

# Smart gadgets may one day anticipate our needs

July 9 2010, By Steve Johnson

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Don't be surprised if one day your refrigerator nags you to lose weight, your phone blocks calls it figures you're too stressed to handle, and your wisecracking car entertains you with pun-filled one liners.

Within a decade or two, researchers at [Silicon Valley](#) companies and elsewhere predict, consumer gadgets will be functioning like hyper-attentive butlers, anticipating and fulfilling peoples' needs without having to be told. Life would not only be more convenient, it might even last longer: Devices could monitor people's health and step in when needed to help them get better.

"I think it's inevitable," said Michael Freed, an [artificial intelligence](#) specialist and program director at Menlo Park, Calif., think tank SRI International, which has been studying the concept for the military. Noting that some of these gadgets already are being developed, he added, "I expect we'll see more soon -- a trickle and then a flood."

The technology propelling this new generation of personal assistants is a combination of sophisticated [sensors](#) and carefully tailored computer software. As envisioned, the machines would adjust their own actions to the preferences and needs of an individual, by analyzing data on the person's past actions and monitoring current behavior with cameras, audio recorders, and other sensors.

Santa Clara, Calif., chipmaker Intel, which has been studying the technology for several years, believes that one day soon the gadgets will

have the ability to read their owner's emotions.

While some experts have proposed that face and [voice recognition](#) gear be used to detect a person's disposition, Intel has been experimenting with heart monitors and galvanic skin-response sensors. A study it did last year envisioned the gadgets detecting mood swings "while people are driving, singing, chatting with friends, attending a boring meeting and even while going to the dentist."

Others expect [household appliances](#) eventually will be designed with human-like personalities. In a study this year that was partly financed by Nissan, researchers at Japan's Hokkaido University experimented with cheery-sounding devices that they imagined one day could serve as "artificial companions for elderly and lonely people" or as pun-spouting car navigation equipment that could "entertain drivers by talking and possibly by joking."

Although some gadgets already make assumptions about what people want, such as word processing software that automatically corrects grammar, the devices contemplated by Intel, HP and other companies would be capable of much more sophisticated judgments about a broader array of human needs. That's a complex task -- so difficult that some experts are skeptical the technology will be ready in the near future.

"My guess is that we will get there in time, but it's a little further off than the most ambitious announcements from a lot of companies have indicated," said Bob Sloan, who heads the computer science department at the University of Illinois at Chicago. "There are a lot of hard problems to solve."

But other experts say the idea recently has become more practical because of the proliferation of computerized devices, from universal

remote controls, MP3 players, air conditioning equipment and microwave ovens to security systems, lawn-sprinkler controllers, exercise equipment and toys.

Because many of these devices come with cameras, global positioning systems and other sensors to monitor what's around them, these experts say, it's not hard to imagine them gathering enough data about people to act autonomously on their behalf, assuming the individuals let the gizmos have that authority.

One product that already claims to partly think for its owner is a "personal assistant" app for the iPhone and iPod developed by Siri, a San Jose company Apple bought in April.

Besides being able to recommend a good play, book a taxi and offer helpful reminders, the app -- which responds to verbal queries -- "adapts to your preferences over time," Siri claims. For example, ask it about a good place to eat nearby and it might suggest a certain type of restaurant you have picked before, a company spokesman said. He added that the app also can learn to recognize a person's voice and speaking style, which might make it easier for it to understand what the person is saying on a noisy street.

Other products could be on the way soon, said Diane Cook, a researcher at Washington State University, which has an experimental smart house filled with such devices.

"We have companies large and small and in-between visiting us monthly -- IBM, Bosch, Qualcomm -- all wanting to commercialize it, all trying to decide what that first step is, that first niche," she said.

Stanford University operates a similar research lab. When it hosted a workshop on the technology three weeks ago, it attracted interest from

Facebook, Google, Honda, Intel, Microsoft, Nokia, Panasonic, Sony and Hewlett-Packard, according to the lab's website.

Hamid Aghajan, who supervises the lab, foresees gadgets knowing enough about their human housemates to select appropriate lighting and music when the people are eating or reading, coaching them on their speaking skills during meetings and connecting them via social networking sites with people the gadgets determine share their interests.

Peter Harwell, a senior researcher at HP, believes such devices could be built into new homes within a decade or so, though he cautions they must operate "in a way that doesn't annoy the user."

One initial application of the technology is expected to be monitoring the elderly in their homes.

Oregon Health & Science University researchers say they have detected the onset of dementia in older people by using smart pill containers that record whether the person takes their medicine and motion sensors that can tell if their walking and dressing slowed, potential early signs of the disease.

Some experts believe it will be possible for a refrigerator with the right sensors to keep track of how much a person eats and to urge them verbally to adjust their calorie intake. And if the person gets seriously sick, these experts say, other gadgets might be able to detect the illness and alert authorities.

Even the military is interested. The Defense Advanced Research Projects Agency hopes to develop computerized assistants for commanders that "can reason, learn from experience, be told what to do, explain what they are doing, reflect on their experience and respond robustly to surprise."

All this raises concerns for Eric Goldman, who directs Santa Clara University's High Tech Law Institute. One issue is how to protect the privacy of the information the gadgets accumulate on people.

"The more data we gather the more the government is going to want to get its paws on it," he said, adding that lawyers in court cases may try to obtain it, too. There also is no guarantee such a device "will do exactly what we want it to," he warned. "There is always the possibility that the smart agent will go rogue."

But others consider the potential benefits worth pursuing. That includes using the technology to rescue people from uncomfortable situations.

If a person gets a call from someone who stresses them out, according to Intel officials, their savvy phone might automatically switch the caller into a voice message. Another intriguing possibility could arise if the phone notices its owner is extremely tense in a meeting, added Lama Nachman, a researcher at the chipmaker. In that case, it might respond with what she termed an "exit phone call," a bogus ring that gives the person a convenient excuse to leave.

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Distributed by McClatchy-Tribune Information Services.

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