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# Building Your Own Phone Face

## Video handsets are taking off, but what about those who shirk the spotlight? Engineers think animated 3-D avatars may be the answer

SLIDE SHOW >>

"Think of when you're having a bad hair day," quips Mike Danielsen of Motorola Labs when asked why he has spent two years developing 3-D animated avatars [LINK TO SS] that can mime a live user's speech and actions on mobile-phone handsets. "Or maybe you're camera shy. With more and more phones capable of video and 3-D graphics on the market, avatars can stand in for you."

Of course, there are even more practical reasons why Motorola (**MOT** ) -- and a handful of competitors -- are taking the design of these synthetic actors seriously. First of all, mobile-phone carriers are always looking for additional features to sell. The growing global market for ring tones -- estimated to garner $27.5 billion in revenues by 2009, according to Boston-based research firm Yankee Group -- clearly shows that a little fun can translate into a lot of revenue. And the use of avatars on instant-messaging systems offers some evidence that the digital stand-ins will be similarly popular. In December, 7.6 million unique users visited Yahoo!'s (**YHOO** ) site for IM avatars.

Danielson sees the avatars as a means for more effective phone conversations. "One form of nonverbal communications is nodding and shaking the head. How many times have you nodded your head while speaking on the phone? That nonverbal communication never makes it to the remote party," says Danielson. "Imagine if that communication was automatically conveyed through the use of an on-screen avatar. Other types of nonverbal communications, such as smiles, frowns, and raised eyebrows, can be controlled."

**SECRET IDENTITY.** While such nonverbal cues would be communicated directly by a video phone, the 3-D animated avatars promise some technical advantages. Expressions and gestures can be sent at a very low bandwidth, because they're expressed as symbols. In other words, a smile, as represented by a single symbol, can be sent much more quickly than a sequence of video frames.

And display resolution for animation isn't as important as it is for live video. As Danielson explains, "The avatar can be rendered at different resolutions and realism, independent of the data communicated." In addition, animation doesn't produce video artifacts, like a "ghost" image or fuzzy pictures.

As for security, Danielson says the avatars can also protect a user who might want to engage in a more physically enhanced conversation but doesn't want to reveal his or her identity or location.

**MOUTH MOVEMENTS.** Motorola already has phone avatars available in China and Japan, but "they're highly cartoony," says Danielson. "What we're working on in the lab represents the next generation." His team are using the same animation techniques pioneered by video-game designers and Hollywood's special-effects masters. Specifically, they're working with what's called "morphing mesh," a digital system of points in space that map out facial features, muscles, and bones. It's a three-dimensional grid that can be molded like clay onscreen. Designers add layers of computer-generated skin, hair, and clothing on top of the complex, textural grid.

By using motion- and voice-tracking software (still in the research stage), Danielson and his colleagues are working on matching up live, spoken words with synchronized animation. To achieve this, speech is broken down into phonemes, the smallest elements of words that still can be recognized as parts of a language. Designers at Motorola Labs are creating 3-D images that match a variety of phonemes by assigning lip, tongue, jaw, and other movements to reflect each phoneme on-screen. The software then recognizes what a mobile-phone user is saying and syncs the speech with the corresponding phoneme visualization.

The result is mouth movement that looks like real-time talk. Designers are also working on a set of typical communication gestures to coincide with a user's actions as he or she speaks, as traced by motion-tracking software.

**EVERYBODY'S TALKING.** Danielson's avatars are more sophisticated than those used offered by IM services today.

Yahoo's IM site, for example, offers animated avatars that can be customized to the point of mixing and matching skin color, hairstyles, and clothing and accessories -- as well as adding pets or environmental backgrounds. They can perform animated gestures like frowning or smiling, but are far from doing complex, real-time speech movements.

Danielson says his team is working on highly customizable animated avatars that range from the photorealistic to the fantastical. Although Motorola doesn't have a set date to bring this technology to market, Danielson says they're working about two years in advance. Danielson's avatars will depend on cell phones powered by chips that can handle more graphics.

Motorola isn't alone in designing applications for next-gen phones. At the Consumer Electronics Show (CES) in Las Vegas in January, 3-Dmsg, a Sunnyvale (Calif.) company, debuted its own animated mobile-phone avatars. Like Motorola, 3-Dmsg, a subsidiary of speech-recognition chip maker Sensory (also based in Sunnyvale), uses animated characters created with a digital-mesh structure, paired with software that analyzes spoken data. The program breaks words into "visemes," or visual representations of mouth positions performing parts of speech, which are then strung together to suggest conversation.

The first set of applications 3-Dmsg is working on include animated mobile-phone greetings, which translate text or voice messages into animations that are synchronized with a user's voice. Another is language-training avatars for mobile phones. While the company has yet to determine its handset and carrier partners, 3-Dmsg founder and CEO Todd Mozer predicts the services will be available to consumers by mid- to late 2006.

**GROWING MARKET.** International competitors include Japan's Oki Electric Industry, which has developed the FaceCommunicator application for PCs and mobile phones to generate both two- and three-dimensional animated avatars using motion- and voice-tracking as well as key commands. In Europe, Germany's BenQ Siemens, officially launched on Jan. 17, plans to continue developing the animated-avatar technology that was first unveiled by Siemens (**SI** ) at the 2004 CeBIT conference.

With new mobile-phone models offering more visual options, and with the global market for the segment staying strong in the third quarter of 2005 -- more than 205 million units sold, according to industry research firm Gartner -- the market for applications is sure to grow. But some analysts are skeptical whether consumers will want to add more charges to their monthly mobile-phone bills.

"Will the animated avatars come out on the market? Yes. Will people buy them? Yes. They're fun and entertaining. But there's a limit to what consumers will spend -- they're already buying games, ring tones, videos, and music," says Julie Ask, senior wireless analyst at Jupiter Research. "The average cell-phone bill is already around $50. And consumers have shown [a willingness] to spend an extra 5% to 10% a month for data services. But they're not going to spend an unlimited amount for more and more services." Even on a bad hair day.

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