# Hearing assistance comes to the home (w/ Video)

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(PhysOrg.com) -- European researchers have combined state-of-the-art technologies to help end the isolation suffered by the hearing impaired. End users are eager to get their hands on the suite of tools.

The number of people suffering from hearing impairment is increasing, and as the disability grows it spreads isolation in its wake. Vision is the primary sensory system for navigating the real world, but sound is the mainstay of our social sphere.

When people start to lose their hearing they slowly begin to withdraw from the world. Conversation becomes difficult and confusing, as sound begins to smudge in the auditory cortex, like ink blotting on a page.

Worse, it is one of the few disabilities that the victims can conceal successfully, and they do. Embarrassment typically causes people to delay seeking help, often for years.

“The average person who begins to lose their hearing typically waits seven years before seeking help,” explains Jochen Meyer, coordinator of the Hearing at Home project, alias HaH. “We wanted to do something to help those people.

## Your TV hearing aid

‘Doing something’ consisted of combining some state-of-the-art technologies into a single system that can be easily integrated into the

average home, where people, including the hearing impaired, spend most of their discretionary time.

This approach not only tackles some of the real and possibly life-threatening in-home difficulties experienced by the hearing impaired, it also introduces them to assistive technologies in a controlled environment.

“So our idea was to move the hearing aid closer to people’s every day life,” Meyer reveals. The HaH team hopes this will help overcome the typical resistance to technology like hearing aids; when users experience the power of a hearing aid they become much more open to it.

In the HaH system, the technology centred around the television, because it tends to be the most frequently used piece of technology in the house, and as the sound and vision centre of most homes, it lends itself to an assistive role.

## Tuned to specific impairments

The heart of the HaH platform is the Set-Top Box (STB), which links hardware around the house, routing the assistive technologies through the TV. These include acoustic technologies, home automation and phone integration.

The system is easy and fast to set up. "Typically, when you go to an acoustician for a hearing aid fitting, you go through a complex testing process to tune the hearing aid to your specific impairment,” Meyer explains.

The acoustician is testing a wide range of frequencies to determine those that pose the greatest problem to the user. Tuning then consists of boosting some frequencies, and suppressing others, to maximise sound

clarity.

“With our STB, the user can go through this test, by themselves, in 10 minutes,” explains Meyer. When the user watches TV, the sound is adjusted on the fly to match their needs. The STB can also suppress background noises from the audio stream.

“If you are watching a documentary about traffic, traffic noise could drown out the narrator. The HaH platform can suppress that traffic noise in real time,” says Meyer.

If there is a phone call, an alert appears on the TV screen, and the conversation is routed to the handset via the STB, so the audio is optimised for the user. It can also handle video calls via voice-over IP (VOIP).

Similarly, there is an alert, and a CCTV picture, if a caller comes to the door. “That’s important, because you don’t want to miss any visitors, it just adds to the isolation,” emphasises Meyer.

The system also links to other parts of the house, such as the washing machine or microwave or the cooker. Any alarms, such as a fire alarm, appear instantly on the screen.

## Talking heads

Finally, the team also created an avatar, an animated talking head, which accurately lip-syncs with any audio coming from the television, so users can lip read if necessary. “This is processed locally, using the data coming from the audio signal to create the lip movements on the avatar.”

The project took a comprehensive approach to many of the problems faced by the hard-of-hearing, dramatically extending the state of the art

in several domains.

“Many of these technologies already existed, and we simply combined them into an integrated system that responds to real needs,” Meyer notes, “But many of them we extended, too.”

For example, research on acoustic tuning for hearing aids is very basic, and HaH worked on this so that users can now perform the tuning automatically.

## Excited end users

The technology has drawn intense interest from industry and academic peers, but the greatest eagerness encountered by the team comes from the end users.

“We spent a lot of time looking at these technologies, at how they could work together to help the hearing impaired with real-world problems,” stresses Meyer. That careful groundwork paid off.

“We have two demonstration sites, in Oldenburg, Germany, and Madrid, Spain, and the feedback we get from the hearing impaired is very encouraging,” Meyer explains. “They are very excited by the technology, and they really want to get it for themselves or loved ones.”

Industrial contacts, too, are interested, and talks are ongoing. “But I think we could see a commercial version of this platform available in the next two to three years.”

In the meantime, the team is currently considering other areas where the technology could be applied and extended, and the partners are looking at new projects under the EU’s current Seventh Framework Programme for research.

**More information:** www.hearing-at-home.eu/

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