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In this article, we will introduce smart home, Arduino and Raspberry Pi boards, IoT in smart home. Further, we describe Applications and technologies in smart home. Finally, we looked at the Application of Arduino and Raspberry Pi in Smart home.

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Home Automation or Smart Home

A smart house is a home with internet-connected gadgets that allow for remote monitoring and control of appliances and systems.

Smart home technology, also known as home automation or domotics (from the Latin “domus” meaning “home”) allows homeowners to control smart equipment via a smart home app on their smartphone or other networked device providing security, comfort, convenience, and energy efficiency.

Smart home systems and devices, frequently work together, sharing consumer usage data and automating activities depending on the homeowners’ preferences.

A smart home today lives up to, and sometimes even exceeds, consumer expectations, and. Sensors, devices, appliances collect data on how you use them on a continuous basis. They use advanced algorithms to learn about your habits and determine consumption patterns.

Internet of Things (IoT) In Smart Home

When your home contains a variety of smart devices that you can operate remotely and programmed to automate house upkeep, you can call it smart. They can also connect to each other to form a single network.

For example, the lights may switch on as soon as you enter the house or your vacuum cleaner may begin cleaning at 11 a.m. every day.

But it's when [internet of thing](#) joins this group that the genuine magic begins. It connects all of the bias to the internet, expanding the possibilities of a home network. For illustration, you can now use your smartphone or computer to cover what's going on in your home via security cameras.

IoT applications let you connect devices and enable automatic communication between them. Think about the following scenario: as soon as your car leaves the office parking lot, your air conditioner starts to cool down your house, allowing you to come home to a cool environment after a hot day.

Best Home Automation Systems

The most cutting-edge home automation technology must be used in every emerging smart home. There are more internet-connected appliances, such as fridges, lighting systems, and thermostats, making it challenging to manage them all. The best home automation systems—often referred to as “hubs”—come into play in this situation.

They function as a single unit that connects to all of your smart gadgets, regardless of brand, and provides you with a simple, intuitive way to control them all, even through voice commands.

By using connections like your home network, broadband, Bluetooth, ZigBee, Z-wave, and other protocols, they achieve this. The selection of intelligent gadgets is expanding. Aside from locks for your front door, there are video doorbells, home security systems, thermostats, smart lighting, smart plugs, smoke and flood alarms, and even thermostats.

Smart wireless technology is now used to manage a variety of devices, including smart TVs, home music systems, and other audio and video entertainment, as well as robots to clean the ground or lawn.

Best home automation systems at a glance

1. [Amazon Echo](#)
2. [Google Nest Hub](#)
3. [Wink Hub 2](#)
4. [Samsung SmartThings](#)
5. [Apple HomeKit](#)

Reasons to Avoid the Smart Home Trend

Many smart home solutions appear cool at first glance, but there are flaws and drawbacks that you should be aware of things that may make you lose interest in the idea entirely.

The additional cost of the technology is the clearest drawback of smart houses. A smart device often costs 2 to 20 times as much as a comparable dumb device.

In addition the cloud is typically used to manage all automations, including Google Home and Alexa routines. This implies that a loss of internet connectivity could render your entire smart home useless.

Home Automation System Cost in

In this table, we'll look at the [average home automation cost](#), from simple DIY setups to custom, whole house installations.

Type of home automation	Low cost	High cost	Average cost
Heating and lighting controls in one room	£400	£800	£600
Simple smart home with lighting, heating and security controls	£5,000	£15,000	£10,000
Mid-level smart home, with additional door access and intercom controls	£8,000	£15,000	£11,500
Advanced/custom smart home with multi-room audio for larger homes	£20,000	£150,000	£85,000
Our costs are ballpark averages – get a local tradesperson to quote now			

As mentioned above, Ordinary smart home technology and equipment are quite expensive, diversified, and in some circumstances useless. It is also time-consuming to select from a large selection of equipment. In this case, open source board solutions such as Arduino and Raspberry pi Smart home are more cost-effective and can be customized as needed.

What Is Arduino?

An open-source electronics platform called Arduino is built on simple hardware and software. For example an LED can be turned on, a motor can be started, or anything can be published online using an Arduino board. Arduino boards can take inputs like light from a sensor, a user pressing a button, or a tweet and turn them into outputs like those.

By delivering a set of instructions to the board's microcontroller, you can order it to perform something. You may do this by using the Arduino programming language and the Arduino Software (IDE), which is based on Processing.

Introducing The Raspberry Pi Board

The Raspberry Pi is a single-board computer. By adding peripherals such as a keyboard, mouse, and display to the Raspberry Pi, it may function as a mini-computer.

Raspberry Pi is widely used for real-time image/video processing, IoT applications, and robotics.

Raspberry Pi is slower than a laptop or desktop computer, yet it nevertheless provides all of the required functions or abilities while consuming little power.

The Raspberry Pi Foundation has provided Raspbian OS, based on Debian. They also supply NOOBS OS for the Raspberry Pi. We can install many Third-Party OS versions such as Ubuntu, Arch Linux, RISC OS, Windows 10 IoT Core, and so on.

