Technical Article Release

Automation Arrives Home at Last

By Patrick Mannion

Historically stymied due to lack of interoperability, poorly designed interfaces and high cost, truly smart home automation devices are about to move in.

Spurred in large part by advances in low-power connectivity such as Bluetooth Smart, and fueled by low-cost silicon, easy-to-use design kits, readily available software and of course rapidly developing ecosystems from Apple, Google, Intel, Cisco, and others, there has been an explosion of ideas and designs to enable home automation.

From Nest's thermostat to connected toothbrushes and health monitoring to surveillance, and lighting control, it's clear that the long-prophesied days of smart connected devices are upon us. Alas, those devices come with wildly varying levels of I.Q., matched to users with equally varying levels of technological understanding.

It's not as though we didn't expect this day to come, we've been preparing for it since Isaac Asimov, The Jetson's, Star Trek, Arthur C. Clarke, William Gibson, and of course Steve Jobs expanded our minds and our imaginations. The question really is how big it's going to be, and how useful.

Tightly coupled to the Internet of Things (IoT), figures for the home automation market vary, but if you think 'big' and throw out a number, you'll probably be right. However, like almost every research firm, Transparency Market Research dutifully took an honest stab at quantifying it nonetheless.

By corralling home automation into the categories of security control, access control, lighting control, HVAC control, outdoor control, entertainment control, and standards, data distribution, and other communication protocols, TMR managed to put some numbers to it. According to this report, the market was valued at US$3.6 billion in 2012, and is expected to reach US$16.4 billion by 2019, growing at a CAGR of 24.6% from 2013 to 2019.
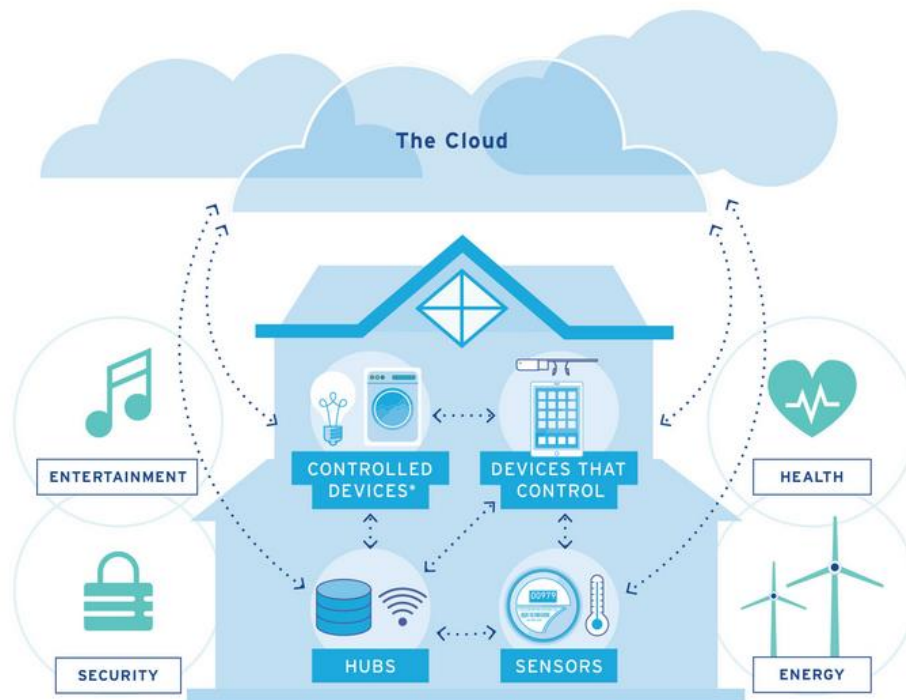
The home automation market, form security and health to energy monitoring and entertainment, will reach $16.4 billion by 2019, according to TMR. While their findings also identified some major hurdles, thanks to new platforms and innovation from all sides, many of those hurdles are shrinking, rapidly. (Image courtesy of TMR).

While numbers may vary, Transparency Market Research (TMR) put its finger on some very real and inconvenient truths. Specifically: while home owners want the supposed, "convenience, comfort, security, and entertainment value of home automation, the, the market is characterized by high-level inter and intra industry competition, complexity of solutions, multiple and incompatible standards, large number of networking technologies, and subsequent high-priced products." Clearly we have a way to go before reaching automation utopia.

Microsoft has also identified some of these issues in a report it completed with the University of Wisconsin called, "*Home Automation in the Wild: Challenges and Opportunities.*" Microsoft was researching a HomeOS at the time. The report studied a group of users many of whom relied upon 'ye olde' x10 networking technology. They found similar issues, but the over-arching response from users was that once systems worked, they enjoyed just being lazy. For example, one switch that could turn on all the first-floor lights. "It's just amazing!" one user quipped, obviously delighted to be able to so from the couch.

Ironically, the other reason they enjoyed it was the peace of mind and "security" aspect. The irony comes from the fact that home automation is now connected with the IoT and the latter is rife with security issues. Homeowners may already have more to be worried about from virtual attackers versus physical attackers.

But it's all under control if you take the right precautions according to Gary Davis, Chief Consumer Security Evangelist at [Intel](#) Security. If the various wired and wireless networks don't connect directly to the outside world directly, but instead through a suitably firewalled home gateway, then he's confident that the home network is secured.

