

A Truly Connected Smart Home

Design Considerations for Effective
Home Automation Systems



ABB

Introduction

An increasing number of Australians are recognising the benefits of a smarter home. Sparked by home-bound Australians looking to improve their lifestyle, over a third of households in the country made technological changes to their home to increase comfort and convenience during the pandemic.¹ Whether it be automated security locks, smart speakers or HVAC sensors, smart home technology is quickly becoming commonplace, with 61% of homes having at least one smart home product.²

As ordinary Australians become more reliant on technology in the home, there is a growing opportunity in smart home design. According to Statista, the smart home market in Australia is expected to grow to 6.6 million users by 2025 – a figure that represents nearly 60% market penetration.³ Much of the projected uptake is the result of increased internet bandwidth, affordable installation and the proliferation of home automation platforms and smart devices connected to the Internet of Things (IoT) available on the Australian market.

These market conditions give architects, designers and specifiers greater opportunities to use technology to create truly connected homes that deliver elevated lifestyle and sustainability outcomes to homeowners. With intelligent automation, not only can homes be designed to be more responsive, comfortable and convenient all-year round, but they can also achieve measurable gains in energy efficiency. Using smart devices offers the potential to reduce home energy usage by as much as 23% a year.⁴ In fact, home automation solutions were key to the successful completion of South Australia's first 10-Star rated energy efficient house.⁵

A well-designed smart home can enable homeowners to transform almost every facet of their life, but some barriers remain – specifically misperceptions about their cost, complexity and security. A better understanding of the process of designing and specifying smart home solutions will be invaluable to design and construction professionals to meet the evolving needs of modern Australians.

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What is a 'smart' home?

A smart home features a range of interconnected devices that can be controlled automatically and remotely through your home internet or smart phone. Several key home devices are becoming 'smarter' in this fashion, including heating and cooling systems, hot water systems, lighting, security and even home appliances.

Home automation refers to the methodology for using smart home devices, the idea being to make them work automatically in response to lifestyle needs. There are a variety of home automation platforms on the market. This includes simple 'plug and play' connected devices to specially-designed 'whole-of-home' systems. Providing an entry point for many consumers, voice-activated digital assistants such as Amazon's Alexa and Google Assistant can also link with connected devices to automate many aspects of home life.

Most smart homes use smart wiring or a purpose-built network to allow different aspects of a house to communicate with a central control system or hub. Such systems incorporate timers, switches, and sensors to determine how and when certain home devices should operate. Different rules and scenarios are programmed into the system, which are cascaded to the various connected devices around the home to fulfil certain functions, such as activating security systems when the home is unoccupied, switching off all lights and appliances when going to bed, or turning air-conditioning systems on or off based on changes to indoor temperature.

Planning a smart home

Why does the owner want a smarter home?

When designing a smart home, you need a deep understanding of what the owner wants to achieve and what benefits they are expecting from smart home solutions. Generally, these objectives can be grouped into five categories:

- **Convenience.** Smart homes can help simplify complex tasks, or automate them completely, making the homeowner's life easier and more efficient.
- **Security.** Using sensors and communications technologies, the homeowner can carefully and constantly monitor their home from anywhere around the world.
- **Comfort.** A smart home can regulate and automatically adjust the home environment – lighting, temperature, ventilation, air quality and so on – according to the time of day, weather conditions or the homeowner's individual mood and preferences.
- **Efficiency.** A smart home can be set to reduce energy and water consumption and save costs on energy bills by controlling when devices are turned on and off, and keeping track of how much energy is being used by the home.
- **Lifestyle.** For many homeowners, it may be simply the case that the digital lifestyle is appealing, with smart homes allowing them to integrate their personal devices, and create living spaces attuned to their specific needs and desires.

Key design considerations

Who will use it?

The specifics of each user of the system will impact the final design. Tech-savviness will vary between users, which will correspond to the types of control options, features and systems that will be appropriate for the project. Each user will also have different lifestyle needs and preferences, so the smart home will need to be tailored to meet those requirements, and avoid any features and functionality that will not provide any real benefit.

What do you want to control?

During the planning and design phase, it is imperative to establish what devices need to be interconnected. There is a wide range of home devices that can be controlled with a home automation system, so it is important to narrow this down with respect to the homeowner's requirements and budget. This could include any of the following:

- shades and windows;
- water heating;
- lighting systems;
- electric heating and ventilation;
- irrigation systems;
- pool and spa;
- home appliances; and
- security locks and alarms.

The homeowner may not want to simply automatically or remotely turn devices on and off. They may want to be able to monitor energy consumption for a specific device, measure and control variables such as temperature, or check whether something is switched on or off. For example, the homeowner may want to get notifications on their phone when a specific event happens, such as a security alarm going off, when a door opens, when energy consumption thresholds are reached, when a washing machine has completed its cycle, and so on.

How do you want to control it?

A smart home can be set up with a range of control interfaces. This may include switches, control panels, voice activation technology, smart phones, tablets and web interfaces. Multiple types of control interfaces and access points can be specified.

What equipment do you need?

Once the above factors are considered, it is time to identify what equipment is needed. This includes smart devices, networking equipment, sensors, gateways and actuators, all of which have to work together to create a seamless experience. A growing number of new homes are being built with smart wiring, but many new devices can operate on wireless frequencies.

Home automation software facilitates control over all the smart devices in a home, usually from a web user interface, smart phone or control panel. Advanced applications enable users to script complex rules and tasks that control how and when smart devices will operate.

