

# Business & Innovation

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## Live-in lab

PlaceLab looks more like an ordinary condo than a research center. But technologists from MIT and TIAX have stuffed it with sensors, cameras, and speakers in an effort to monitor people's behavior in the home.

By Robert Weisman  
GLOBE STAFF

**C**AMBRIDGE — Greater Boston's newest cutting-edge research lab boasts no test tubes, lasers, or printed circuit boards — at least none in plain view. It looks like what it is: a clean, modern, and sparsely furnished 950-square-foot condominium near Central Square.

But it's also a living research lab, called PlaceLab, owned and operated by the independent research company TIAX LLC. And over the next three years it will be conducting dozens of experimental studies, co-directed by TIAX and House\_n, a Massachusetts Institute of Technology research group, into how people behave at home. The collaboration was formally launched at a "Changing Homes" conference here last week, though PlaceLab quietly opened its doors in July.

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The kitchen and living room in PlaceLab, a 950-square-foot condominium near Central Square in Cambridge.

### On deck at PlaceLab

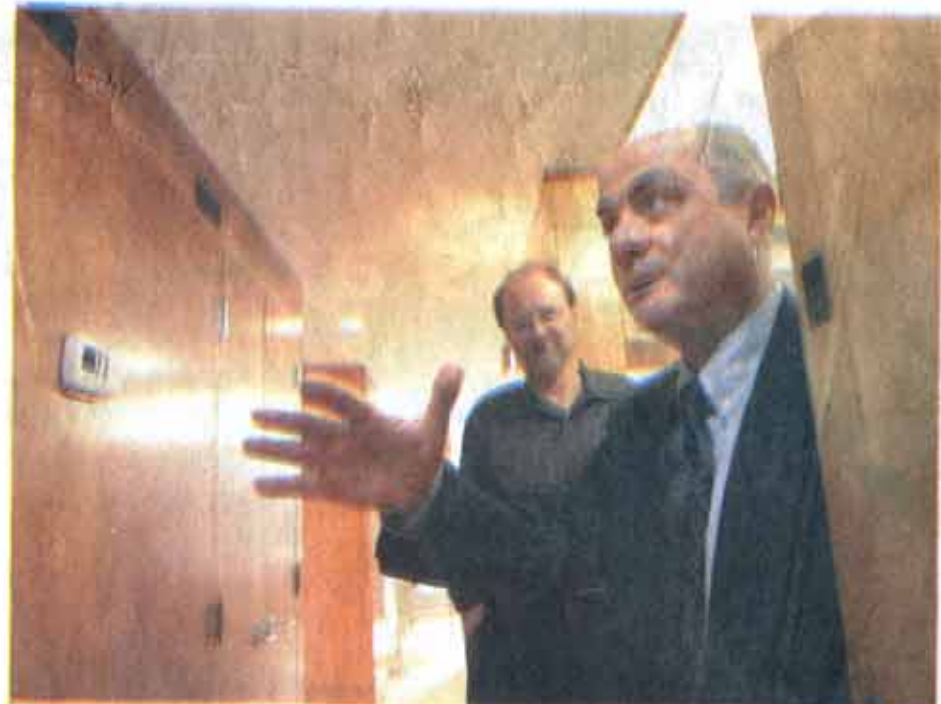
Here are some technologies that might be explored in PlaceLab research studies over the next three years:

- Windows alerts that set off blue light-emitting diodes when the outside temperature gets warm enough to open the windows.
- Bottom-step warnings that flash or sound when older residents get to or near the bottom of a staircase.
- Indoor air monitoring of everything from dust mites to oven particle emissions to organic compounds from gadgets.
- Personal microclimates that could enable three people sitting in a living room to each have their own temperatures and humidity; microclimates might even follow individuals around their homes.
- Plug-and-play technologies that create a universal interface for everything from electronics to appliances.

SOURCE: PlaceLab research directors



Above and below: Diagrams showing the locations of PlaceLab's many sensors and cameras.



GLOBE STAFF PHOTO/BARRY CHIN

Kent Larson (left), a research scientist at MIT's Department of Architecture and director of the House\_n research group, with Kenan Sahin, TIAX LLC president.

