

Smart Homes

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Overview

A smart home is a residence that uses internet-connected devices to enable the remote monitoring and management of appliances and systems, such as lighting and heating. Smart home technology, also often referred to as home automation or domotics, provides homeowners security, comfort, convenience and energy efficiency by allowing them to control smart devices, often by a smart home app on their smartphone or other networked device. A part of the Internet of things (IoT), smart home systems and devices often operate together, sharing consumer usage data among themselves and automating actions based on the homeowners' preferences.

How Smart Homes Work

The goal is to connect the devices in your home so they can communicate with each other and with you. The Internet of Things is a phrase that refers to the objects and products that are interconnected and identifiable through digital networks. This web-like sprawl of products is getting bigger and better every day. All of the electronics in your home are fair game for this tech revolution, from your fridge to your furnace.

Ways to Connect

- X10: The original smart home technology, X10 allows devices to connect over existing electrical wiring in your home (e.g. network tools to create data ports). X10 has limitations – connections over electrical lines are “noisy” and can lose commands or see commands that aren’t there. For this reason most networks now use wireless access.
- Z-Wave
 - Mesh network – This means there’s more than one way for the message to get to it’s destination
 - Uses a Source Routing Algorithm to determine the fastest route for messages
- ZigBee
 - Also Mesh network
 - Uses more of a brute force, zig zag method of sending signals – slower but less draw on the network
- Insteon
 - Dual-mesh network – communicates over both wireless and electrical wires

Notes:

- <https://www.z-wave.com/> - Z-Wave hub is required to work with home systems
- Google Home doesn’t use Zigbee or Z-Wave
- Amazon Echo uses Zigbee but NOT Z-Wave
- Remember to place wireless network nodes to cover the area your smart devices will be in

Categories of Devices

There are countless individual smart home devices available, but just to give an idea of possible improvements we'll discuss the categories below:

- Overall – general smart home tools (e.g. Amazon Echo, Amazon Cloud Cam)
- LED Bulbs
- Home Security – from full systems to individual items like smart locks, door bells and cameras
- Locks – remote control deadbolts, key free locks, garage door openers
- Smart thermostats – programmable, remotely controllable temperature settings that can be set to learn your patterns and adjust accordingly
- Smart plugs and switches – use to control older equipment
- Smart leak detectors
- Robot vacuums
- IFTTT devices – devices for programming a series of behaviors. Google Home is a recommended tool for this

Benefits

This is always a question of what is helpful for you and what you would like to do. The main benefits of going to the trouble and cost of putting in smart home technology are the following:

- Savings – over time more efficient tools should save considerably on energy costs
- Convenience – being able to use (or stop using) devices in your home from anywhere with minimal effort has obvious benefits. At first glance this might seem like laziness but there is also a security element for things forgotten
- Efficiency – this is closely related to the convenience issue. The idea of being able to clean up messes immediately and remotely, or to begin an ordering process as soon as you run out of a household item can clearly make life run smoother.
- Safety – particularly for those living alone smart homes can simplify calling for help

Talking in general terms is important but I'll give some more concrete examples here:

- Cameras that track the home's exterior and react to movement even if it's dark
- Controlling your thermostat from anywhere you have a wifi signal
- LED lights that let you control color and brightness from your smart phone
- Motion sensors that will send an alert if there's motion around your house
- Ability to turn appliances on from your phone or tablet
- Automatically lock your door when you leave for work
- Turn off the lights with one word
- Get a notification when your kids walk in the door
- Door locks and garage doors that open automatically as you approach
- Get an alert if your house has a leak
- Check in on napping kids over your phone
- Trash cans that monitor what you throw away and generate online orders for replacements
- Refrigerators that create recipes based on the ingredients stored inside

- Washers and dryers that text you when their cycle is done
- Feed your pets on a schedule with a preset amount of food
- Control television use
- Warm the bedroom in the morning
- Light a path to the bathroom at night

It's important to remember that you can do as much or as little automation as you like.

Smart Home Security Concerns

Smart Home devices are, by their nature, Internet enabled. Therefore they are vulnerable to attacks from bad actors on the Internet. There are a few major concerns:

1. The device itself could be exploited (e.g. thermostat data taken to calculate when you aren't home, webcams observed, etc.)
2. The devices could be used collectively for large scale attacks
3. The devices could be used as a way into your network

Ways to reduce your risk:

1. Use a more secure WiFi router
2. Research privacy, update, and security policies of the devices you are considering buying
3. Give your router a name
4. Set up a guest network so no one else is connected to the same network as your Smart Home devices
5. Change default usernames and passwords
6. Disable features, particularly remote access, that you may not need
7. Keep your software up to date
8. Use two factor authentication at all times
9. Hide your network

Other Concerns

- Many smart home products use their own apps. This can add complexity and clutter to your digital life
- Cost

If This Then That (IFTTT)

<https://ifttt.com/>

IFTTT is a web based free service that will help you create applets to perform tasks. When you create an account they will ask what services you frequently use and begin there. Several popular options will be presented based on your selections. You can also search for options that you are interested in, for example I searched for "lights" and found options like "automatically turn your lights on at sunset" or "turn on and off your lights at the touch of your phone."