

SMART HOME



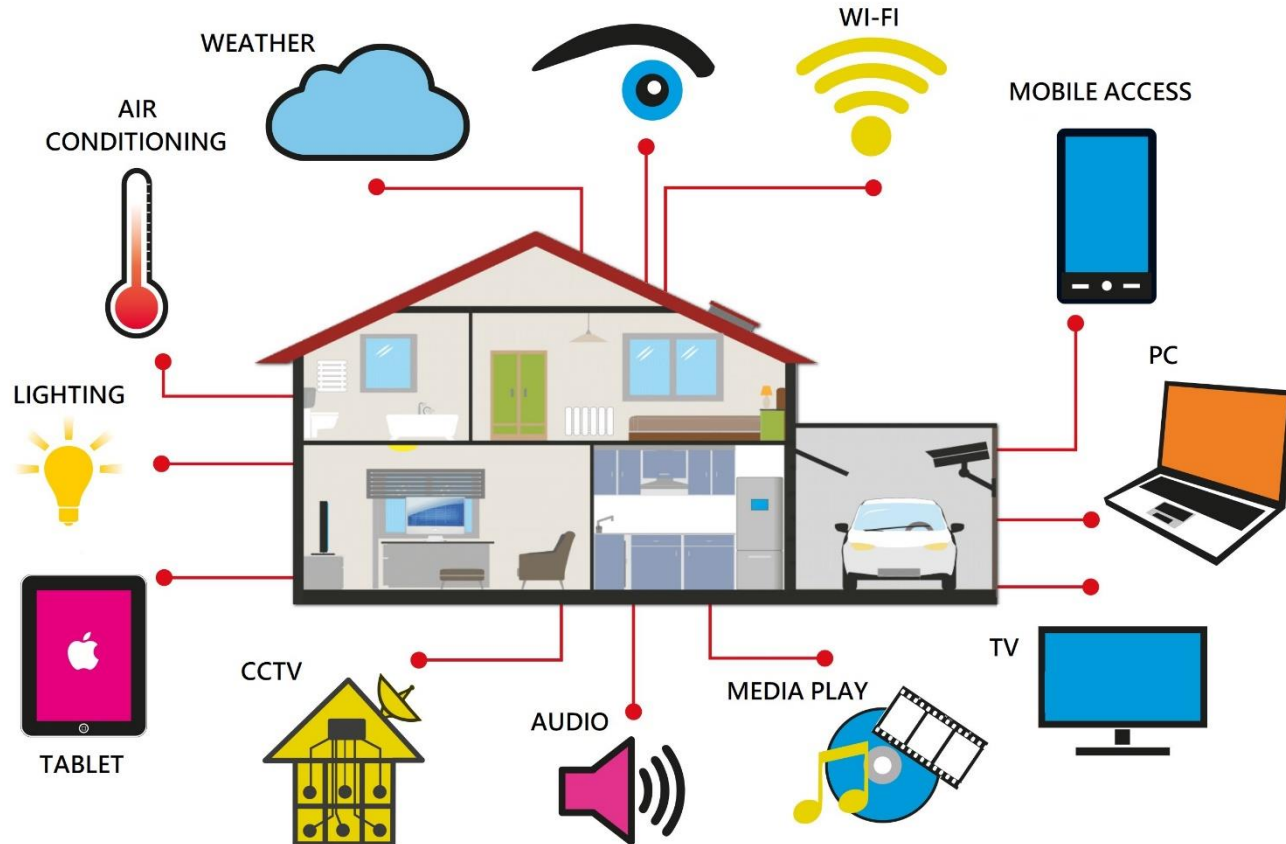
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Assistant Professor (CSE)



Smart Homes

- When you assemble a collection of smart devices under one roof, and you enable them to connect to and communicate with one another, what you end up with is called the **Smart Home**.

