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No longer lost in translation

By Jennifer Bails
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An increasingly globalized world became even smaller on Thursday when Carnegie Mellon University and German scientists unveiled technology that makes it possible to speak one language, yet be understood in another.

Although this speech translation system is probably a decade away from commercial availability, it has the potential to topple the Tower of Babel by bridging the language divide between countries and cultures, said CMU computer science professor Alex Waibel, who directs the International Center for Advanced Communication Technologies, or interACT.

"This is a bit science fiction, but it's clearly a vision we think is very exciting," Waibel said as he demonstrated a prototype of the translator during a videoconference viewed on the CMU campus in Oakland and at the University of Karlsruhe in Germany. Launched in 2004, interACT is a multimillion-dollar joint effort between the schools to develop advanced communication technologies.

CMU computer science graduate student Stan Jou, 34, of Shadyside, stood before the audience yesterday morning with 11 tiny electrodes affixed to the muscles of his cheeks, neck and throat.

The Taiwan native then mouthed -- without speaking aloud -- the following phrase in Mandarin Chinese: "Let me introduce our new prototype."

The sensors captured electrical signals from Jou's facial muscles when they moved to form the silent Chinese words. In a matter of seconds, this information traveled to a computer that recognized the words and translated them into English and Spanish. The phrase was then displayed on a screen and spoken by the computer in both languages.

Never quite got the hang of conjugating French verbs? Always wanted to visit Poland, but were afraid you won't be able to prattle with the Poles?

"In the future, we could implant the electrodes into your mouth and throat if you want and have your mouth become multilingual," Waibel said.

While certainly the most revolutionary, this device wasn't the only new communications tool

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Translation goggles
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
Simultaneous speech-to-speech translation
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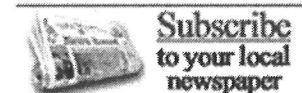
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showcased yesterday.

Waibel exhibited "translation goggles" that displayed his words on a miniature virtual screen, seen only by the wearer of these souped-up eyeglasses. His speech was translated from spoken English into Spanish text, almost like having automatic movie subtitles for the real world.

Waibel also demonstrated an array of small ultrasound speakers that delivered a narrow beam of sound in a foreign language to one person, while others nearby heard the same words in the language they were spoken. Developed in partnership with German car manufacturer Daimler-Chrysler, this technology could be used to translate speeches in several languages simultaneously for an international audience such as at the United Nations.

Underlying these new speech-delivery systems is more robust translation technology created in the past two years by Waibel and his colleagues.

Existing speech-to-speech translation systems allow for translation of spontaneous speech in limited situations such as making hotel reservations or shopping, said Chao Wang, a research scientist at the Massachusetts Institute of Technology Computer Science and Artificial Intelligence Laboratory.

But they don't allow for translation of lectures, TV broadcasts, telephone conversations or other large, open-ended forms of communication that involve complicated vocabularies and the 'uhs' and 'ahs' of everyday speech.

"Even for humans, it is sometimes hard to understand what we say to each other," Wang said. "For a machine, it becomes very challenging."

To make it possible to translate spontaneous speech about unlimited potential subjects, Waibel said his team developed statistical methods that allow the computer to learn from oodles of example translations available on the Internet.

Rather than producing a word-by-word translation, the system builds phrases, smoothing out some of the quirks of sentence structure among languages.

As Waibel delivered his lecture in English yesterday, the Spanish translation and English text appeared on the screen behind him -- albeit with some glitches. For example, had the writer of this story relied on these translations for her notes, the word "diverse" would appear as "divorce" in this article and "potentially" would show up as "put tension."

"Right now it still makes mistakes," Waibel said. "But we have quite a bit of funding and support and should be able to make tremendous improvements in the next five years."

Future systems will have the power to know when they are wrong and to translate more exotic languages for which large Internet databases aren't available, he said.

Even the most advanced speech translation systems won't make the study of foreign languages obsolete, Waibel said. He believes the opposite might be true.

"It will make communication and cultural learning more likely" since people using this technology will be empowered to come together when they wouldn't otherwise interact, Waibel said.

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