Debunking smart home myths

Smart homes are too expensive

A well-designed smart home can be surprisingly cost effective. This is due to several factors, including the proliferation of smart home technologies on the consumer market, the potential energy savings if the smart home is programmed for energy efficiency, and the property value a home automation system can add to an existing home. It is also possible to slowly build a smart home over time, feature by feature, to manage costs.

Installation is too complex

Technological advancements have made installation and operation of a smart home intuitive and fairly straightforward. Many current generation smart devices do not require wiring and can work wirelessly. Manufacturers and home automation software providers also offer pre-configured templates to streamline the setup process. As the market grows, there is also a growing number of experienced smart home installers readily available to assist.

Data security issues

Is a smart home vulnerable to hacking? Leading smart home solutions use highly-encrypted technology. It is also possible to add security protocols to ensure no one

with proper clearance can gain access to smart home devices. Ultimately, security is dependent on the quality of installation and using the correct technology.

Time consuming and complicated to use

A well-designed smart home is easy to operate by anyone if the right devices, software and installer are selected. To reduce complexity, choose one central control system, rather than relying on multiple apps to control different home services. Many of the leading smart home systems have been specifically designed to be accessible to individuals of all experiences and skill levels.

New builds vs. retrofits

Smart technology is not just for new builds. Most technologies can be readily retrofitted to any type of home where there is an internet connection. As noted, most modern sensors and devices that operate within a smart home can be operated wirelessly.

Leading high performance timber window systems offer even greater performance when paired with thermally-efficient glazing. Table 2 provides the performance values of two such models.



Avoiding common mistakes

Lack of planning

As it is made of several interconnected systems and platforms, a smart home requires careful planning. It must meet the homeowner's present needs, but must also be flexible enough to meet future needs. Accordingly, it is advisable to consult directly with specialists to ensure short and long-term needs are accommodated by the design. Variations in connectivity, desired functionality and budget should be considered early in the planning and design phase.

Choosing the right installer

High quality installation by an experience specialist will likely save homeowners in time, cost and complexity, ensuring a more reliable and efficient system with opportunities for expansion. Seek out certified and trained installers who are knowledgeable in the planning and design of smart home systems, who are able to maintain, upgrade and service the system.

Choosing the right solutions and suppliers

When choosing smart home devices and software, it is better to go with trusted brands and suppliers. Such companies are more likely to be compatible with a wider range of third-party solutions, offer products of a higher quality, and provide more options for security

and upgrades. They are also more likely to offer a high quality end-to-end experience, with easy installation and setup, intuitive user interface and extensive training and technical support.

Limited controls and access points

A limited number of access points can eventually lead to dissatisfaction as users become more comfortable using smart devices around the home. Rather than a single wall-mounted control panel, specify several access points around the home, as well as tablet and smartphone access. Leading smart home control solutions offer a wide variety of control options, from control panels, tablets and smart phones to voice control with Alexa and Google Assistant.

Overspecification

A smart home system that is too complicated or challenging to operate will prevent homeowners from reaping its full benefits. Providing too many features, products and control interfaces is an easy way for users to become overwhelmed. For novice smart home users, it is better to start with a simplified set up, with the option to add more functions over time.



Making home automation easier than ever ABB free@home®

ABB-free@home® transforms the house or the apartment into an intelligent home. You can manage blinds, lights, heating, air-conditioning and door communication using just one system. Offering multiple control options, you can control your home remotely via a switch on the wall, with the laptop or with the smartphone. This innovative home automation solution combines all the useful functions of comfortable home automation and is easy to commission, install and operate.

The ABB-free@home® app is easy to understand. To start with, all available devices in the rooms are activated in the display, allowing the favourite settings to be made immediately via drag-and-drop. You can turn the smartphone into a remote control, allowing you to raise the blinds, switch on the radio in the kitchen, and deactivate all devices when leaving the house, all with a touch of a button.

Very convenient. Extremely comfortable.

Very energy efficient.

Connecting South Australia's first 10-Star rated energy-efficient house

In 2021, Adelaide-headquartered consultancy SUHO celebrates the opening of its 10-Star display home in the Adelaide suburb of Woodforde.

Australia's Nationwide House Energy Rating Scheme (NatHERS) scales a home's energy efficiency on a scale of 0-10, with a 10-Star rating awarded to houses that require less power to be comfortable all-year round. The passively-designed SUHO features the first Australian pilot installation of ABB-free@home® home automation, TerraAC wallbox electric vehicle charger and solar inverter with a solar energy storage system, REACT 2, from Fimer.

It is unusual for a 10-Star energy efficient home to feature artificial heating or cooling, but clever design, an advanced ventilation system and intelligent automation makes it possible. ABB-free@home® enables homeowners to control lighting, shutters, windows and awnings directly

from their smart phone, and provides direct feedback on the energy consumption of the house. All the features that make a home comfortable and efficient can be automated according to accurate energy efficiency requirements.

ABB-free@home® also maximises the potential of the Fimer REACT2 solar-energy storage system. It can monitor the status of the battery to show much solar energy has been generated and stored. Pre-set rules can be programmed so that, if the battery reaches 80% charge, it will automatically start to charge your electric vehicle.

Delivering even more convenience, ABB-free@home® integrates with third party solutions – such as whitegoods and audio systems – as well as other ABB smart home products, such as the ABB-Welcome door entry system for added security.

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References

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