SMART HOME SYSTEM



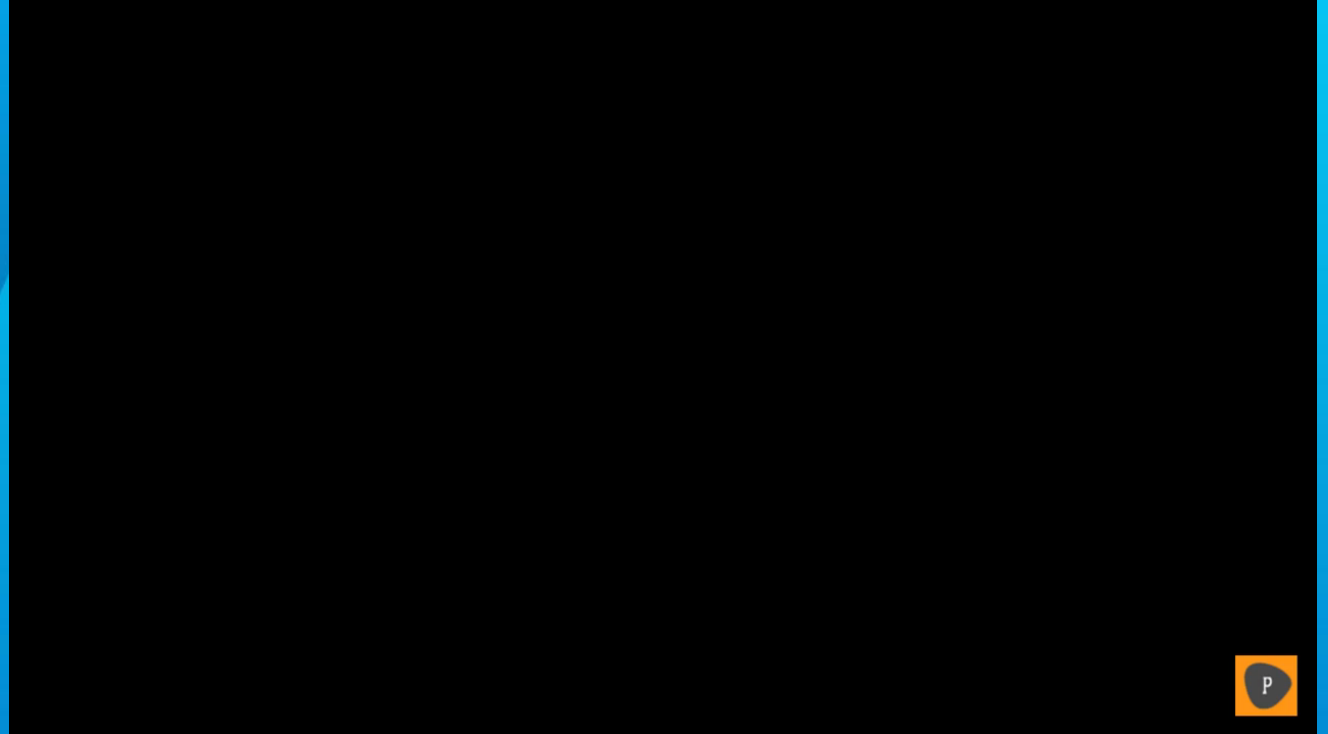
Convenience

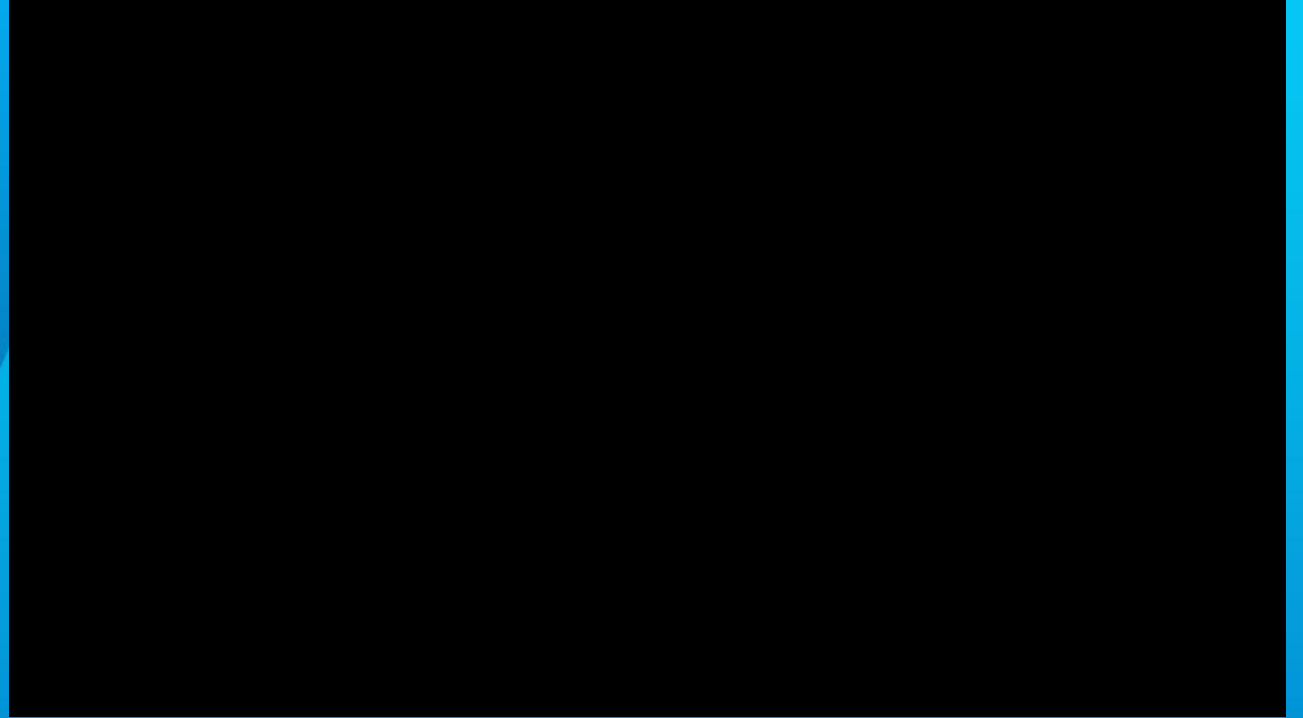




- Less you have to do.
- Less you have to remember to do.
- Home do most of the work for you.
- Ability to control everything from your smartphone or computer.

Security





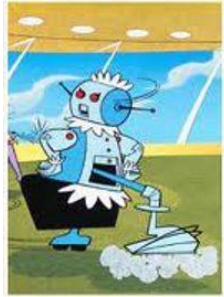


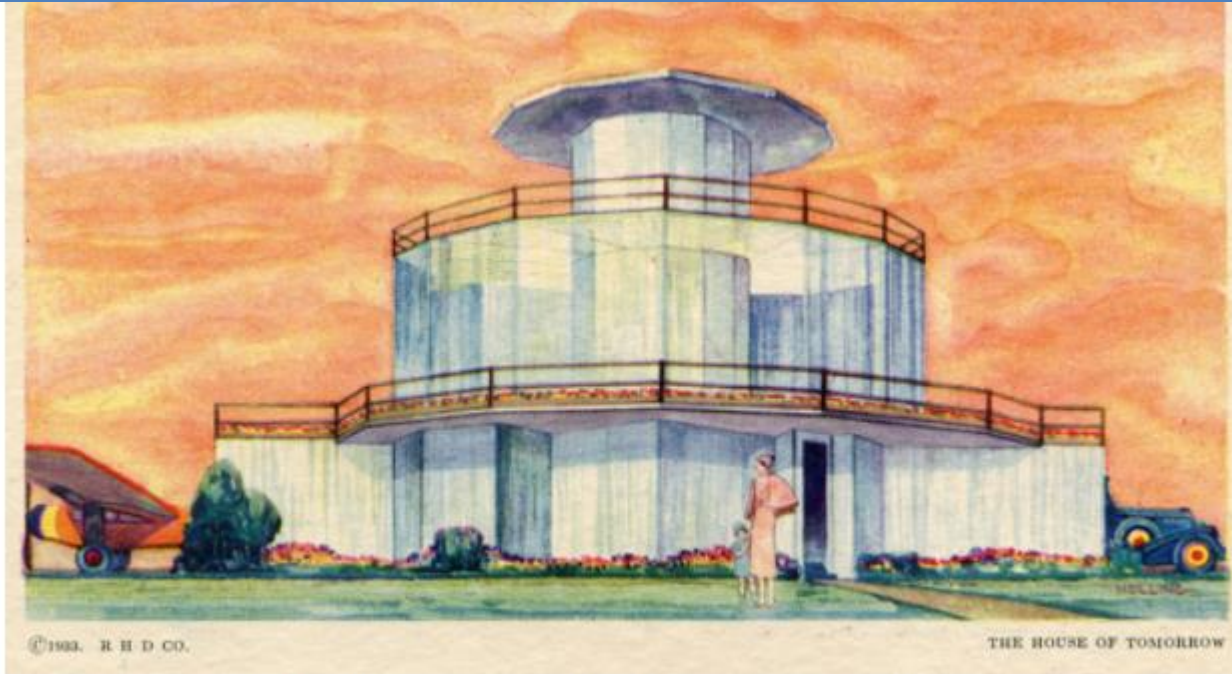
Efficiency

- Know more than you to save energy.
- Smart appliances are scheduled to run.
- Save energy without your knowledge.

Short History of Smart Homes

- Science Fiction writing & Cinema.
 - 1950 – Robots & Self servicing Kitchens.
 - 1960 – Jetsons cartoon & Robotic maid Rosie.
 - 1977 – Thriller Demon Seed
- 1915 to 1920
 - Birth of electricity & electrical home appliances.





A postcard of the House of Tomorrow from the 1933 Century of Progress World's Fair in Chicago shows garages for both car and airplane. (Collection of Steven R. Shook)

https://en.wikipedia.org/wiki/1933_Homes_of_Tomorrow_Exhibition



X10 Project

- 1975 – Scottish company Pico Electronics X10 Project.
- 10th Project of the company.
- In X10 system, all the appliances and electrical receivers and the items you use to control the system are transmitters.
- You install the necessary receivers and transmitters to automate a given series of tasks.



