The History of Smart Homes

http://www.iotevolutionworld.com/m2m/articles/376816-history-smart-homes.htm

The first smart homes were ideas, not actual structures. For decades, science fiction has explored the idea of home automation. Prolific writers, such as Ray Bradbury, imagined a future where homes were interactive, and seemingly ran themselves. In Bradbury?s cautionary short story, ?There Will Come Soft Rains? he describes an automated home that continues to function even after humans have died out. It?s all well and frightening, until you consider the actual benefits of home automation, and then the idea becomes more comforting than chilling.

Although the idea of home automation has been around for some time, actual smart homes have only existed a short while. This timeline focuses on hardware; meaning actual inventions leading up to the smart homes we know today and can expect from the near future.

1901 ? 1920 - The invention of home appliances

? Although home appliances aren?t what we?d consider ?smart,? they were an incredible achievement in the early twentieth century. These achievements began with the first engine-powered vacuum cleaner in 1901. A more practical electricity-powered vacuum was invented in 1907. Throughout two decades refrigerators would be invented, as well as clothes dryers, washing machines, irons, toasters, and so much more.

1966 ? 1967 - ECHO IV and the Kitchen Computer

? Although it was never commercially sold, the ECHO IV was the first smart device. This clever device could compute shopping lists, control the home?s temperature and turn appliances on and off. The Kitchen Computer, developed a year later, could store recipes, but had the unfortunate tagline, ?If she can only cook as well as Honeywell can computer? and therefore sold no models.

1991- Gerontechnology

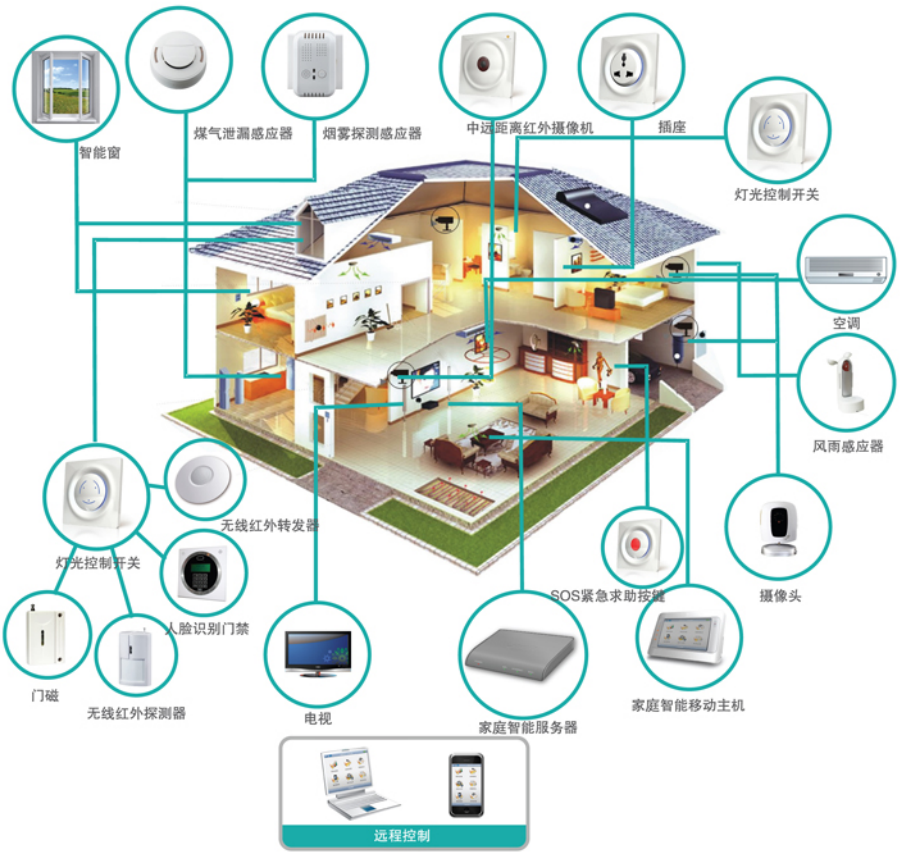
? Gerontechnology combines gerontology and technology and makes the lives of senior citizens easier. In the 1990s, there was a lot of new research and technology in this sector.

1998 ? Early 2000s: Smart Homes

? Smart homes, or home automation, began to increase in popularity in the early 2000s. As such, different technology began to emerge. Smart homes suddenly became a more affordable option, and therefore a viable technology for consumers. Domestic technologies, home networking, and other gadgets began to appear on store shelves.

Today?s Smart Homes - Today?s smart homes are more about security and living greener. Our smart homes are sustainable, and they help to ensure that our homes aren?t expending unnecessary energy. They also help alert us to intruders (whether we?re home or not).

Current trends in home automation include remote mobile control, automated lights, automated thermostat adjustment, scheduling appliances, mobile/email/text notifications, and remote video surveillance.



From a technical perspective, Home Automation consists of five building blocks:

http://www.openremote.com/wp-content/uploads/2013/12/How-To-Smart-Home-PDF-OR.pdf

? devices under control (DUC) ??????

? sensors and actuators???????

? the control network???

? the controller ???

? remote control devices ????

Devices under control are all components, such as home appliances or consumer electronics, which are connected to and controlled by the home automation system.

