Editorial

The aim of this newsletter is to inform scientists, industry as well as older people in general about the achievements reached within the HERMES project. The newsletter appears approximately two times per year.

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- User Interaction with the HERMES System
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Please do forward this newsletter to people that might be interested in the project! For more information on the project, take a look at the project website at http://www.fp7-hermes.eu.

Kind regards and enjoy reading!

Arjan Geven
On behalf of the HERMES Consortium

HERMES at the AAL Forum '09

From the 29th of September to 1st of October 2009 the AAL FORUM 09 took place in Vienna at the famous Hofburg with the involvement of over 500 participants. It was the kick-off event of the international conference series of the AAL Joint Programme and served as an information and discussion platform for stakeholders, researchers, companies and users in Europe.

The thematic priorities of the first AAL FORUM 09 were national and European AAL activities, R&D and innovation projects, economic aspects of the Joint Programme, the third AAL call for proposals as well as key questions of the further development of the AAL Joint Programme.

HERMES was represented at an exhibition stand with various information materials. CURE researchers answered the questions of the participants during the event. The first prototype was also available for visitors to see. The project saw great interest with over 200 flyers being handed out at the first day alone.

User Interaction with the HERMES System

The efforts to integrate the different components developed by various consortium members were successful with the interfaces for the applications being operational. All components, from face recognition to textual transcriptions, to database abstraction layers using XML notation are now integrated and are able to communicate properly.

Even if this integration accomplishment is a milestone in the project, the user should not be exposed to any of these technological components, but rather interact with intuitive user interfaces that support the user's cognitive needs:

- Day and activity planning with *MyFuture*
- Episodic Memory and conversation support with *MyPast*
- Cognitive Training with *Cognitive Games*
- Mobility support with the *PDA application*

Videos showing the interaction with the various systems will be made available on the HERMES website under http://www.fp7-hermes.eu.

These interfaces are currently being evaluated with end-users in order to further iterate them based on user feedback.

Day and activity planning – *MyFuture*

The front-end application for day and activity planning allows users to manage their future appointments. It allows browsing of the events stored in the HERMES database and to create new entries easily. Event data is shared between the mobile and the stationary application.

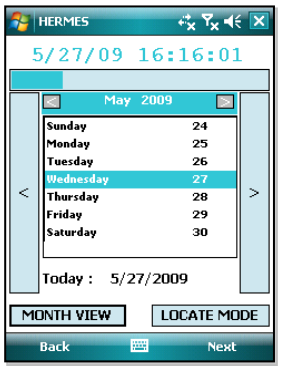
Cognitive Games

The cognitive games in the system are represented by the puzzle game, where pictures from daily life are used to play games. Using multi-touch interaction, the user interacts with pictures of daily life and thereby gets ambient support for episodic memory and at the same time trains memory for these kinds of activities. Other games are developed during the course of the project.

Episodic memory - *MyPast*

The MyPast application allows users to browse all the information stored by the system. This includes all video and audio recordings and text transcripts of talks. To make finding of items easier

Mobile (PDA) Application



The mobile application gives mobile access to all calendar data. It also features GPS based location detection.

Events which are entered in the mobile application are also available in the application that runs on the home computer.

Audio and Visual Processing Components in the Hermes System

The components that form the back-end and feed the before-mentioned front-end applications are the backbone of the HERMES system.

The back-end components consist of both audio and video technologies as we as processing components that deduce information from the gathered low-level data as described below.

Video Technologies and Processing Components

- **Face Detection and Validation**: This module scans the video frames from all available cameras and attempts to detect the actual faces of users in the in-door environment. At the same time it tries to avoid false alarms that may be generated from objects in the background by making use of colour and position constraints.
- **Face Identification**: This component processes the cropped images generated from the face detector and attempts to recognize the face contained therein. Facial data is stored in the database of faces from known users/actors.
- **Visual Person Tracking**: The tracker processes incoming video frames to determine how many participants are present in the HERMES room and records their individual tracks across time. This subsystem must cope with problems like merging, splitting and even overlapping targets.
- **Identity Tracking**: The tracking subsystem is integrated with the face detection an identity tracking system. This reports the number of people and their identities to the HERMES database, and enables or disables video recording based on the presence of people in the monitored room.
- **Hand and Fingers Tracking**: This module is of paramount importance for the operation of the HERMES cognitive games on the multi-touch (finger tracking) and mixed-reality table-top (hand tracking) surfaces. Hand and finger trajectories are maintained and analyzed to provide the input for the interface of the cognitive games.
- **Video Annotation and Summarization**: This perceptual component processes long streams of pre-recorded video and produces a list of pertinent meta-data (tag annotation). Additionally a shortened version of the video recording is also created, which contains the most important events of the full recording.