- Cost of electronic home controls fell throughout 1980s and 1990s.
- Remote control and Intelligent control technologies began to be adopted.
- High end home theater and automation systems.



Smart Steps for Smart Home

- Step 1 : Basic communications
- Make members of home to communicate to members outside home.
 - Mobile phone.
 - Landline phone.
 - Internet phone.



Smart Steps for Smart Home

- Step 2 : Simple Steps
 - Locking & Unlocking doors.
 - Turning on & OFF lights.
 - Checking for email (Turning on Light notification)
 - Fall detect & Assist (alarm notification)



- Step 3 : Automating Basic Functions
- Automation of
 - Room temperature
 - Lights ON & OFF
 - Activate & deactivate alarm system
 - Activate sprinkler system



Smart Steps for Smart Home

- Step 4 : Tracking & Taking action
- Tracking of activity patterns, sleep patterns, health status.
- AI based decision making based on the analyzed data.
- Take action based on your activities.
 - Indication for fire.
 - Indication for water leakage.



- Step 5 : Prompting activities and Answering Questions
 - Ask questions about news, schedules, deadlines.



- Step 6 : Automating tasks
 - Schedules maintenance and repairs.
 - Reorder medicines before it run out,
 - Prepare grocery list.
 - Run a robotic vacuum cleaner



Simple Components for a Smart Home

- **Sensors**
 - To determine the status of our environment and of various devices.
 - Detect temperature, humidity, light, noise and motion.
 - Smoke and carbon monoxide levels
 - Proximity sensor detects whether doors and windows are open or shut.
 - Status of a given device.
 - Location of devices and people.



Simple Components for a Smart Home

- **Controllers**
 - To send signals to other devices to initiate some sort of operation.
- **Actuators**
 - Typically a mechanical or electrical device that actuates a given activity.
 - Electronic light switches
 - Motorized valves



Simple Components for a Smart Home

- **Buses**

- Communication system that transfers data between devices in a smart home.
- Within the home to communicate with one another.
- Must be compatible with same bus type.

- **Interfaces**

- Enables the communication between different devices or between humans and devices.
- Device to device communication interface.
- Device to human communication interface.



Simple Components for a Smart Home

- **Networks**
 - Communication take place over some sort of networks
 - Wired or wireless
 - WiFi, Bluetooth



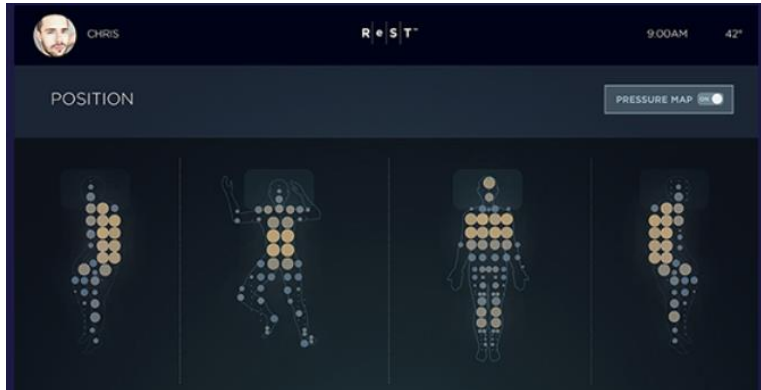
Smart Living with Smart Furniture



Smart Mirror



Responsive Surface Technology



Luna co-founder Matteo Franceschetti presents a pretty appealing vision of what it can be like to go to bed: As you lie down, the lights, temperature (of both the bed and the room), and the music all adjust to a setting of your choice. Then as you fall asleep, they adjust again, perhaps turning off completely.



Smart Living with Smart Lighting



Smart Lighting

- **Belkin**—Its WeMo Smart LED Bulbs can be controlled by the company's WeMo Link system. Insert a WeMo bulb into your lamp and then control it (over Wi-Fi or 3G/4G) with the WeMo Light Switch, WeMo Motion (motion detector), or WeMo App. The WeMo App lets you register each light bulb, rename it, and customize rules for its operation.
- **FX Luminaire**—Specializes in landscape and architectural lighting. The company offers a variety of LED lights that can be controlled via traditional programming or smartphone app.
- **Lutron**—Has long been a player in custom-installed, whole-house automated lighting systems. The company offers a variety of home automation solutions that enable you to control your home's lighting, window coverings, and heating/cooling systems—all wirelessly, using Lutron's controllers or smartphone apps.



Smart Lighting

- **Philips**—Offers Hue Connected Bulbs that can be controlled via the company's smartphone app, shown in Figure 5.3. You can program individual LED bulbs to turn on or off, brighten or dim, or change color.
- **Connected by TCP**—Offers smart LED bulbs of various types and sizes that, when connected to the company's lighting gateway, can be controlled by the Connected remote control or their smartphone app.



