

Hillingdon u3a
Computer Club

Home Automation (the Smart Home)

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Home Automation

Tasks Happen Automatically, Not Manually

This means getting your home to do things for you without needing to be told.

Examples:

- Lights turn off when everyone leaves.
- Heating slows down when windows are open.
- A fan turns on when the temperature rises above a set point.

Automation is about eliminating repetitive tasks and improving daily living.



Home Automation

Home automation is the use of Smart Devices:

Devices - Smart lights, thermostats, locks, plugs, blinds, appliances, cameras.

Sensors- Motion, temperature, humidity, CO₂, leaks, door/window.

Controllers - Apps, hubs, voice assistants, dashboards, local servers.

Logic Engine – The If / Then processes.

Examples :

Triggers: when motion is detected

Conditions: only after sunset

Actions: turn on hallway light

Being called : **Domotics**

Smart Home

A Smart Home is a home environment where appliances and devices can be automatically controlled remotely from anywhere with an internet connection using a mobile or other networked device. Also called IoT.



Pro's

- Wireless or hardwired
- Commercial system £1k+
- Current Smart Home products can cost a few £100's



Smart Home

Advantages of Smart Home Automation

- **Convenience:** Simple and easy way to automating daily tasks
- **Energy Efficiency:** Taking care of unrequired wolfhounds
- **Security:** Improving home security with smart technology
- **Sustainability:** Advocating for eco-friendly practices

How it Works



Home automation has three main components that work together: a hub, a network, and devices. Very basically they work like this:

The hub gives the commands.

The network communicates the commands over Wi-Fi, Bluetooth, Zigbee/Z-Wave, Thread and now Matter.

Smart devices receive the commands and carry them out.



How it Works : Example



The hub could be a Google Nest Hub Max or an Amazon Echo Show.

It could also be a local (non-cloud-based) option like Home Assistant

Or just your smartphone with an automation app such as IFTTT.

Your hub would then send the command over Wi-Fi, Zigbee, or Thread/Matter. Finally, your smart bulb would receive the message and flip on the lights for you automatically.



The X10 Systems

- X10 developed in **1975** by **Pico Electronics**, Scotland.
- In the 70's, **No mainstream home automation**, no Wi-Fi smart hubs or IoT .
- Pico wanted to control lights and appliances remotely without rewiring homes

Their breakthrough idea was **use existing power lines as a communication network**

Brief History

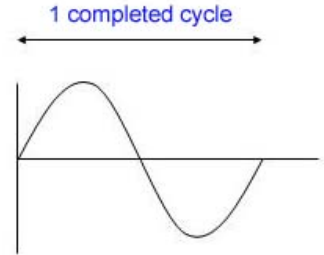
Power-line carrier (PLC) technology

X10 used **PLC** meaning control signals were sent across the home's electrical wiring. Worked by transmitting data at the **zero-crossing point** of the AC cycle

Signals were one-way: controllers → devices

Radical for the time as any home with electricity could use automation without special wiring.

Commercial X10 devices were on sale in the 70's until 2000's but limitations too much





Modern Technology Protocols

- **Ethernet (1983)**
- **Wi-Fi-based IoT devices (1999)** Simple and familiar, but power-hungry
- **Z-Wave (2001)**: Secure choice for alarms and locks
- **Zigbee (2004)**: Reliable mesh for everyday smart homes
- **Thread (2020's)**: Fast, local, battery-friendly mesh
- **Matter (2020's)**: New & versatile backed by big brands



Technology

	Wifi	Bluetooth	Zigbee	Thread	Z-Wave	Matter
Range	100m	100m	10m	30m	30m	Depends
Power consumption	High	Low	Medium	Low	Low	Depends
Hub to WiFi	No	Yes	Yes	Yes	Yes	Depends
Network	WiFi	Direct / Mesh	Mesh	IPv6 Mesh	Mesh	Depends
Popularity	Many	Many	Several	Few	Few	Few



Technology

Device	Wi-Fi	Zigbee	Z-Wave	Thread
Smart Speakers/Hubs	Yes	Yes	Yes	Yes
Smart Plug	Yes	Yes	Yes	Yes
Smart Light Bulb	Yes	Yes	No	Yes
Smart Switch	Yes	Yes	Yes	Yes
Smart Thermostat	Yes	No	No	Yes
Door/Window Sensor	No	Yes	Yes	Yes
Motion Sensor	No	Yes	Yes	Yes
Water Leak Sensor	No	Yes	Yes	Yes
Smoke/CO Detector	Yes	Yes	Yes	Yes
Smart Lock	Yes	Yes	Yes	Yes
Video Doorbell	Yes	No	No	No
Security Camera	Yes	No	No	No
Garage Door Controller	Yes	Yes	Yes	No
Smart Blinds	Yes	Yes	Yes	Yes



Security

Any equipment in your home that communicates with another piece of equipment in or outside your home is a potential security risk, even smart bulbs.

The good news is, many manufacturers review IoT device vulnerabilities now.

But ultimately, our digital security is up to us.

