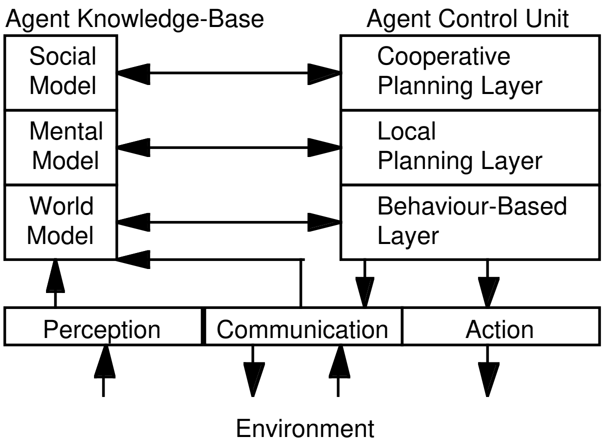
1. Motivation

The average citizen already spends several hours of her/his waking day in her/his apartment, especially in the living room. This is all the more true for people with special needs, especially the growing group of the elderly who are faced with difficulties in leaving their homes. While as of today their connection to the outside world consists mainly of the telephone and the TV set, agent technology will enable them to search and retrieve information, to receive personalized information updates, to shop, to learn in an entertaining way, to cultivate their own interests, and to interact with computer-generated partners. Furthermore, the living room is enabled through agent technology to take special care of the citizen by adapting temperature and light conditions, sensing her/his mood and responding with adequate choice of audiovisual stimuli.

What makes agents so different from standard software? Why are they a hot topic now?

2. The Advent of Agents

A twofold explosive growth is taking place in information technology: on one hand, *pervasive networking* is providing seamless access to geographically widely dislocated information of the most diverse kinds; on the other hand, an increasing *variety of sensors* is interfacing ever more tightly the physical world to cyberspace, thereby enabling monitoring of specific selected aspects of "real life". To exploit the possibilities offered by this new infrastructure to its fullest, a significant extension of traditional interfaces between the human and the computer but also between different information acquisition, storage and processing instances in the information infrastructure itself is being researched and implemented with the introduction of intelligent software agents [1,2,3].



InterRAP, an example of a hybrid layered software agent architecture (adapted from [4]).

Software agents are defined to be purposeful autonomous entities capable of communicating and dynamically adapting to changing requirements and opportunities. Within the infrastructure itself, dynamic interoperability shall allow the active reconfiguration of the network according to current requirements and the handling of appearance and disappearance of information sources of varying quality. On the user interface side, *intelligent agents* of different kinds will do largely away with the burden currently still placed on users, of having to continuously learn and re-learn irksome and idiosyncratic skills in order to be able to take advantage of a continuously expanding range of capabilities and services (which by themselves must be known/discovered first!).

3. Synthetic Personalities

Furthermore, we are witnessing rapid developments in the areas of *computer graphics*, *cognitive robotics*, and *virtual reality* technology. Realistic simulation of complex physical phenomena, including rendering of faces, hair and bodies that are indistinguishable from those of real humans, is getting within the capabilities of common information appliances, future TV sets and personal computers. *Synthetic characters*–endowed with broad knowledge, versatile skills, social competence, and emotional intelligence–are beginning to populate multi-user environments [3,5,6].

They can serve as personified interfaces allowing the exploitation of the rich, powerful and naturally acquired skills of human communication. At the same time, virtual actors provide a location in which to place knowledge and skills that free human users from having to tackle personally with every detail of a task and, to the contrary, can even empower users to benefit from results of uses of the information infrastructure beyond their own capabilities and knowledge. Finally, situated social agents and their virtual environments provide exiting new *social places* for traditional and novel pastime and working activities.

Tokimi, a custom Verbot™ synthetic character
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4. Agents into the Future

Designers of intelligent agents face a plethora of challenges. Their creatures have to be endowed with differing degrees of autonomy, sensing, acting and communication capabilities. Agents performing in open environments have to cope with partial knowledge and information subject to expiration. Visible personified instantiations in particular must pass the additional severe tests of persistent believability and comprehensibility, so as to be trustworthy and able to act in a truly cooperating, empowering manner.

Not least as a result of intensive interdisciplinary collaboration, the size of the available toolbox of conceptual models, techniques and tools is growing steadily, already enabling producers of film, video and edutainment to make use of this fascinating technology.

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