Smart Living with Smart Windows



Smart Windows





Smart Windows





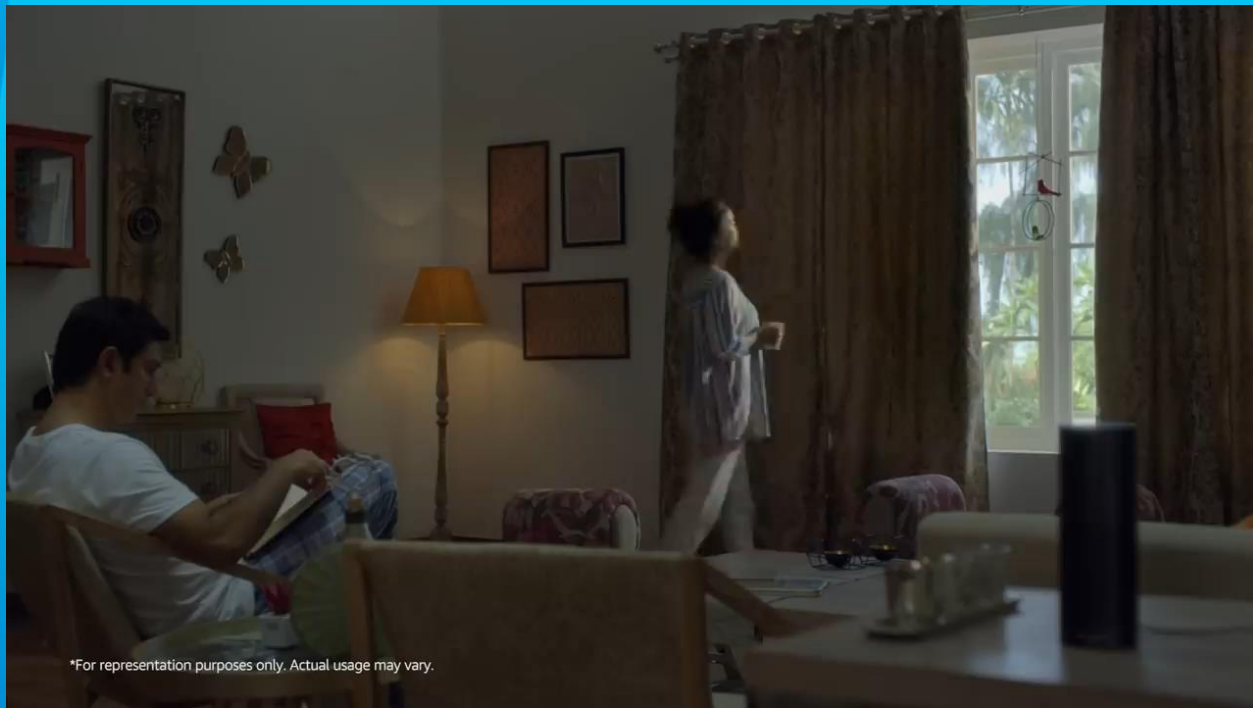
Smart heating and Cooling with Smart thermostat



This is
Nest Thermostat
from Google



Amazon ECHO – Smarter Information





Reimagining Smart Network



INSTEON®



Insteon Hub

Home control for the rest of us



Plug-In Devices

Lamps and small appliances



Wall Switches

Advanced remote control switch



Wall Outlets

Built in remote control



Wall Keypads

Control multiple devices



Sensors

Give your home some sense



Thermostats

Heat and cool your home



Remotes

Wireless, anywhere control

<https://www.insteon.com/sensors-menu>



Technology Compared

	Insteon	Z-Wave	WiFi	Bluetooth	Zigbee
Maximum Theoretical Network Size	Unlimited	232	256	9	256
Maximum Practical Network Size	1,000s	30-35	Dozens?	9	Dozens?
Physical Layer 1	RF	RF	RF	RF	RF
Physical Layer 1 Frequency	915MHz	915MHz	2.4GHz	2.4GHz	2.4GHz
Physical Layer 2	Powerline	-	-	-	-
Physical Layer 2 Frequency	132KHz	-	-	-	-
Mesh Enrollment	Automatic	Procedural	Procedural	Procedural	Procedural
Operate W/O Hub	✓	-	-	-	-
Cost	\$	\$\$	\$\$\$	\$	\$\$

<https://www.insteon.com/technology#ourtechnology>



Click the category below to learn more about Z-Wave Smart Products

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SMART LIGHTING

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SMART LOCKS

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SMART SENSORS

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SMART HUBS



<https://www.z-wave.com/>



Smart Sensors

WATER/FLOOD SENSORS.

