

Presentation of the SIMILAR network of excellence

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The SIMILAR network

SIMILAR is a network of excellence integrating a research task force on multimodal interfaces. Funded by the 6th framework of the European Community since December 2003, SIMILAR was created for a duration of 4 years with to give a large momentum that will ultimately be able to sustain itself in the long term.

Merging 32 excellent European laboratories in Human-Computer Interaction (HCI) and in Signal Processing in a single research network, SIMILAR sorted the vast multimodal interfaces research area in 8 principal sub-domains. SIMILAR members active in these sub-domains are working together in special interest groups (called SIGs) focusing of these specific aspects.

The first three SIGs deal with the theoretical aspects of multimodal interfaces: multimodal signal processing, fusion and fission of modalities and context-aware adaptation. One group, dubbed OpenInterface.org, is designing a set of open source common software platforms that will provide an easy access to the various building blocks developed within the network and even outside. One group will focus on the usability problems: assessment of interfaces efficiency in various practical and theoretical contexts. The last three groups are working closer to the end-users of those new interfaces. We decided to focus on three vertical domains: the

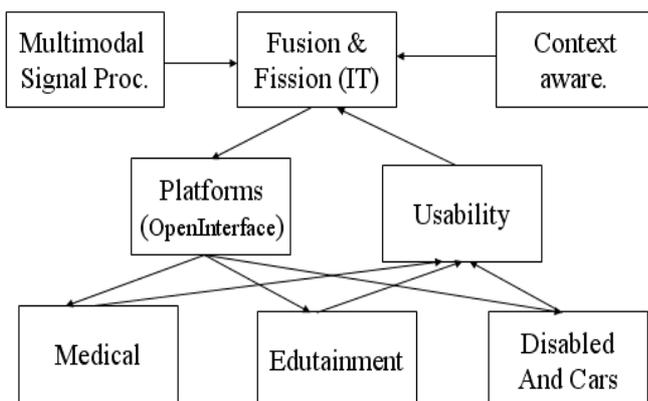


Figure 1. SIMILAR principal sub-domains of research

medical imaging one with a special attention to surgeons in operation rooms; education and entertainment, immersive interactive environments in museums, etc. ; and disabled people and in general, people unable to use one or several of their natural communication channels.

We have a long term vision of a world with more natural, intuitive interaction between man and machine, *SIMILAR* to the human behavior by adapting themselves to their surrounding context.

In this future world, SIMILAR will have solved a number of grand challenges involving speech, gestures, vision, haptics and direct brain connections. For example, creation of an interface machine enabling communication between blind and deaf people.

The partners

The SIMILAR institutions are spread all over Europe and were chosen for their skills and excellence in signal processing, in human-computer interaction or both. From Senegal to Finland and from Canarias to Saint Petersburg, SIMILAR is covering the Europe at large and even a little more. The taskforce gathers 32 research institutions and has more than 20 privileged contacts in the industry, large companies like EADS-airbus or small SMEs active in the multimodal interfaces business.



Figure 2. SIMILAR on the map

The network is managed by an elected steering committee and a permanent office based in Louvain-la-Neuve, Belgium at UCL, Université Catholique de Louvain. All SIMILAR details are available on the web at www.similar.cc.

Multimodal interfaces

Human-Machine dialogue is not an easy task. The humans are by nature used to communicate through various channels like speech, gesture, drawing, writing, reading, giving and receiving objects and artefacts, etc... and most of the time they use several of those modalities at the same time or in sequence, with or without synchronisation between them. Mimicking real human behaviour is thus very difficult for a machine, even for the most "intelligent" computers.

SIMILAR is addressing the problem by segmenting it in smaller and more easily addressable challenges. Let's take the medical imaging in operation rooms as an example : the surgeon has both hands occupied and need to use his eyes to look at his hands and to coordinate his movements. The medical imaging computer's task is to present cat-scan images to the surgeon with the least possible disturbance. Control of the computer may be done by voice commands interpreted and answered with a synthetic voice. The cat-scan images requested may be presented to the surgeon by semi-transparent glasses displaying images of the operated organ with a perfect registration with the line of sight. Of course, this implies that the computer is aware of the exact position of the head and of the gaze direction of the surgeon. This can be provided by a set of sensors on the glasses or by a shape recognition software connected to stereoscopic cameras. From the software point of view, all of this is not an easy set of tasks. And when you want a computer able to switch from one modality to another according to all possible changes in the environment, things become even more complicated...

SIMILAR objectives

The main goals of the SIMILAR network is to make significant progress in the eight research domains described above and to fuse all the partners labs in a large more efficient European network of excellence. But SIMILAR has also several secondary objectives:

- SIMILAR will develop a common theoretical framework for fusion and fission of multimodal information using Signal Processing tools constrained by Human Computer Interaction rules. This framework is seen to be the most important and the most visible contribution of SIMILAR to the multimodal interfaces research community. This initiative is known as

OpenInterface. The public side of OpenInterface is available through www.openinterface.org

- SIMILAR will develop a network of usability test facilities. They will be installed in partners labs all around Europe. Such multimedia test facilities are already in use or under construction at NISLAB, Denmark, UCL, Belgium and EPFL, Switzerland.
- SIMILAR will manage an international journal, special sessions in conferences such as SPECOM, summer schools, interact with industrial partners and promote new research activities. Our first summer school was held in July 2003 in Belgium in collaboration with the BEST European organization. Over 70 multimodal interfaces related papers have already been published as well as the first two books in the SIMILAR collection. Most of the papers are freely accessible on the Internet and the books may be downloaded for free or purchased in paper copies through the Web; details are available on the SIMILAR web site.
- Within several years, SIMILAR will address a series of grand challenges in education and entertainment, disabled people and medical applications and will develop new interfaces for environments where the user is unable to use his hands, like in surgical operation rooms, or in cars.