Sensors are the eyes and ears of the home network. There are sensors for a wide range of applications such as measuring temperature, humidity, light, liquid, and gas and detecting movement or noise. **Actuators** are the hands of the home network. They are the means

of how the smart network can actually do things in the real world. Depending on the type of interaction required, there are mechanical actuators such as pumps and electrical motors or electronic actuators such as electric switches and dimmers.

The control network provides the connectivity between devices under control, sensors, and actuators on the one hand and the controller along with remote control devices on the other hand. There are three main technology options for home and building automation control networks today:

? Powerline Communication

? Wireless Transmission

? Wireline Transmission

In general, control networks based on power line communication and wireless transmission are dominant in residential home automation due to lower component prices and installation cost. Wire line control networks, on the other hand, are found in the premium residential segment and in industrial building control applications.

The controller is the computer system which acts as the brain of the building automation system. It collects information through sensors and receives commands through remote control devices. It acts based on commands or a set of predefined rules using actuators or means of communication such as loud speaker, email, or telephone.

One of the main reasons for the increased acceptance of home automation systems in the residential segment is that, with the omnipresence of smart phones and tablets, the need for dedicated automation control devices has vanished. Within a few years, literally all home automation systems on the market have introduced smartphone and tablet based control applications. In addition, advances in voice recognition have finally brought voice based control to smart homes as well.

The remote control devices act by connecting to the home automation application on the home controller. They do this eitherby connecting to the controller through the control network itself, or through any other interface the controller provides, such as WLAN,the Internet, or the telephone network. Thus, the use of smartphonesas a home remote makes the capability of remote building control via Internet or the mobile telephone network a feature which is available as a default.

Examples:

Concept MFC (Maison France confort) 2020

Une maison intelligente et durable au service de ses occupants

http://www.construireavecsaint-gobain.fr/wp-content/uploads/2012/09/DossierDePresse.pdf

http://www.constructalia.com/francais/actualites/plus_dactus/plus_dactus100/concept_mfc_2020_une_maison_intelligente#.VlHBYGAirlI

Le **Concept MFC 2020**

est un projet unique en Europe. C?est le pari ambitieux défendu par le Groupe Maisons France Confort : construire un habitat pilote conçu pour être la vitrine des techniques de pointe en matière d?architecture et d?urbanisme durables. Une démarche pionnière dont la clé du succès tient à la fédération d?un pool de compétences composé de 16 industriels partenaires, acteurs majeurs du Bâtiment ou de leur propre secteur d?activité. La maison de demain sera**résolument autonome et douée d?intelligence**

. En intégrant les technologies les plus innovantes et les plus performantes, le Concept MFC 2020 fait preuve d?une énergie débordante. L?installation du système domotique et de la technologie SMART GRID est l?occasion de faire le point sur l?avancée des travaux.

Ce projet entend résoudre une nouvelle équation : **?Habitat individuel + voiture électrique = zéro énergie, zéro CO2?**

. Démarche pionnière en Europe, pour la première fois, un concept associe, dès la phase conception, logement et transport décarbonnés. Cette équation ambitieuse repose en effet sur une mise en ?uvre audacieuse. Le Concept MFC 2020, maison réellement à énergie positive, entend dégager quotidiennement un excédent d? é nergie pour assurer l?alimentation des batteries du vé hicule é lectrique, a? raison d?une autonomie de recharge minimale de 60 km/jour. La construction de cette maison se positionne en effet bien au-delà de la réglementation en intégrant tous les usages de la maison dans l?é laboration des calculs thermiques (é clairage, informatique, é lectromé nager, voiture...).

Function:

- Real-time video monitoring in each door camera
- In-house call among VDPs and sub phone
- Brightness and volume control with OSD menu
- Various model of cameras can be connectable

http://research.microsoft.com/pubs/157701/homeos.pdf

Microsoft HomeOS

A platform that bridges this gap by presenting users and developers.

Microsoft has identified the challenges faced by today's home technology:

1. Management: Unlike other contexts (e.g., enterprise or ISP networks), the intended administrators are non-expert users. But the management primitives available to users today were originally designed for experts. As a result, most users find them hard to use.

2. Application development: Users want to compose their devices in various ways and software should be able to do just that, but heterogeneity across homes makes it difficult to develop such application software.

3. Incremental growth: Users frequently want to grow their technology incrementally, as their preferences evolve. Such growth is difficult today because users cannot tell if a given piece of technology will be compatible with what they currently have.

HomeOS uses a layered architecture (Figure 1) to bridle the complexity of the home environment and address the challenges faced by today?s home technology. The key elements of their approach are: (i) providing users with management primitives and interfaces that align with how they want to manage and secure their home technology, (ii) providing application developers with high level APIs that are independent of low level details of devices, and (iii) having a kernel that is independent of specific devices and their functionality. Our design borrows heavily from traditional OSes but also differs from them in a few key ways.

Layered architecture:

The Device Connectivity Layer (DCL) solves the problems of discovering and associating with devices.

The Device Functionality Layer (DFL) takes the handles provided by the DCL and turns them into APIs (**A**pplication **P**rogramming **I** nterface) that developers can easily use.

The management layer in HomeOS provides two key functionalities. First, it provides a central place to add and remove applications, devices, and users as well as to specify access control policies. Second, it mediates potentially conflicting accesses to devices ensuring that applications do not need to build their own mechanisms to handle shared devices.

The application layer is where developer-written code runs. The key feature this layer provides, beyond the ability to use and compose devices, is the ability to determine if an application is compatible with the home and what services and/or devices are missing if it is not.