Detect water, and alert you so you can take action to avoid damage to your home.

SMOKE / CO SENSORS.

Keep you informed if your home has a fire or a carbon monoxide issue.



Smart **SENSORS**

MOTION / MULTI SENSORS.

Detect motion, multi-sensors detect motion and much more.

DOOR / WINDOW SENSORS.

Check the status of your doors and windows



YOUR WAY

A collection of icons representing various aspects of digital security and technology. The icons include a smartphone with a house icon, a laptop, a server, a key, a padlock, a speech bubble, a cloud, a document, a magnifying glass, a thermometer, and a red bomb. The icons are arranged in a circular pattern around a central smartphone icon.

<https://zigbeealliance.org/>



ZigBee	Z-Wave
Data Rate: 250kb/s	Data Rate: 40kb/s
Power Consumption: ~40mA	Power Consumption: ~2.5mA
Range: 10-20 meters	Range: 30-65 meters
Operates at 2.4GHz	Operates at 908MHz
Chips and modules available from multiple manufacturers	Chips only sold by Silicon Labs
Variable certification process	Strict certification process
Supports over 65,000 end nodes	Supports over 232 end nodes
More difficult to configure and set up	More user-friendly and easier to set up
More cost-effective	More expensive than Zigbee

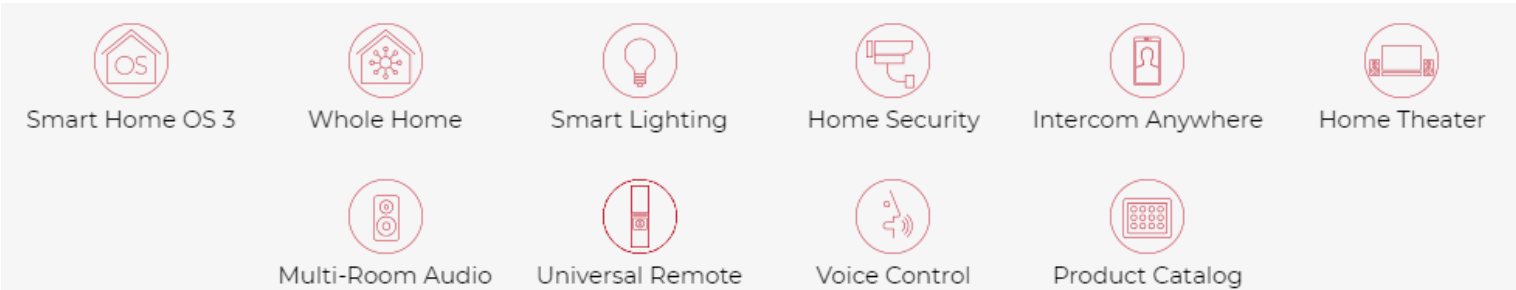


Controlling the Smart Home



Control4

- Control4 is a provider of automation and networking systems for homes and businesses, offering a personalized and unified smart home system to automate and control connected devices including lighting, audio, video, climate control, intercom, and security.



<https://www.control4.com/>



- **Crestron Electronics** (or simply **Crestron**) is an American privately held multinational corporation, and manufacturer and distributor of audiovisual automation and integration equipment.
- The company designs, manufactures, and distributes equipment used to control technology in commercial audiovisual environments such as meeting spaces, conference rooms, classrooms and auditoriums; Crestron equipment is also used for high-end residential audiovisual installations

your idea of comfort

A warm room on a cool night. Smart shades that open to the nighttime sky. Just the right lighting for any occasion. Crestron Home finds your comfort level. Instantly.

your idea of entertainment

The home theater you've always imagined. A sound system that fills your home with music. It's your idea of entertainment. Crestron Home merely makes it happen. Effortlessly.

your idea of peace of mind

Complete control means complete peace of mind. Knowing all it takes is the touch of a button and your home is secure. At home or away. Crestron Home offers everything you need to make you feel safe and sound.

<https://www.crestron.com/Products/Market-Solutions/Crestron-Home#>



- HomeSeer Technologies LLC is a technology company based in Bedford, New Hampshire, in the United States. HomeSeer makes home automation controllers and software, designed to integrate lighting, HVAC, security, AV and other subsystems in most homes.



Lights

Your lights come on when you want them to, for safety, security & convenience.



Garage Doors

Ever forget to close your garage doors? Those days are over.



Thermostats

Get a handle on your heating & cooling costs without breaking a sweat.



Door Locks

Keep tabs on the kids or let the contractor in when you're not home.



Water Valves

Is the hot water heater leaking? Our smart valves come to the rescue.



Cameras

Keep an eye on your property, your family, your life with our security cameras.



