



Intelligent Homes

Tania Casselle explores the brave new world of homes that anticipate your every need.





Above: Nicole Sassaman's kitchen; she can watch her baby sleep. Left: Smart Home in Vancouver, Canada, automated by Digiconcepts Home Technologies, features integrated motorised blinds on 20 windows. Far Left: Two-ton bi-fold 'fire station' doors open between Steve Outtrim's lounge and indoor pool.

Please pick up a pint of milk on your way home.' It's not a text message from your partner, it's from your fridge. As you step in the front door, your favourite music plays. The blinds sweep closed, the lights are low, except for the lights leading a path to the bedroom. The house is at the temperature you like, and in the background you hear the bath filling. It's still nothing to do with your partner; the romantic mood is set by your house, anticipating your every desire. The only thing your home can't do is undress you and tuck you into bed. But give it time...

Smart homes, intelligent homes, digital homes, automated homes... there's no single term for it yet, but we're talking buildings with brains. They know what home owners need, and sometimes even what they don't know they need yet. Like the email from your basement to warn of a broken pipe. With the rise of intelligent homes in the U.S., we enter a new relationship with our living space. Parks Associates, a research consultancy for digital living technologies, projects that the American market for home system controllers will be worth over \$3 billion by 2009. So how far can the smart home go?

Any American DIY fan can buy a simple X-10 device for a few dollars to control one element of their environment; lighting is a popular first step. The truly intelligent home, however, has a central management system to connect and

integrate lighting, security, home theatre, music, communications, appliances, plumbing, and HVAC (heating, ventilation and air conditioning).

Tricia Parks of Parks Associates argues the case for integration by observing that 45 per cent of US households already have programmable thermostats, but if they can't communicate with a bigger system, they can't respond to changing conditions. "If I have my air conditioning on and a fire starts, my central air system thinks of that as heat, and blows harder. That will increase the pace of the fire. With integration, my fire system tells my A/C system to shut down."

This capability has traditionally required a customized system, with specific hardwiring in the walls, and a price tag that's kept integration exclusively for the wealthy. "On larger ticket homes, it's almost expected that they will be integrated," says Indianapolis-based architect Mark Demerly. He cites \$4 million condos that have \$500,000 invested in smart systems. For a \$2 million house the investment might be \$100,000.

There's hope for the average consumer though, with developments in wireless, broadband and other technologies. "We now have these technologies that work well over the power wiring or with radio frequency that are much easier to install, much more readily available," says Mark Walters, vice president of Alliances for the Z-Wave Alliance. Existing homes

can be retrofitted, because there's no specific hardwiring needed in the walls. In the last year, there's been a surge of automation between entertainment, lighting, window treatments and HVAC. Five years ago this was complex and expensive, but Walters says it's now included in almost every installation, so when you watch a movie, your lights automatically dim, the blinds close, and the heating cranks up a few degrees. Many are attracted by the James Bond type applications; Push One Button to set the scene. "That's cool on a Saturday night when you have friends over," says Walters. "But then you find out that what you really love is the switch on the key fob in the car that turns all the lights off in the house as you leave, and turns the thermostat down."

Convenience and peace of mind are also major selling points. "You wake up and press one button, the whole house is ready for your morning routine," says Ilya Billig, vice president of Business Development for Lagotek, whose average home automation system for a 3,000 square foot home costs \$10,000. "You go to bed and press another button and the house goes to sleep with you. You hear a noise in the night, you can turn lights on in the whole home; that might spook intruders. Then you look at your camera monitor to see if it's the cat."

Some smart homes have central locking, just like a car, with one button controlling all doors



Case Study: Malibu, Usa

Nicole Sassaman has appeared as an interior design expert on TV shows from the hit E! Series 'Area' to HGTV's 'Designer's Challenge' and 'Smart Solutions'. She renovated Greta Garbo's former hideaway estate in Beverly Hills, and creates visionary spaces for her starry Hollywood clients. So when Sassaman gutted her own 5,500 square foot Malibu property, built in 1991, she knew exactly what she wanted to transform it into a dream home.

