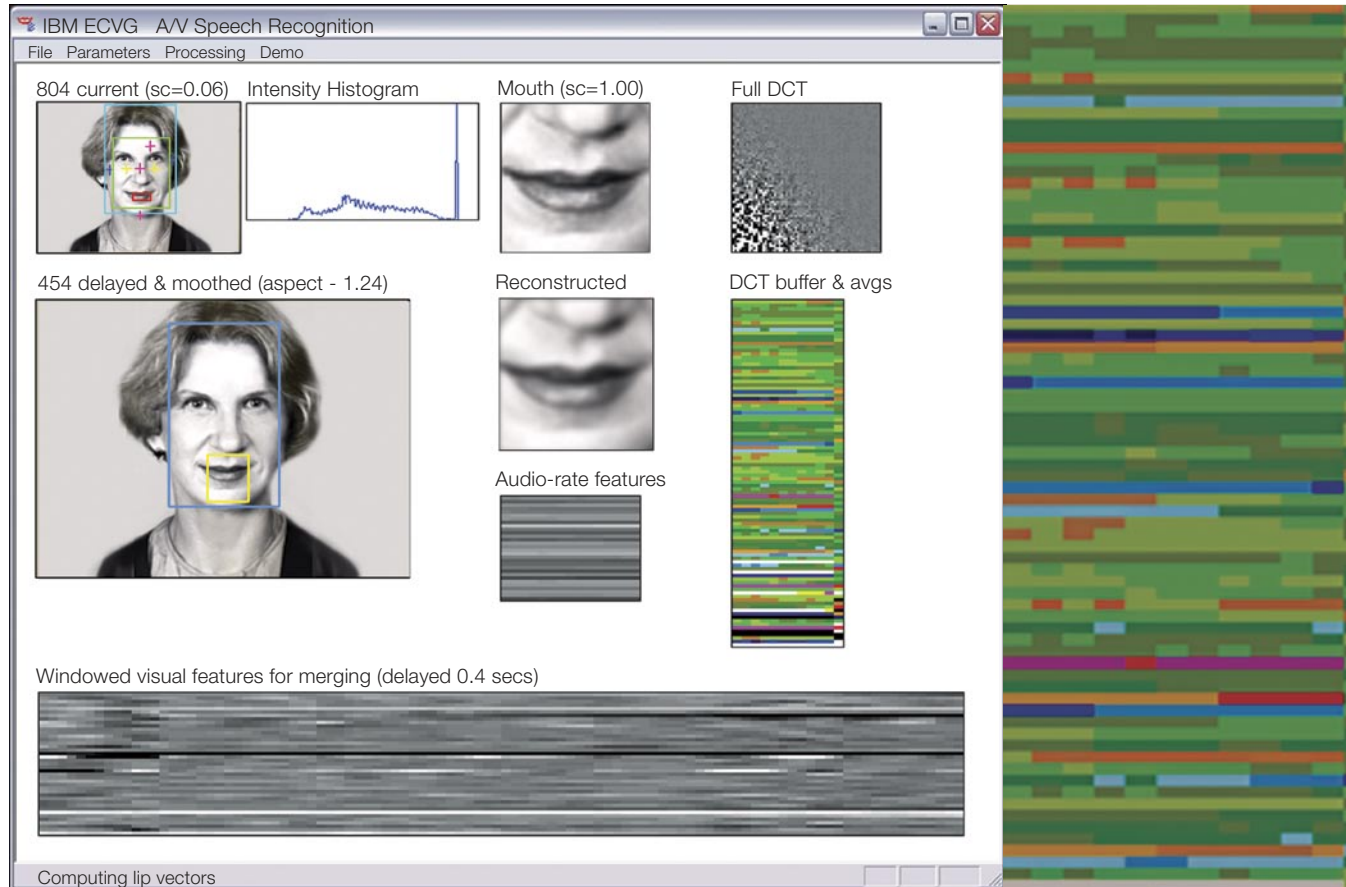


IBM Research, a pioneer in the field of interaction with computers, has generated many of the key innovations that shape the way people interact with computers; the way they use computers to interact with colleagues; and the way computers mediate interaction with the world. Our research, encompassing both the cognitive and technological aspects of interaction design, speech and language processing, multimodal input, multimedia output, and collaboration, is breaking new ground in the underlying technologies that allow the interaction to be more natural, intuitive, and efficient. Multi-disciplinary teams of engineers, computer scientists, social scientists, and designers collaborate to understand work practices, define new models for interaction, and create interactive prototypes and solutions.

IBM's research in Human-Computer Interaction (HCI) and User Interface Technologies (UIT) is based on significant achievements, including the breakthrough development of large vocabulary automatic speech recognition using Hidden Markov Models, the creation of innovative input devices such as the TrackPoint, and the founding of such research fields as Computer Supported Cooperative Work (CSCW) and social computing. IBM's researchers imagine a future of computer interaction where interfaces recognize naturally occurring human actions and behaviors, such as speech, gesture, gaze, and emotion, and respond in appropriate and intuitive ways. The progression toward more human-like sensory perception will involve new interface technologies and additional input streams, such as sensor data and other contextual information that will need to respect boundaries for privacy.