Iris

- Iris is a line of home automation devices sold by Lowes.
- Iris control hubs, smart wall plugs, contact sensors, motion sensors, thermostats, surveillance cameras, smoke detector, water leak detectors, door locks
- Can be controlled by smartphone App or voice commands



mControl

- Digital home software control platform dubbed mControl.
- Connects devices using INSTEON, X10 and Z-Wave.
- Controls connected lightings, thermostats, home security systems, audio/video systems.

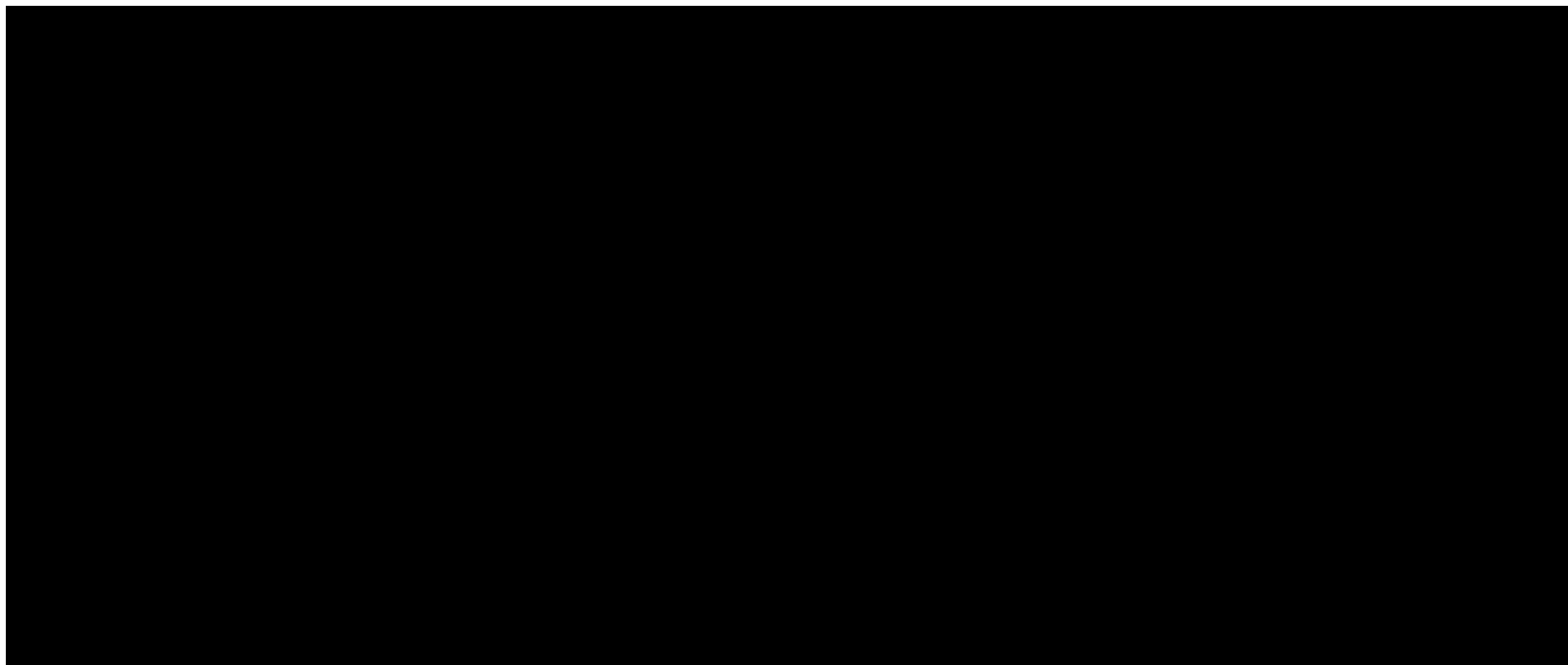


Quirky + 

Quirky



SmartThings

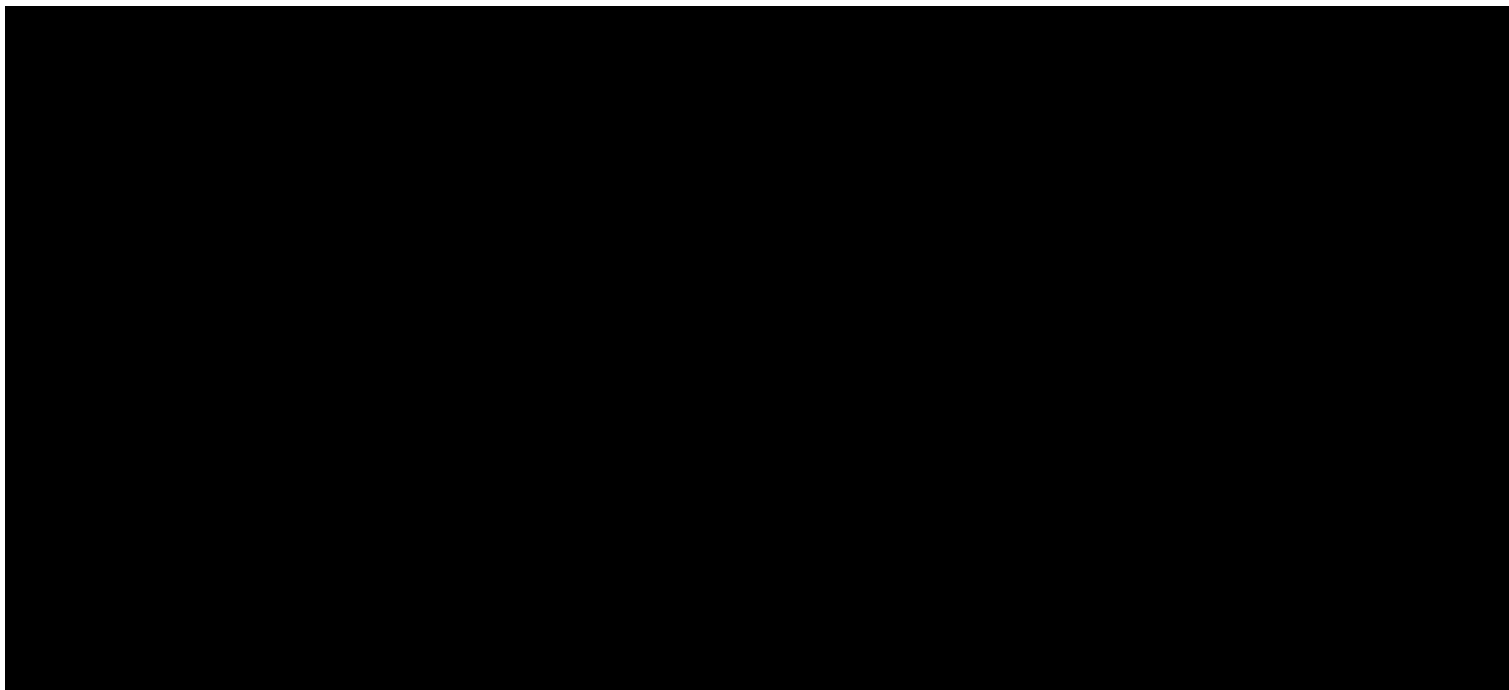




Vera Smart Home Automation



VIVINT SMART HOME





WiFi Smart Outdoor Plug



WiFi Smart Dimmer



WiFi Smart Plug



Light Switch 3-Way



Mini Smart Plug



Insight Smart Plug



Light Switch



Bridge

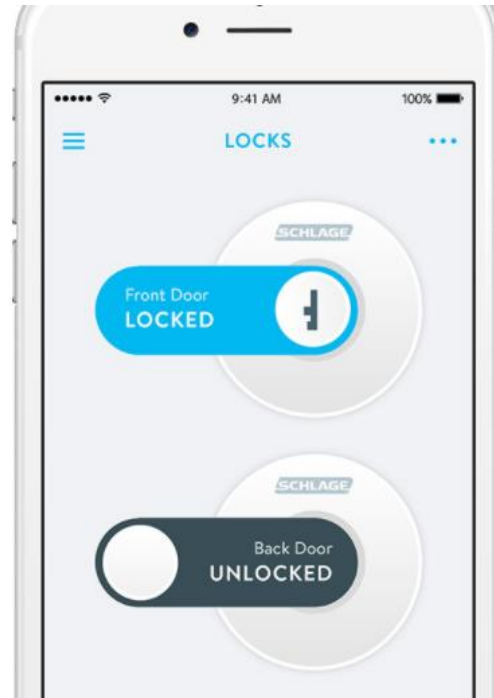


wink

THE WINK APP

A SMARTER APP FOR THE SMART HOME

Lights. Power. Security. Now they're all connected through a single app, so you don't need a different one for every product. Simple controls allow you to monitor and manage everything in your home. This means it can do more for you, and you can do less. Finally.





HOME GADGETS
SINCE 1978



WS13A Decorator Wall Switch
\$34.99

Add to Cart



KR19A Keychain Remote Control
~~\$49.99~~
Special Price \$14.99

Add to Cart



X10 3 Pin Plug In Appliance
Module AM466
~~\$22.99~~
Special Price \$16.99

Add to Cart



LM465 Lamp Module
~~\$22.99~~
Special Price \$17.99

Add to Cart



AM486 Appliance Module 2-Pin
Polarized
~~\$21.99~~
Special Price \$16.99

Add to Cart



MT14A 64-Event LCD Mini Timer
(New MT13A)
~~\$54.99~~
Special Price \$45.99

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