She installed an HAI system, with three touch screens (front door, master bedroom, kitchen) to control the house. This integrates three automated thermostats, four pet proof motion sensors, six smoke/heat detectors, and 6 carbon monoxide sensors. The surveillance system has eleven inside and outside cameras, with night vision. Three cameras inside the house are disguised as motion sensors to fool intruders. (If they don't realize it's a camera, they don't avoid its gaze.)

One camera plus a microphone is mounted in the ceiling over the baby crib. The camera is infrared, so Sassaman can see her baby even in the dark, on any Plasma TV in the house. Cameras record on a continuous seven day loop, and can be accessed remotely on the internet.

Outside lights adjust to the changing seasons of sunrise and sunset. When Sassaman comes home, she can turn on the house lights from the car. When she disarms the security system, if it's dark, lights turn on to create a pathway from the garage and front door to the master bedroom and kitchen. The HVAC system starts to heat or cool depending on season.

After dark, if any car pulls into the driveway, motion sensors trigger the entry and landscaping lights. When Sassaman arms the security system to leave, all lights turn off and the HVAC creates different climate zones within the house: cutting back to save energy in some rooms, continuing as normal in the areas where her dogs live.

Should the burglary alarm activate, it calls the alarm company, sends cell phone, text, and email messages to Sassaman, and switches on all lights inside and outside. It's the same for fire alarms, except the HVAC systems also shuts off to prevent spreading fire, smoke and carbon monoxide.

Sassaman moved in earlier this year. Doug Burton, who consulted on technology, continues to log in to her system from his home computer to fix any glitches, such as a light that doesn't go off when it should.

With 90 plus wall switches in the house, Burton thought it prudent to use Insteon switches, which cost around a third of the \$70-100 price tag for other switches. However, the HAI system didn't fully support Insteon, so he used a third party software called Homeseer to run between HAI and INSTEON, a much cheaper proposition. "A house like this, you almost need this much technology" says Sassaman. One thing she hasn't used yet is the voice activation capability. In theory, she can phone the house and tell it what song to play as she arrives home. "We thought the music thing was sort of goofy, but most of our friends said 'NO!' They're techies and they want everything. While you're pulling the wires and have the walls open, you might as well go for whatever you might want."

and windows. If you want to find out when the kids come home, or when the housekeeper arrives and leaves, an email or text message is sent to you as each household member enters their personal code to disarm the alarm and access the house system. Or surf from your office laptop to keep an eye on the nanny through the cameras studded throughout your home. If you're leaving on holiday, the house records your lighting habits and replicates them while you're away. "We already have elevator systems that analyze traffic and dispatch elevators based on the learned artificial intelligence of traffic," says Herb Hauser, President of Midtown Technologies, who coined the term 'genius' buildings. "Now the building is not just learning about traffic patterns and temperature patterns, it's learning about the way people live inside their buildings and it can adapt to people's lifestyles."

Some of Midtown Technologies' property projects have door locks with a biometric thumb print reader as well as an ordinary key. There are showers with a touchpad on the wall; punch in your code and your chosen water temperature gushes immediately, with no water wasted while hot and cold are mixed.

If you're an apartment owner in the Ritz-Carlton Residences in North Hills, New York, you're given a big welcome home. The car signals ahead to the gate, which opens before you arrive and closes behind you; the valet is notified by wireless to greet you and take the car, while the doorman emerges to help with packages. Meanwhile, the apartment starts the 'I'm Home' program of desired lighting, music and temperature.

Midtown Technologies has also started to design homes with a 'Forward Living' ethos, meaning that as we grow older, our homes adjust to our ageing process, such as visual changes, where certain frequencies become bothersome to our eyes, so the house modifies the lighting to match.

Homes communicate with the natural environment too, through microclimate systems such as WeatherHawk. It snows, and your driveway heaters switch on to melt dangerous ice. A torrent of rain? Your automated garden sprinkler skips a day. This utility efficiency means less impact on the environment, and lower bills. Ilya Billig estimates a 30 per cent financial saving where home management systems are installed, although Lagotek's CEO saw his monthly energy tab drop from \$200 to \$50-60.