Raspbian OS is an official operating system that is free to use. This operating system is well-suited for use with the Raspberry Pi. Raspbian has a graphical user interface (GUI) that provides tools for browsing, Python programming, office, games, and so on.

To save the operating system, we should use an SD card (minimum 8 GB is recommended) (operating System).

Raspberry Pi is more than just a computer because it gives you access to on-chip hardware, such as GPIOs, for designing applications. We can connect and control devices such as LEDs, motors, and sensors by using GPIO.

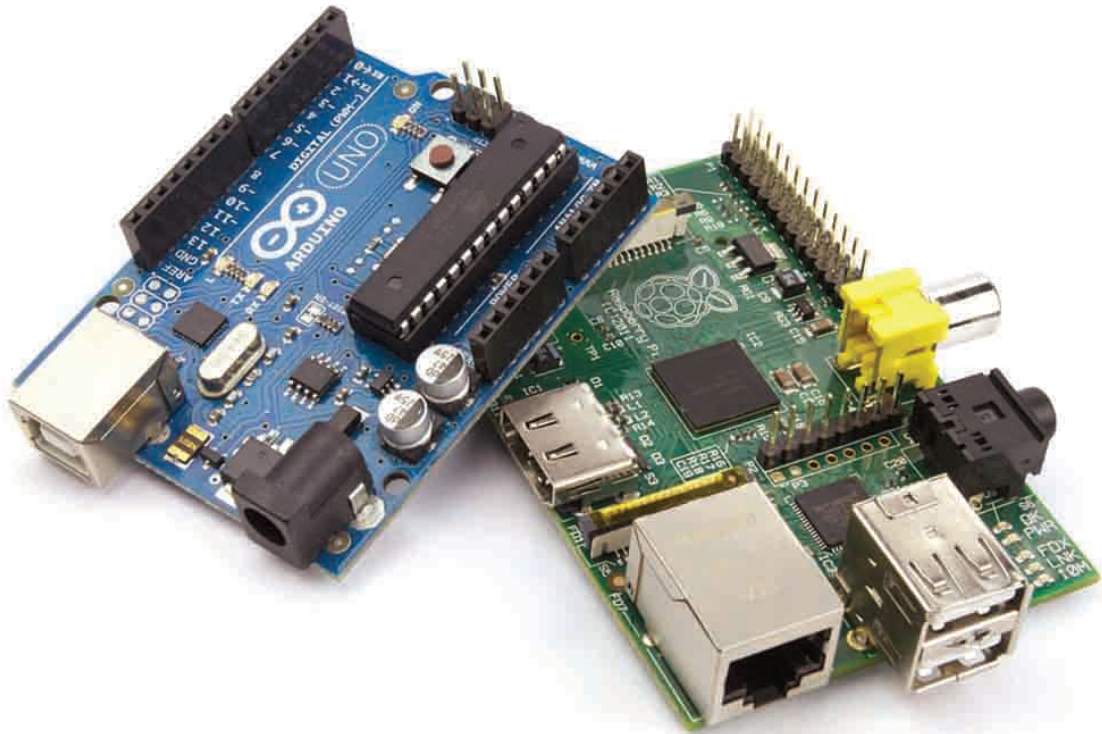
It has an ARM-based Broadcom Processor SoC with an on-chip GPU (Graphics Processing Unit).

The Raspberry Pi's CPU speed ranges from 700 MHz to 1.2 GHz. It also offers on-board SDRAM ranging from 256 MB to 1 GB.

Advantage of Arduino and Raspberry Pi in Smart Home

The home automation industry is inundated with high-priced consumer systems that are incompatible and difficult to install. This is while if you have an Arduino and Raspberry Pi you can do the same thing for a fraction of the cost, provided you're prepared to put in the time and work.

The Arduino ability to interface with the Raspberry Pi via an Ethernet shield over a LAN allows us to create a wide range of applications. by combining Arduino and Raspberry Smart home. We have the ideal toolkit for creating low-cost devices and systems for our homes. These devices can then communicate with their commercial equivalents and we customize to our specific needs.



The Raspberry Pi and its shields provide an all-in-one platform for creating devices without the need for a separate PC, providing an alternative to current solutions.

The first solution for Arduino and Raspberry pi smart homes is that We use the Arduino to communicate with the sensors, relays and any other inputs and outputs and simply connect the Arduino to the Raspberry Pi board. In this case, Raspberry pi Board with the aid of open source software, can easily provide all control of processes to users with connecting to the Internet.

As a second solution for smart homes, Arduino boards can be used independently. In this case, the Arduino board can connect to the Internet with the help of a WIFI shield and control processes with the help of IoT cloud and Alexa home software which is explained below.

Best Raspberry Pi Smart Home Software Options

The Raspberry Pi device can assist you in developing smart home systems such as home automation systems, security systems, plant watering systems, and much more. However, completing these projects would necessitate the installation of appropriate Smart Home automation software on your Raspberry Pi device.

There are various Raspberry Pi smart home software possibilities, and you will be able to choose the finest to begin building various smart home projects for yourself.