You would be too, until you talk with Augustus 'Skip' Ashton, VP of software at Silicon Labs. Skip's amused take is that if any deterrents are put in place at the chip, system, or home level, that's ok: hackers will just get your data somewhere else. "There are so many other, easier, ways to access your personal information," he said. From "the edge" of the internet to the server, the portals for black-hat operators are everywhere. Home networks are, for better or worse, the least of our worries.

With the security issue more or less settled depending on how much insecurity you can handle, let's again take a quick look at the opportunities that Microsoft's researchers identified. For designers, there are some good ideas are floating amidst the data.

	Application	Have	Buy	Not
Con.	Ability to set 'Scenes'	24	5	0
	Centralized control of automation systems	24	4	1
Media	View computer content on TV	19	5	5
	Watch recorded TV on any TV in house	16	11	2
	View computer content on mobile phone	4	20	5
	Show mobile phone content on TV	3	13	13
	Transfer video calls between devices	0	13	15
Security/ Monitoring	Remote Access to home cameras	16	10	3
	Automatic Alerts (e.g. Stove left on)	9	18	2
	Remotely open front door	4	18	7
	Log people's use of devices	3	9	17
	Time limits across multiple devices	1	15	12
	Watch child pc use on TV	0	17	12
Environment	Thermostat that learns routines	16	10	3
	House Energy Monitor	3	23	3
	Turn devices on/off based on presence	3	20	6
	Adjust windows and shades automatically to keep house comfortable	1	24	4

Some of the top home automation devices users would be willing to buy include home energy monitoring, presence awareness, window and shade adjustment and door lock security. (Image Courtesy of Microsoft[1])

Some of the top opportunities, which we'll classify as those for which users surveyed were willing to pay, include home energy monitoring, remote alerts, remote access to home cameras, remotely opening the front door, intelligent thermostats, and adjusting windows and shades automatically.

Nest jumped early on the intelligent thermostat and got its payday when Google bought it for $3.2 billion in January of last year. However, the exciting thing about the age in which we live is that pretty much anyone can take a stab at being the next Nest. Thanks to the falling cost of silicon and electronic parts, the high availability of open-source hardware and software development kits (such as Arduino, Raspberry Pi), free application software, seemingly infinite online resources, and crowd funding through Kickstarter and Indiegogo, almost anyone from professional designers to DIY'ers is free at least *try* getting an idea off the ground.

For example, let's take the energy monitor application mentioned above. A small company called Neurio developed an energy-monitoring idea, put it on Kickstarter with a goal of raising $95,000. It raised over $267,000.

There are thousands of examples. It's not as easy as it looks, of course, and there's a process to follow, but getting that idea off the ground in an era of democratized design is easier now than it has ever been. But it's about to get a whole lot easier.

Development Platforms Gel: iOS vs Android, Redux

To date, many home-automation networks have grown up around relatively independent efforts, that is, in the absence of collaborative networks or standards. For example, Belkin has its Wi-Fi-based WeMo Switch and WeMo Motion Kit, Lowes has its Iris Home, Smart Home ecosystem for everything from IP video to smart plugs, Sonos does great audio, Phillips has Hue Lighting and Lutron has its light switch. Quirky's Wink got a bad rap in one reviewer's experience because when it came time to demonstrate it to his friends, nothing worked. (A link to the review is omitted; the language may offend some.)

With so many ideas around connecting home devices do we need so many proprietary ecosystems and wireless interfaces protocols? There is Wi-Fi, Bluetooth, ZigBee plus Z-Wave, and all with their own APIs and development environments? Maybe not.

Like smartphones, home automation development platforms are crying out for standardization, making it fertile ground for Intel, Apple and Google to ply their trade.

Last December, Intel announced its IoT Platform, a comprehensive suite of tools and support to ensure what it identified then as the five pillars of IoT: security, ease of use, seamless data ingestion and processing, clear customer value, and finally, services. The Platform comes atop an ecosystem that Intel had already developed for IoT and home automation around its Edison chips and Galileo boards.

Intel's goal is to make home automation and every IoT application simple to design, implement and use. However, when it comes to ease of use for Home Automation, Apple and Google are bringing their battle inside the home atop their smartphone platforms, iOS 8.1 or higher, and a skinned version of Android, called Brillo.

Apple's HomeKit will be incorporated into AppleTV Gen 3 and later, and partners announced to date include Lutron (lighting), EcoBee (thermostats), Insteon (LEDs to door locks), Elgato (wireless sensors), and iHome (smart outlets).

Elgato became one of five official partners within Apple's HomeKit ecosystem, making its Eve wireless sensors easier to use and integrate to, "make the home a smarter place."

Being official partners means the company's apps can be controlled by Siri and setup and discovery is automatic and devices can be controlled remotely over the Web.

While HomeKit itself was announced in June of 2014, Google's official entry into the Home Automation space came more recently: on May 28, 2015 it announced Project Brillo, a "polished down" version of Android for the IoT. Along with Weave, a protocol for communications between IoT devices, Google is also making development for the smart home as simple as possible.

Brillo, according to Google, will be available in Q3 of this year, while Weave will roll out over the coming months, with the developer stack coming sometime in Q4. To overcome the language barrier, Google will of course have interoperability testing and certification for Weave devices.

Brillo and Weave complement the Google and Nest-developed "Works with Nest" developer program that provides a web-based API that lets developers connect to Nest and use its expertise and learnings. It's proactively looking for developers to sign up. Knowing Google and Nest, it's worth a look.

The age of really smart devices versus devices that we *wish* were smart, is fast approaching.