Audio Technologies and Processing Components

- **Speech Transcription**: This module scans audio recordings from individual microphones and converts audible discussions into a textual representation that is stored in a database. Additionally, the transcription is analyzed and tagged with pre-determined keywords that allow for faster search and indexing.
- **Speech Transcription with Noise Reduction**: This component combines input from multiple microphones in order to generate a more clean speech signal. When analyzed this signal can provide more accurate textual transcriptions. Ambient noise is filtered out through the use of techniques like “Beam Forming” and “Direction of Arrival” (DOA) estimation.

- **Speaker Tracking**: This subsystem analyzes conversations between multiple people to determine when the current speaker changes. It can also determine who the current speaker is (speaker identification) and discern non-target speakers (i.e. those that are not already registered in the database of persons).
- **Speaker ID**: This module processes speech segments belonging to a single individual and attempts to match their voices to a database of known users. It is possible to combine more than one microphone to enhance the identification accuracy.
- **Emotion Detection**: This perceptual component attempts to identify the underlying emotions in a person’s speech. For differentiation it uses a “neutral” voice

tone based on pitch and other spectral characteristics.

- **Acoustic Localization and Tracking**: This subsystem attempts to identify the locations of people based on information from their voice and by performing a "Direction of Arrival" (DOA) estimation. As long as a person keeps talking while moving, their "trail" can be monitored using multiple microphones spread around the smart space. This provides robust location estimations in the 3D space.
- **Voice Activity Detection**: This module processes sound coming from one or more microphones in the smart space and attempts to differentiate between ambient noises (i.e. people walking around, coughing or keyboard sounds) and actual speech generated by the people present in the room.

Focus Groups on Cognitive Games

In the field of Cognitive Games, two focus groups have been held. The first one was an expert group composed of 6 neuropsychologist who were invited in order to provide their opinion on cognitive games in general and on HERMES cognitive games in particular. This group emphasizes the relevance of the following points:

- Materials should be included that are related to the user's daily life. In this respect they pointed out that the HERMES system will be useful even for their own stimulation programs at centres for disabled people.
- To ensure that the system is easy to use and easy to install.
- To make explicit which cognitive process is being stimulated promotes sense of safeness in older gamers.
- Feedback provided to the users should include both score and more graphical representations. Aggressive feedback, such as "mental age" scores, should be avoided.
- Concrete suggestions about the game proposed (e.g. to use a city map in the maze games in order to stimulate orientation).
- The participants think that it can be interesting to give a score at the end of the game. Still they do not want to receive their "brain age" as some of the current games do.
- The most preferred HERMES games are the Maze Game and the Monsters Maze Game. The participants think that these are very interesting and entertaining games and also recognized that they can help them to stimulate their cognitive skills.

According to the participants in this group, "My Who is Who" game is the most useful one. In the second phase, the user-target group (composed by seven elderly people) was invited to assess the games' usability and subjective value by means of a focus group. The main results of this focus group were:

- The main reason because they do not play the games is because the games are very difficult and fast for them, because their movements and reaction speeds are slower than those of younger people.
- Their reasons for playing the games are to train their cognitive capabilities and for personal satisfaction and entertainment.
- They think some changes are necessary to adapt the computer games to their needs and characteristics (e.g. poor vision, slow movements, etc.).
- They propose easy games that include a scale complexity and a tutorial program so they know what they have to do.
- They feel frustrated when they cannot reach the highest level of the difficulty in the game.

Most of them preferred the intellectual games and are dismissive of violent games.

HERMES Field Trials nearly finished

The deployments of the HERMES system at the Austrian and Spanish trial sites were successful, after which the field trials have been started in order to get direct user feedback for the different system components. 32 participants in the two countries have been

invited to gain insights into how effective the systems are in functioning in the targeted memory aid areas. The components of the HERMES system that are tested are the MyPast and MyFuture applications on the home-based touch screen terminal, the PDA application on a PDA (which users were allowed to take home in order to facilitate longer interactions), and the cognitive games.

Another important aspect of the field trials was to find out if the attitudes of elderly towards technology and computers in general are positive or negative and whether they would like to use the HERMES system in their daily life.

The results of these trials are important to further refine the system, identify potential weaknesses of the current prototype and to see how and if the system needs to change to be accepted by the elderly.

About the HERMES Project

"HERMES – Cognitive Care and Active Aging" is an international collaboration between six organizations in six countries, aimed at providing cognitive care to combat general cognitive decline induced by aging. The project is supported by the EU under Framework Programme 7 (Ref: 216709).

The project is conducted by the following six organizations:

1. CURE – Center for Usability Research and Engineering, Austria (Coordinator)
2. INGEMA Foundation, Spain
3. IBM Haifa Research Lab, Israel
4. University of Bradford, UK
5. Athens Information Technology, Greece
6. TXT e-Solutions, Italy

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