# This condo's a consumer-tech research lab

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Crammed behind the cabinets and walls are hundreds of light, temperature, humidity, water-flow, and other sensors linked by three or four miles of cable. Also invisible are banks of computers, cameras, and microphones that have recorded nearly a terabyte of data on everything from the cooking to the toilet flushing to the window-opening habits of volunteers who live in the condo for set periods and agree to have their activities monitored.

"It is the most highly instrumented living environment ever built," said Kent Larson, a principal research scientist at MIT's Department of Architecture and director of the House\_n research group. (The group's name means "house to the nth degree," referring to the unlimited possibilities of home technologies.) "The real challenge is to figure out what to do with all the data, so we do something useful for people."

The goal of the shared research lab is to explore technologies with the potential to improve health, diet, disease management, indoor air quality, energy conservation, user interfaces, and injury prevention. MIT, which designed the facility and installed its sensor infrastructure, would like to publish research on health and energy technologies for the home. TIAX, which invested \$700,000 to buy, equip, and maintain the condo, would like to commercialize the technology in partnership with other companies or outside parties that can sponsor research.

"We feel very strongly that the American home is at an inflection point," said Kenan Sahin, founder and president of TIAX (an acronym for "technology and innova-



GLOBE STAFF PHOTO/BARRY CHIN

The PlaceLab kitchen appears ordinary, but it's loaded with state-of-the-art sensors to monitor occupants' habits. "The real challenge is to figure out what to do with all the data," says MIT's Kent Larson.

tion applications to the power of X"), a Cambridge company that acquired the former Arthur D. Little technology labs in 2002. "It's going to change dramatically."

Among the trends poised to transform home technologies are the aging of the baby boomers, the move toward home healthcare, the proliferation of computer, electronic, and entertainment devices, and the limits on the number of stand-alone technologies people will embrace. Together, these trends create a fertile ground for

new technology development and experimentation, PlaceLab's directors believe. And unlike "homes of the future," such as the ultrawired Microsoft Home in Redmond, Wash., the aim of PlaceLab is less to showcase futuristic devices than to bring technology to bear on activities of daily life.

PlaceLab's first volunteers moved in for two short periods over the summer as researchers did their initial tests of the sensors and other technologies for automatic recognition of home activi-

ties. Going forward, the lab plans to host singles, couples, and families of different ages for a range of academic, industry, or government research projects. Among technologies that might be tested are the microzoning of temperature for each resident of a home, light-emitting diodes that flash when the weather outside gets warm enough to open windows, and warnings that sound when older residents get down to the bottom of a staircase, where falls are most common.

Accident prevention is just one of the health-related fields that is expected to generate the most interest. Soaring healthcare costs already have given rise to a burgeoning industry of home-based and mobile products that Forrester Research, the Cambridge technology research firm, has dubbed "healthcare unbound." Companies are building pacemakers with intelligence and transmitting technologies to relay data that can be read by healthcare professionals remotely, or devices that collect and

relay information from glucose meters, blood pressure cuffs, pulse oximeters, and electronic scales in the home. Such activities will generate worldwide revenues of \$460 million this year, a Forrester estimate says. The firm projects the industry to grow to \$5.7 billion by 2010 and to \$63.3 billion by 2020.

Research operations like PlaceLab could play a vital role in that growth, said Elizabeth W. Boehm, senior analyst for healthcare and life sciences at Forrester. "It's an important environment for figuring out which technologies will work," Boehm said. "One of the things that's unknown, and that's valuable to the healthcare industry, is whether you can change people's behavior and get them to do preventive care and stay with routines of taking meds, exercising, or eating healthy foods."

One potential stumbling block is privacy. PlaceLab has gone to great length to assure volunteers that their identities will be kept confidential. Only a small group of researchers working on specific studies will be permitted to visit, and most of the data will be crunched remotely at MIT. Volunteers are informed of the sensor locations and have the option of blocking sensors or deleting data at their discretion.

Keeping medical data out of the hands of employers or insurance companies, who could use it to discriminate against individuals with health risks, is a key issue in healthcare research, Boehm said. "For any of the technologies that come out of this to have credibility," she said, "they're going to have to work hard to show they have privacy protection."

Robert Weisman can be reached at [weisman@globe.com](mailto:weisman@globe.com).