The visual front-end in the IBM audio-visual speech recognition prototype performs real-time face detection, mouth tracking, and feature extraction.



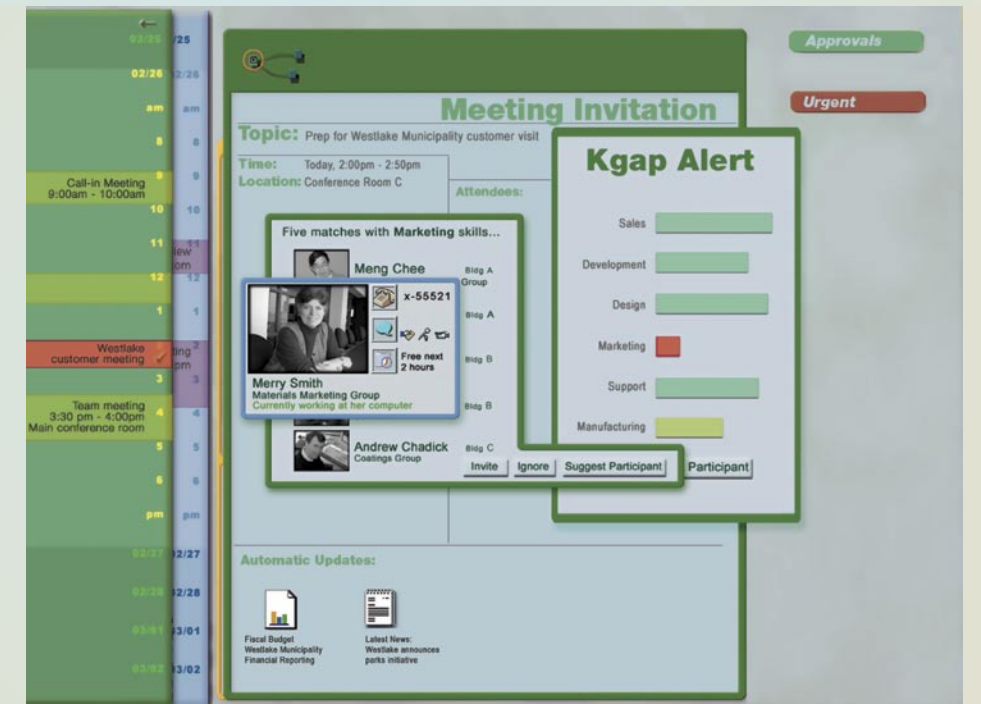
SUPPORTING HUMAN COLLABORATIVE ACTIVITIES

Our researchers study the nature of human collaborative activities in business practices, develop platforms to support the activities, and design tools to make these activities more productive for both co-located and distributed teams. As an example, a leading area of investigation centers on how people use electronic mail to engage in collaborative business activities. E-mail is the most widely employed business productivity application, yet studies show that people are increasingly frustrated and overwhelmed by their e-mail and by the currently available tools to effectively manage and organize the varied and accelerating mass of informal communications and structured documents. Today's e-mail clients have not evolved sufficiently to support today's new demands. As a result of IBM's research to provide solutions to these problems, an activity-centered approach to collaboration has been created that enables people to manage documents, e-mail, contacts, meetings, and events as integrated activities.

Another research focus is to make it easier for IT developers, administrators, and business people to manage and adapt IT systems in light of evolving business requirements or opportunities. This requires fundamental HCI research to understand the way these systems are designed, deployed, and operated. Ethnographic studies of system administrators revealed that their work is highly collaborative, yet system management interfaces and tools rarely enable such sharing and coordination of information. An Eclipse-based prototype has been created that enables the integration of collaborative tools, such as chat, buddy lists, screen sharing, and real-time awareness of code, into the working environment of developers.

IBM's researchers are also at the forefront of multilingual speech-to-speech translation and are building real systems for portable, handheld devices. These translation systems enable real-time, bi-directional, natural communication for people who speak different languages, and require the combination of state-of-the-art technologies in automatic speech recognition, generation, synthesis, translation, and understanding.

Reinventing email: focusing on collaborative tasks rather than on the tools being used.



IMPROVING THE INTERFACE TO COMPUTERS

As part of IBM's work toward freeing users from the Windows, Icons, Mouse and Pointer (WIMP) interface, our focus continues to be directed on developing new methods of interacting with computers. Speech, vision and gesture, used in isolation or in combination, afford a more natural interaction. IBM's goal for speech recognition, for example, is to make the computer capable of recognizing what words are spoken, who spoke them, and what the speaker meant. Reaching beyond the current limits of human-computer interaction, IBM Research's work in Superhuman Speech Recognition — a recognizer that actually performs better than humans — provides another example of IBM's vision and commitment to enhancing computer access. Another focus area is advancing technologies that help eliminate barriers encountered by persons with limited sensory, physical, or cognitive abilities. A system has been developed, for example, that allows users to adapt Web pages to their needs. With a standard Web browser, users can adjust content features, such as font size, colors, and layout, as well as have the mouse and keyboard input adapted to their requirements.