1: Home Assistant in Raspberry Smart Home

[Home Assistant](#) is an excellent alternative for those looking to construct smart home projects. It's an open-source home automation solution that's a perfect fit for your Raspberry Pi device. Installing the Home Assistant OS on your Raspberry Pi device, will install Home Assistant on your device and enable you to use a wide range of smart home add-ons and features such as Google Assistant and Alexa.

2: OpenHAB in Raspberry Smart Home

[OpenHAB](#) is another great smart home software choice for your Raspberry Pi device, as it provides a framework for automating various appliances. It's a well-known open-source smart home automation solution with a committed community. Users can experience OpenHAB capabilities on their Android or iOS smartphones in addition to a web interface. Users of the Raspberry Pi may run this software efficiently by installing its image on their devices, and once completed, you can then automate your household appliances on the go.

3: Calaos in Raspberry Smart Home

[Calaos](#) is a free and open-source smart home software that converts your Raspberry Pi into a smart home system. It will allow you to easily control and monitor your household activity. It will run as an OS on your Raspberry Pi and give you with many smart home functionalities ranging from basic to advanced user interfaces.

You may manage your home appliances, such as lights, play music, and transform your home into a smart home.

4: PiDome in Raspberry Smart Home

[PiDome](#) is smart home program that developed for your Raspberry Pi, allowing you to easily control your smart home equipment. It makes it simple to build a regulated environment. For example the dashboard set in any way you desire, and developers can use the built-in code editor to create their own drivers. The user interface is consistent and looks the same across all displays.

5: Mycroft in Raspberry Smart Home

[Mycroft](#) is a little different from other smart home applications. In addition to a distinct operating system, it contains a virtual assistant comparable to Google Assistant and Alexa. It is an open-source platform that can transform your Raspberry Pi into a smart voice assistant capable of controlling your smart home equipment.

we can utilize in a variety of DIY projects, from a small scientific project to the creation of a worldwide company environment.

You can use Mycroft's functionality by installing its image on your Raspberry Pi device, as a result having a good quality speaker/mic will allow you to automate your home appliances using voice commands.

Arduino IoT Cloud

[Arduino IoT Cloud](#) enables makers to quickly, easily, and securely create linked things. we can connect Multiple devices to one another to communicate real-time data. Using a straightforward user interface, you can also keep an eye on them from anywhere.

Since Arduino IoT Cloud is fully integrated into the Arduino Create ecosystem, you may generate a template of code there, edit it in the Arduino Web Editor, and then upload it to your board.

Alexa Home Automation

Alexa is a voice-controlled virtual assistant. To keep you informed, entertained, safe, connected, and organized. she can play audio, manage your smart home, answer queries, and activate your favorite services. She is also your personal shopper because she is an Amazon product.

A rising number of smart speakers and other Alexa-compatible devices allow users to access Alexa, which is based in the cloud.

Applications and Technologies in Arduino and Raspberry Pi Smart home

We can find home automation in a wide range of applications, including:

Heating, ventilation, and air conditioning (HVAC):

we can control all home energy monitors remotely through the internet using a simple and friendly user interface.

Lighting control system:

a “smart” network that uses one or more central computing units to communicate between various lighting system *inputs and outputs.*

Appliance control and integration with the smart grid and a smart meter:

allowing for the use of high solar panel output during the day to power washing machines, for example.

Security and home robots:

A home security system integrated with a home automation system can give extra services such as remote observation of security cameras over the Internet, or access control and central locking of all perimeter doors and windows.

[Indoor positioning systems\(IPS\):](#)

Inside multistory buildings, airports, alleys, parking garages, and underground places, an indoor positioning system (IPS) is a network of devices used to find people or things where GPS and other satellite systems lack precision or fail totally.

[Home automation for the elderly and disabled:](#)

The purpose of home automation for the elderly and the disabled is to allow them to stay safe and comfortable at home.

About the Author: My name is Mohammad Eslamdoost. I specialize in designing and simulating electronic circuits, designing printed circuit boards, programming Arduino microcontrollers.

I am also active in repairing electronic devices such as laptops, LCD and LED TVs and mobile phones.

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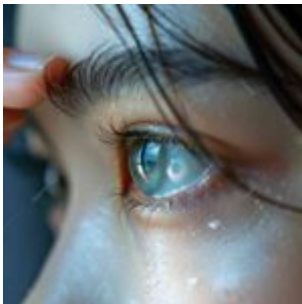
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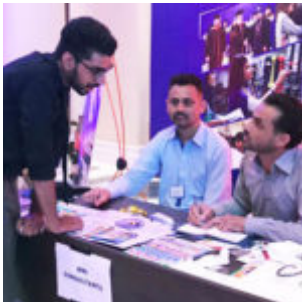
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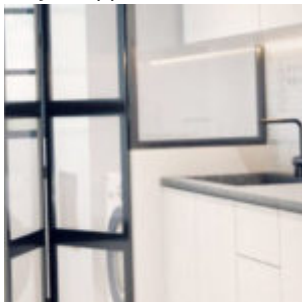
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