Midtown Technologies is working on a device that changes colour to give instant feedback on home energy use that all the family can understand: Green if you're frugal, through to Orange if you're being wasteful. Herb Hauser reckons that a 2000 square foot American home can save \$150 a month.

To help balance electricity supply and demand, Mark Walters observes that in some places (San Diego in the US, a few areas of Europe) home owners give permission to power companies to connect to their home systems and switch off agreed applications during peak demand. In Southern California, that would be your pool pump. The home owner barely notices, but when 60,000 pool pumps shut down for a couple of hours, it takes strain off the electricity supply. In return, you get a discount on your bill.

A major trend is towards developing more sophistication in identifying individuals, partly for security reasons. "People want a force field, Star Trek style," says Tricia Parks. They want to know if someone other than a family member or pet approaches the house, and they want to know before they reach the door. Identification also personalizes our experience. Mark Walters recalls Bill Gates' Seattle home, where everyone wore a Radio Frequency Identification (RFID) tag, and according to who entered a room, the lighting would change, the music, the artwork on flat panel screen displays, to suit that person's preference. That was twelve years ago. Now the technology has dripped down to non-billionaires.

RFID tags are already implanted into pets, so if they get lost, a vet can identify them. If you have an RFID scanner, you're alerted when the dog strays outside home grounds. Nobody suggests implanting RFID into children, but tags in their clothes, combined with similar scanner technology, will ease parents' minds.

RFID technology is now used in some consumer items like food and clothing to track inventory and manage supply chain logistics. Extend that a little further, and in a few years your fridge will read the tag on your cheese and remind you that it's near its use-by date, according to Peter Bongers, founder of Living Tomorrow, a visionary European company that matches future technologies and companies. A screen linked to the Internet recommends recipes for the cheese, drawing on knowledge of what else is in your fridge. If you take fish from the fridge, fragrance is dispensed to neutralize cooking smells. And if food contains an ingredient you're allergic to? The RFID reader warns you,

Below: Sassaman's 5,500 square foot Malibu house, monitored by eleven cameras. Opposite: Nicole Sassaman's smart home, with hidden technology; clean lines, cool aesthetics, and one-button control; Chic sleek, Sassaman's lighting responds to family needs.





Case Study: Melbourne, Australia

I.T. entrepreneur Steve Outtrim is the founder of Majitek and ekoLiving, and his home in Melbourne's Yarra Valley is also the Majitek research and development house, featuring technology from Majitek, ekoLiving, Echelon, Sun Microsystems, and eKey, among others.

Outtrim's 10 room, 10,000 square foot house was built in the 1980's and extensively renovated between 2000 and 2002. Everything is controlled from 23 LCD 15" touchscreens built into the walls, plus cell phone, wireless web tablets and PDAs (Personal Digital Assistants). There are no light switches. There are also no worries about losing your keys, as the house has eKey fingerprint locks.

Central locking (40 electronic locks for doors/windows) are activated by a single button. 'One touch lockdown' instantly secures the house at night or when Outtrim goes away, in which case remote access and control is through military-grade encryption, via Web and cell phone. On his return, the gate to the house automatically recognises Outtrim's cars and opens for him.

Ten high resolution security cameras have motion and object tracking capability and night vision capability. Security systems, TV and lights operate from a single button, and multi room music and video are connected to central server. Music can be sent to individual rooms or played across multiple zones at once.

Pilkington supplied the iGlass, an electrochromic smart glass, which turns from transparent to opaque in 1/100 of a second. For energy efficiency, the house uses advanced programming to control pool heating, ventilation louvres, underfloor slab heating, air conditioning and motorised blinds and curtains.