Technology

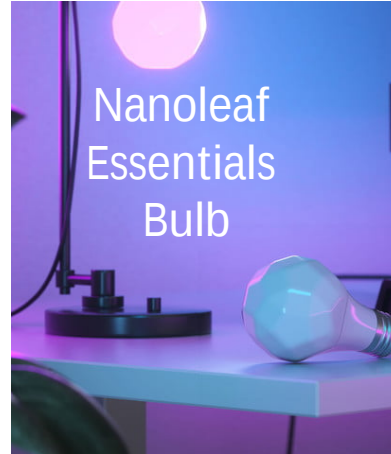


Zigbee Devices

Technology



Apple HomePod Mini



Nanoleaf
Essentials
Bulb



Apple TV 4K Gen 2



Eve Energy Smart Plug

Thread Devices



Google Nest Hub Max



Home Automation Systems

Home Automation Systems to look at

Home Assistant - an open source smart home platform for connected devices.

Apple HomeKit - perfect for iPhone users who want to expand their smart home. It runs on the HomePod mini smart speaker or the Apple TV 4K streaming device.

Google Home – provides a great app experience, similar to Apple Home. It's one of the easiest and most intuitive to navigate.

Amazon Alexa – provides top-of-the-line voice control. As the popular virtual assistant is widely considered to be the most accurate and responsive. It works with thousands of smart home products across different connectivity requirements, including Wi-Fi, Bluetooth, Zigbee, and Matter.



Home Automation Systems

Home Assistant - Screen Views

New section

Imported cards

Bedroom

CO2 level

419 ppm

Luminance

0.0 lx

Bedroom Cloud Light

Bedroom Hue Bowl

Clear, night

16.1 °C

21.3 °C / 10.2 °C

Tue

21.3°

10.2°

Wed

25.5°

15.4°

Thu

22.8°

6.7°

Fri

19.5°

6.3°

Sat

15.2°

10.6°

Air conditioner

Off

22.2 °C

20 °C

Party Mode

Off

Bedroom

Off

Bedroom Salt Lamp

Off

Home Assistant

Overview

Debug

Playground

Tablet

Energy

Map

Living room

Bathroom

Office

Bedroom

L-lightLINE

Naked

Bathroom Mirror Top

Bathroom Mirror Bottom

Elgato

Office Aurelle

Enter search criteria							
#	Pic	Friendly name	IEEE Address	Manufacturer	Model	LQI	Power
1		Loft temp and humidity	0xf4425000165a0000 (0x536C)	Third Reality	3RTHS0224Z	136	
2		Smart plug 5	0xa4c138754b5a765e (0x2106)	Tuya	TS011F_plug_3	192	
3		Smart plug 6	0xa4c138ee2c935456 (0x5F0A)	Tuya	TS011F_plug_3	220	
4		Smart plug 7	0xa4c1380c1a8a3173 (0xBC2F)	Tuya	TS011F_plug_3	120	
5		Smart plug 8	0xa4c1387b5f528b85 (0x39CB)	Tuya	TS011F_plug_3	128	

Home Automation Systems

Apple HomeKit - Screen View





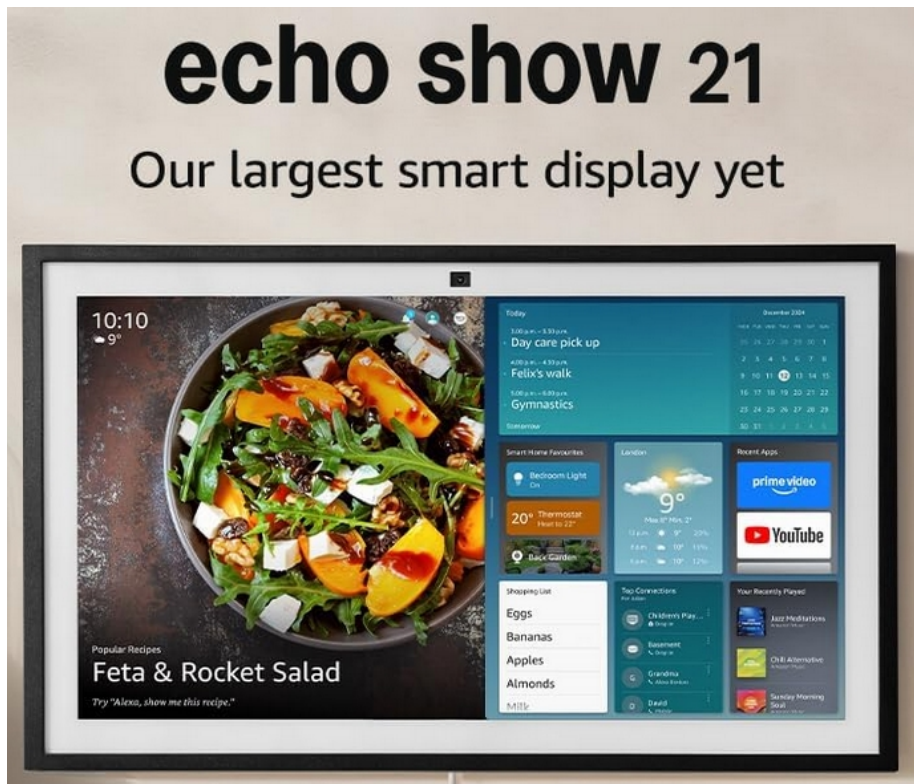
Home Automation Systems

Google Home Hub - Screen View



Home Automation Systems

Amazon Alexa Hub - Screen View



Smart Homes Support for Accessibility

Smart homes can assist:

- elderly individuals
- people with disabilities
- anyone with limited mobility

Examples:

- Voice-activated controls
- Automated lights and doors
- Smart reminders and alerts
- Remote monitoring for caregivers

Accessibility is a major but often overlooked aspect of “smart.”



The End