

A Framework For Automation Using Networked Information Appliances

MIT9904-05

Progress Report: January 1, 2000—June 30, 2000

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Project Overview

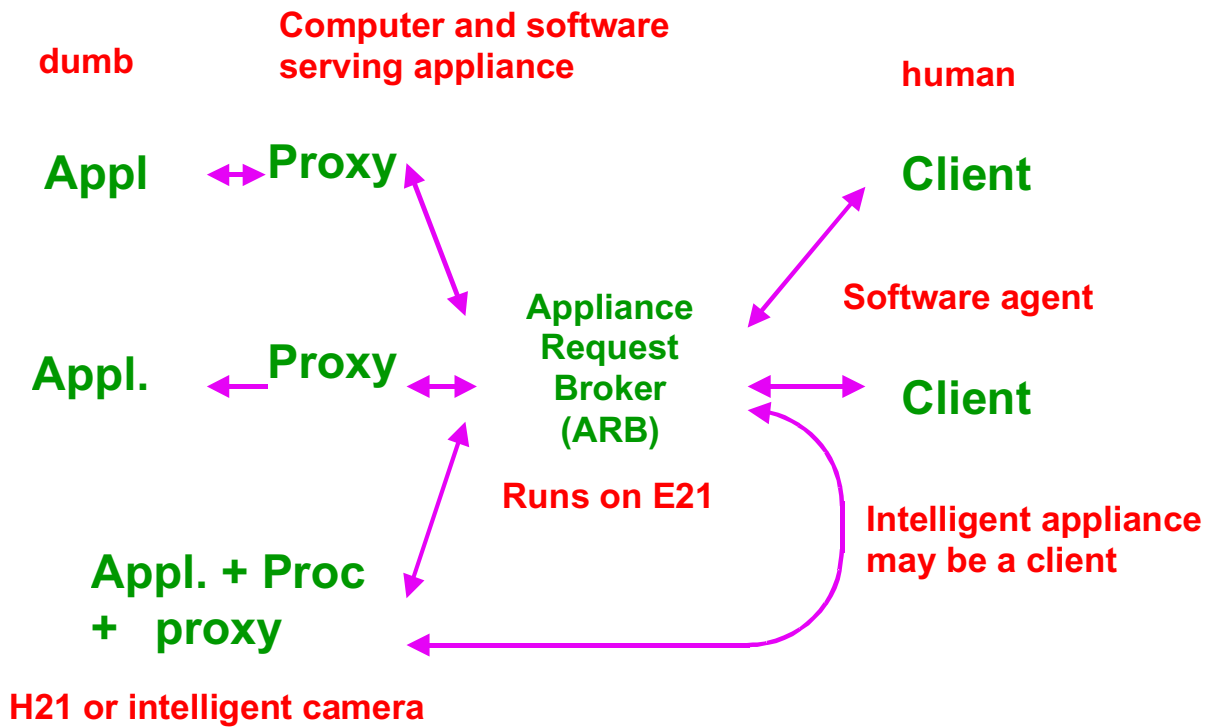
The proliferation of diverse and heterogeneous information appliances has produced a new set of problems, challenges, and opportunities. We are building a development infrastructure for information automation that combines the synergistic use of sensors, standard hardware interfaces, intelligent software, and adaptive algorithms in order to rapidly produce intelligent, networked information appliances. Using our infrastructure, we will automate many information-intensive tasks in office and home automation.

We are building a computing platform that consists of locally networked computational elements attached to sensors and actuators. The sensors provide image, audio, pressure or position input. The computers control actuators within appliances and also interface with other appliances. Not only is intelligent application software fully customizable and adaptable to user preferences, but it also makes use of our middleware that seamlessly integrates new custom or commodity sensors and actuators. This framework of computers, sensors and intelligent software allows for the rapid deployment of a wide variety of information automation problems. We believe that the deployment of such a solution should take no more than a week, including customizing hardware and writing software applications.

Progress Through June 2000

We have setup a networked Linux workstation with a speaker, microphone, infrared controller and camera, and are running our automation software on this workstation. Interface software to the speech server is almost complete, and input/output interfaces for the audio and video appliances have been written. Simple automation software that determines which number to call when calling a person from amongst his many numbers based on the person's schedule is operational. Full voice-based control of appliances that can be controlled by the infrared (IR) controller has been achieved.

We have built a lightweight infrastructure for networked information appliances based on an Appliance Request Broker (ARB) model. The system has four components: appliances, proxies, appliance request brokers and clients. They interact as shown below.



The proxy software is lightweight and can run on a Handy device, powered by a StrongARM processor or a MASC card built in our group. This is an important difference between our system and a system like Jini.

We have also built a communication layer using digital RF for wireless communication across appliances. So appliances in the network may be tethered or mobile.

Finally, we are in the process of finishing an automation layer that will run on top of the appliance network layer described above in the picture. Scripts will automate data transfers and interactions between appliances in the appliance network.

Research Plan for the Next Six Months

We will target applications such as intelligent navigation and intelligent Web/database search and implement automation scripts for these applications. Automation scripts will sequence through combinations of automation commands while interacting with the user to perform complex tasks. The automation software will first be tested and debugged on a Linux workstation, and then on MASC cards.