

Project Results

Improving human-system interactivity

Developing a natural approach to new-generation interface technology



Putting interactivity in context will simplify systems use

The ITEA 2 EASY Interactions project has developed more natural ways of interacting with complex systems to provide an intelligent and semantic access to information and services as demonstrated across a wide range of domains. By integrating cutting-edge natural-language processing techniques and machine learning with domain ontology, it is now possible to carry out content and information mining at the semantic – or meaning – level. Existing user modelling methods were extended by specific methodologies for the semantic analysis of content.

Current devices for human-system interactivity – such as the computer mouse, keyboards, joysticks and display screens – are no longer able to cope with the growing complexity of computer-based systems. It is therefore necessary to move to more pervasive human-system and human-environment interaction paradigms – a major challenge for systems developers.

EASY Interactions focused on developing more natural ways of interacting with systems using new technologies involving eye/head tracking, gesture analysis, speech recognition and synthesis, natural-language

processing and understanding, spoken dialogue, three-dimensional (3D) video systems, and 3D and multi-display devices. The result is enhanced and personalised human-system interactivity applicable in many domains.

ADAPTING TO USER AND SITUATION

The ITEA 2 project focused on how to adapt interaction to context and behaviour of users and the situation. For example, there would be no point in providing speech synthesis in a noisy environment; using gestures and voice in a combined way improves the solution robustness for non-controlled environments. This meant taking into account all sources of context as soon as a sensor exists, as well learning user behaviour and adapting services and user interfaces.

EASY Interactions developed both a context-management framework and a multimodal engine to deal with the different inputs linked to the context-management framework. The resulting double framework was used in a series of demonstrators, covering mainly professional applications.

OPEN-SOURCE MULTIMODAL ENGINE

EASY Interactions has developed a number of sub-systems. These sub-systems are:

- **Human System Interaction components.** The new generations of user interfaces involved are voice recognition, gesture recognition, vision-based localisation and multimodality between voice and gesture recognition.
- **The Context Management Framework (CMF)** deals with the context sources, recapping and processing this data and providing context information that will facilitate a more accurate multimodal decision.
- **The Multimodal Engine (MME)** is a platform which is able to provide to the final user a better way to interact with applications taking into account the context, the user and the application information.

EASY Interactions (ITEA 2 - 06009)

Partners

AIDICO
 Alcatel Lucent Bell Labs
 Cassidian
 CEA-List
 CREATIV IT
 IDEAN Research
 Martec
 Philips CL I-Lab
 Robotiker-Tecnia
 Sisteplant
 Telefónica I+D
 University of Jyväskylä – Cognitive Science
 VECSYS

Countries involved

Finland
 France
 The Netherlands
 Spain

Project start

October 2007

Project end

July 2010

Contact

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Project Results

These components were used in 7 demonstrators, covering professional and general public applications.

The objective of establishing a multimodal framework applicable to several domains required a broad industrial partnership. And, as some of the technology – such as speech recognition – is linked to language, it needed to be proved across several languages. A European consortium offered the best way of meeting these requirements – and also enabled sharing of information across many domains.

TECHNOLOGY PROVIDERS AND USERS

Partners included both those with the necessary technologies – such as Robotiker, which offered video gesture solutions, CEA-List video-based localisation expertise, Telefonica and VECSYS as speech-processing specialists, CREATIV IT and Cassidian with mobile applications expertise, Philips Innovation Labs 3D display solutions, and Alcatel-Lucent Bell Labs on context-management system. Usability studies were carried out with the help of University of Jyväskylä and IDEAN Research.

New technologies emerging from the project included:

1. The development of geolocalisation technology based on image processing;
2. The improvement of speech-recognition systems to handle tougher

conditions such as noisy environments with improved algorithms to provide a technology that works for all rather than having to tailor systems for each individual application; and

3. The improvement of 3D machine vision algorithms for better performance and robustness.

DEMONSTRATING ACROSS SEVERAL DOMAINS

A series of applications were developed and demonstrated, Sisteplant and AIDICO were interested in using the results for factory and construction domain applications, Cassidian for the public safety domain, Martec for the transport domain, Alcatel-Lucent, Philips and Telefonica for the home domain.

A 3DTV home multimedia application controlling video and picture content on screen is already being commercialised but the other applications are more midterm.

An important goal was to accelerate the introduction and widespread application of new-generation user interfaces. The EASY Interactions open-source multimodal engine can be used by other projects and companies. And involvement of small and large enterprises during all phases of the project will guarantee the penetration of knowledge into industry and the spread of the EASY Interactions technology throughout Europe.

Major project outcomes

DISSEMINATION

- 32 conferences
- 3 workshops and participation to 8 events
- 35 papers published, 5 newspaper articles and 1 book under preparation "Foundations of interaction design."
- 4 presentations at international user events
- 1 public technology state of the art document
- 1 public web site with all demo videos and results: <http://www.itea2-easy-interactions.org/>
- Open source code: <http://multimodalengin.sourceforge.net/>

EXPLOITATION

- 7 demonstrators
- 6 products (2 for internal use)

PATENTS

- 1 patent: Improved ASR performance in a noisy environment. It especially has improved the ability to distinguish the user speaking from the environmental noise.

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■ ITEA 2 – Information Technology for European Advancement – is Europe's premier co-operative R&D programme driving pre-competitive research on embedded and distributed software-intensive systems and services. As a EUREKA strategic Cluster, we support co-ordinated national funding submissions and provide the link between those who provide finance, technology and software engineering. Our aim is to mobilise a total of 20,000 person-years over the full eight-year period of our programme from 2006 to 2013.

■ ITEA 2-labelled projects are industry-driven initiatives building vital middleware and preparing standards to lay the foundations for the next generation of products, systems, appliances and services. Our programme results in real product innovation that boosts European competitiveness in a wide range of industries. Specifically, we play a key role in crucial application domains where software dominates, such as aerospace, automotive, consumer electronics, healthcare/medical systems and telecommunications.

■ ITEA 2 projects involve complementary R&D from at least two companies in two countries. We issue annual Calls for Projects, evaluate projects and help bring research partners together. Our projects are open to partners from large industrial companies and small and medium-sized enterprises (SMEs) as well as public research institutes and universities.



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