AMIGO

Scope

Today's average household consists of several electronic systems such as televisions, refrigerators, personal computers, personal digital assistants and music systems. All these devices operate independently from each other. In the vision of the networked home environment, these devices can communicate with each other in an intelligent manner. In such a futuristic home, for example, the refrigerator may communicate with the TV to warn the viewer that the door has been left open. Another example is that the ambient lighting might change automatically for movie watching. Several challenges have been hampering development in intelligent networked home environments, such as lack of interoperability between different manufacturers' equipment and the lack of compelling user services.

Amigo provides a platform and building blocks for technologically advanced home environments. This platform gets all networkable devices and services in the home to communicate with each other (Figure 1). It overcomes interoperability issues by using a service-oriented architecture, Web services and protocols such as Universal Plug and Play (UPnP). Semantic interoperability is ensured through ontology definitions that enable a common understanding between the interacting devices.

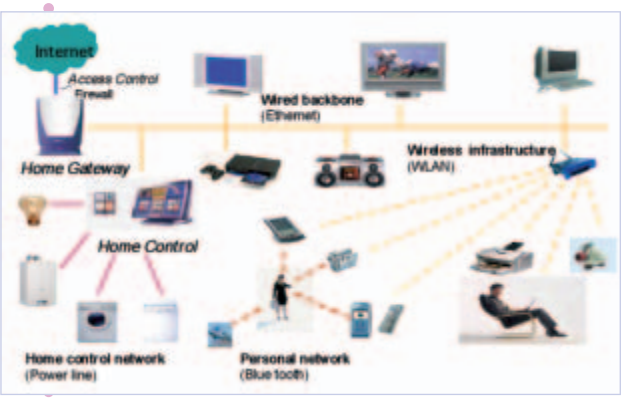

Figure 1: Amigo networked home environment

Advances

The Amigo architecture contains a base middleware layer, an intelligent user services layer, Amigo-aware applications, and a programming and deployment framework (Figure 2). The middleware layer and the user services layer provide the functionalities needed for a networked environment and an ambient in-home network, respectively. Amigo-aware applications and services form the top-layer of the architecture. The programming and deployment framework allows developers to create these applications and services. The interoperable middleware operates across different application domains and across different homes and environments. This flexibility of the architecture ensures that the system can grow, as and when new devices and applications are added. Furthermore, the Amigo software is open source, which encourages further development of the system.

Figure 2: Amigo Architecture

The Amigo service-oriented architecture enables the development of software as services that are delivered and consumed on demand. Existing protocols for discovery and communication are supported in an interoperable way. This allows programmers to select the protocol of their choice while they can still access the functionality of services that are using different methods.

A suite of applications on top of the Amigo platform shows the potential for end-users and the benefits of the architecture for application developers. These include a comfort management system that maintains environmental conditions adapted to user profiles, different zones in the home, and the time of the day. Another example is a health management system that offers people in-home health monitoring and coaching. Using a personal device - a mobile - in somebody else's home network for using the services in one's own home is another possibility.

Amigo applications show the move ahead towards realisation of a future where homes adapt to user behaviour. For example, doors are locked when someone leaves, and relatives or emergency services are contacted when someone is ill. The applications also allow sharing of information and experiences in an extended home environment, thereby enabling the use of tele-presence applications to communicate and interact socially (Figure 3). These applications use standard protocols that are widely used, such as wifi, Ethernet, and UPnP. Most of the applications are web-based, that is, any device with a web browser can connect to the Amigo network and users can easily interact with the home devices.

Figure 3: The Extended Home Environment applications provide end-users with services that enable them to share activities and experiences in an easy and personalised way. For example, parents who are on a business trip can still share daily activities with their children at home, tell them their bedtime stories, watch TV together, look at pictures or play a game with them. That is, they can share their presence independent of location and devices, for example, using TV with PC, TV with TV, or mobile with TV

Positioning in global context

Separate islands of Internet, mobile, CE broadcast and home automation that don't work together, currently exist next to each other. These proprietary vertical implementations are easy to market, but inhibit a wider acceptance by consumers as complex installation, operation, service and maintenance problems are induced. Installation of separate products is quite easy, but installation of networked products is hard. The Amigo project made a significant progress towards providing interoperability over devices, networks and services and making the installation easier for users. Amigo achieved this by means of automatic device and service discovery, and by creating flexibility and sustainability for a gradual roll-out and incremental build-up of customised home networks. The Amigo infrastructure and open source software enable the development and flexible implementation of a wide variety of innovative services, applications and products for the digital home. Current proprietary systems cannot provide this.

Contribution to standardization and interoperability issues

First of all, Amigo shows standards in action. The focus is on Open Source development, which supports open standards and promotes interoperability and interaction between systems. The components of the Amigo Service Oriented Architecture support Universal Plug and Play, OSGi, and Web Services. The Digital Living Network Alliance standard is used to achieve multimedia interoperability in the base middleware. Results from Amigo are incorporated in a draft proposal for a Web-based protocol and framework for Remote User Interface on UPnP (Web4CE) and remote display of User Interface for third party devices. This enables a wide range of UI capabilities for TVs, mobile phones and portable devices.

Target users / sectors in business and society

The main target users are designers and developers of services and applications and third-party developers in:

- telecommunication, multimedia, informatics and consumer electronics convergence,
- home automation and security, such as energy suppliers, household appliances, security and surveillance enterprises or health and assistance service providers, and
- Internet service providers and entertainment companies.

Overall benefits for business and society

Application designers and developers can build applications very quickly by just using a subset of the Amigo platform, having the possibility to gradually extend the applications with the tools that they are most familiar with. This is particularly effective for building showcases, for customisation, and for transfer of knowledge and technology to different businesses and domains. It also facilitates effective knowledge transfer to SMEs and technical training of young professionals for the digital home domain.

Achievements

- Software framework and components, available as open source software, and supported by extensive tutorials and software developer's guides.
  - o Interoperable middleware for integrating resources from CE, PC, mobile and home automation domains.
  - o Building blocks for making applications context-aware, personalised, multi-modal and privacy-aware.
  - o The .NET / OSGi programming framework to support developers to write their application or component software in a fast, easy and effective way.
- Amigo suite of applications
- Amigo modular training program for industrial and post-graduate learners
- Amigo usability work on user needs and user requirements methodologies.

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