What is OpenInterface ?

OpenInterface is a general specification for multimodal interfaces geared to solve interconnection problems between hardware and software from heterogeneous origins devised, developed and maintained by the SIMILAR researchers.

Goals

OpenInterface main goals are:

- To avoid redundancies in common tasks during multimodal applications development (e.g. data formats support, usual audio/image/video processing algorithms,...);
- To allow for an easy integration between various modules using the same SimilarPlatforms specifications;
- To become a common platform that will let any partner focalise on his work and not on tasks already accomplished by others (e.g. image reading, FFT transform, ...);
- To integrate finished modules into the OpenInterface library to facilitate his deployment.

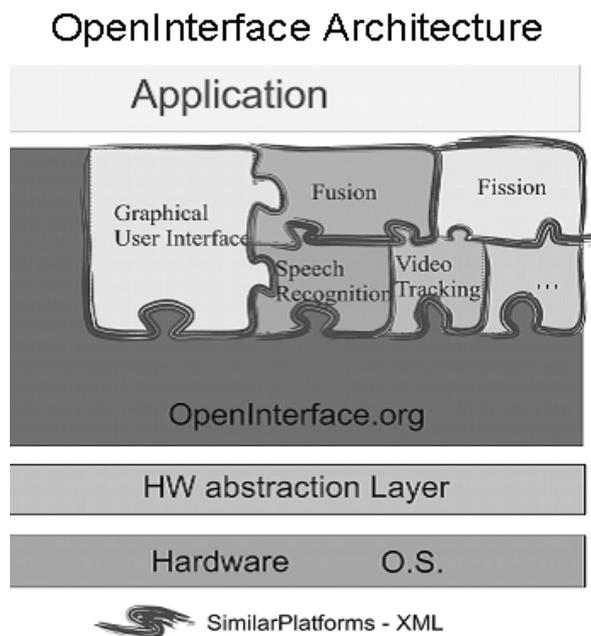


Figure 3. SIMILAR OpenInterface Architecture

SimilarPlatforms

SimilarPlatforms will be described in a Mark-Up Language such as XML. Each platform will contain descriptions of the hardware and software libraries needed for a particular device, group of devices or interactive application. These description-based platforms will not put obstructive restrictions on the connections between researchers and between the external world and the public part of SIMILARnet.

Framework

The OpenInterface framework is based on a C/C++ plugins architecture. It will provide the ability to connect various codecs, filters and other multimodal functionalities needed by the multimodal interfaces developers and will present a common API to write complete applications using the various plugins.

The plugins will be linked and arranged in a pipeline. This pipeline follows the data flow. Pipelines will be editable with a GUI (Graphic User Interface) editor and saved as XML (using the SimilarPlatforms description) so that pipeline libraries can be compiled with a minimum of effort.

OpenInterface uses the SimilarPlatforms specification (described in XML) to store and load its pipeline definitions. SimilarPlatforms-XML is also used internally to manage the plugins registry. The plugins registry is a reference file that contains all the plugins definitions known by OpenInterface. This reference file will be published online to give quick access to the plugins' details.

OpenInterface will be accessible under an OpenBSD-like license. That will allow anybody to integrate modules with the license they want, even

closed licenses (the module will be provided only in binary format).

Users

OpenInterface is planned to serve three levels of users: developers, application designers (AD) and end-users. Specifically, as soon as a new plugin with a specific functionality is coded and compiled according to the specifications of the framework (as a DLLs for example), it will be immediately available for ADs who will design a custom built program for the end-users. ADs will not have access to the source code of the plugin but to all of its functionalities, the binary executable code being available as freeware.

Conclusion

After less than one year of existence, the SIMILAR Network of Excellence is already seen by many as a single entity and not a collection of separated, loosely coupled group of human interface research labs. Connection with the industry by the way of usability labs and a growing number of researchers exchanges between the SIMILAR actors from the signal processing and the human-machine interaction communities are the first visible integration steps taken by the network. SIMILAR branded publications, conference papers, workshops and special sessions in international conferences are strengthening the internal network cohesion and reinforce its visibility to the outside world.

We believe that the wide acceptance of the open-source OpenInterface will be a key factor for SIMILAR success reducing the gap existing actually between human computer interaction creators and the signal processing community. It will make participation and contribution of external partners more easy and more attractive by filling the gap between developers and end-users inside and outside the SIMILAR network community.

The OpenInterface initiative is mainly driven by FPMs, Multitel and UCL-Tele (Belgium), ITI/CERTH (Greece) and CLIPs-IMAG(France) but all SIMILAR partners are involved in the project.

Internet links

<http://www.similar.cc>

<http://www.openinterface.org>

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