The house sports four pools, and two-ton bi-fold 'fire station' doors open between the lounge and indoor pool, and the indoor/outdoor pool. To prevent bushfires, a sprinkler system draws on massive on-site water tanks. A dedicated, climate controlled 'head end' room contains Outtrim's smart home equipment.



and also gives nutritional information if you are on a diet. When you're down to your last pack of butter, the fridge orders more online. Washing machines could check RFID tags in clothing, to ensure the right wash programme, and if a red sock finds its way in with the whites, you'll be notified in time to prevent pink laundry.

Living Tomorrow's Intelligent Mirror (Phillips and Unilever have shown interest) recognises who stands in front of it, and gives customised information by Internet display, such as weather (so you know what to wear) and traffic (leave ten minutes early if there's a jam). When you dye your hair, the mirror gives instructions and suggests complementary products to try. As a child brushes his teeth, he watches a video of a cartoon bird brushing a crocodile's teeth, guiding him on brushing and for how long. The mirror knows if he stops before three minutes, and mum can check her offspring's dental discipline.

Voice activation is tipped to be big, and retina scanning and finger print readers are out there now too, although they'll all have to prove their value to consumers. Doug Burton, the consultant on Nicole Sassaman's home, rarely uses his home's voice activation because it's easier to press a button than remember the verbal command. And Malibu architect Doug Burdge, who designed his first automated house in 1988 and mentions Pierce Brosnan among his Hollywood clientele, says that even the most sophisticated don't want retina scanners for security in their homes. "When you're working with someone like Barbra Streisand, they would rather spend the money on armed guards."

What Americans do want, 72 per cent of them according to a Z-Wave Alliance/ Kelton Research

survey, is the ability to monitor their home remotely. And that's available now.

While on a cruise ship off Tahiti, Doug Burton realized he'd left the air conditioning too chilly for his mother, who was staying in his house. He logged in to his home system, adjusted the temperature, checked the security cameras, saw a record of her activity, what time she set the alarm at night and got up in morning. Comforted that all was well, he continued his holiday. His mother didn't even know she'd been checked on.

So how do you make all this happen? While retrofitted systems in existing homes are most likely to use wireless technology, on new builds it's best to include enough structured wiring to anticipate future needs. Structured wiring is a built-in network, linked to a central hub, to distribute services to multiple room outlets, including phone, data, video, audio, and security. Wires are cheap, easy to install while you have the walls open, and you don't risk the signal interference that is possible with wireless. "Put everything you can into your walls, even if you don't know what you'll run in ten years," says Doug Burdge. "Even to a blank cover plate, because the hard wire is still the backup source, versus trying to go 100 per cent wireless." Parks Associates reports that 35-40 per cent of American builders now incorporate full structured wiring in new homes. "You will see higher stats," says Tricia Parks, "but many builders offer just one tier, just an Ethernet, and that's not useful for carrying video, for example."

Aesthetically, integrated systems eliminate 'wall acne' with one unobtrusive control panel instead of a clutter of switches. A Lagotek panel is 13 x 13 cm, and the screen dims when not

in use to blend with the wall. Typically there are three panels: in the entry way, kitchen and master bedroom. Doug Burdge notes that even starter homes offer a \$5-10,000 upgrade package for minimal home automation. People get used to the technology, are teased into wanting more, and when they later move into a custom home, they'll pay \$100,000 plus for a fancier system.

With prices dropping, consumer awareness and education is, in fact, the major challenge for the home automation industry. They have to build trust in the technology. "Consumers don't like the word Automation," says Tricia Parks. "It brings up a fear of who's being controlled? What if it breaks, will the whole house turn off?" And although the houses are smart, systems must be simple. Nobody wants to consult a thick manual, they'll just stop using the features, and visiting family and friends should be able to switch on a light without complicated instructions. In the sensible words of Doug Burton; "Unless it passes the mother-in-law test, it doesn't belong in my house." ■

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www.midtowntechnologies.com
www.nicolesassaman.com
www.parksassociates.com
www.z-wavealliance.org

Below: Steve Outtrim's 10,000 square foot house in Australia is controlled by 23 LCD touchscreens and protected by a central locking system on 40 doors and windows with 'one touch lockdown'. Opposite: External Atrium and Outtrim's home theatre.

