uWand for Smart(er) Home Interaction

Introduction: The living room will become the user interface

The Internet of Things holds enormous potential for the modern home, and the steady introduction of new and improved smart devices will irreversibly change the living room environment in the near future. From TVs to fridge freezers, more consumer products are now connected to the internet than ever before, causing the term ‘smart home’ to gain traction. But what does this phrase mean to the average user?

It is hard to provide a clear definition of the smart home. Some view it as an entirely autonomous environment, while others see it as a series of internet-enabled products that together provide the user with universal control. All interpretations, however, agree a smart home is made up of multiple connected devices that can interact with one another to make life easier. To achieve a relaxing user experience, the user interface should hide the system’s complexity and should be simple and intuitive to use.

Many view mobile applications as the easiest way to interact with all connected devices in the living room. However, while this approach works well for initial setup (despite the fact setup is complicated and lengthy when using a smartphone approach) it is far from ideal for day-to-day use.

This document outlines an alternative and complementary approach to interacting with multiple devices in the smart home environment.

uWand is a camera-based, direct pointing technology developed by Philips. uWand technology enables a dramatic simplification of Smart Home interaction by providing users with a single remote for intuitive control of multiple smart devices. Selection of the target device is done by pointing uWand to the target device and control is achieved via gestures or limited button presses – the room itself becomes part of the user interface.

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Smart homes

In recent years, new technology developments and the ubiquity of wireless communications have made mass market adoption of smart home technologies possible. Smart climate control, security, door entry, lighting, music and video systems have all made considerable inroads into our homes and we are now seeing the next wave of connected devices coming onto the market – refrigerators that can order replacement food items for us, washing machines that send an SMS message when they've finished a cycle, etc.

The user interface challenge

However, despite these advances, the smart home we've been given isn't living up to its potential. A 'smart' environment ought to offer convenience and ease of use for the consumer. If it doesn't, it really isn't that smart. The underlying technologies of a smart home will likely be complex, but that complexity has to be hidden from the user for the smart home approach to work. After all, homes are for relaxing and not problem solving.

How to transform the conceptual convenience of the smart home into a reality is a fundamental issue currently faced by the industry.

Consider the situation for the average homeowner today. Smart home solutions are available that can perform a wide range of functions, from dimming lights and handling climate control, to managing music and video. But most of these products still come with a traditional button-based remote control.

Adding more remotes into the mix for home entertainment will only complicate matters. Universal remotes designed to perform multiple functions are available, but like smartphone apps they require a lot of initial setup. Designed to work with dozens of devices, these remotes are also packed full of buttons, which makes things more complicated for the user.

This scenario isn't easy, convenient or smart.

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Complexity and control

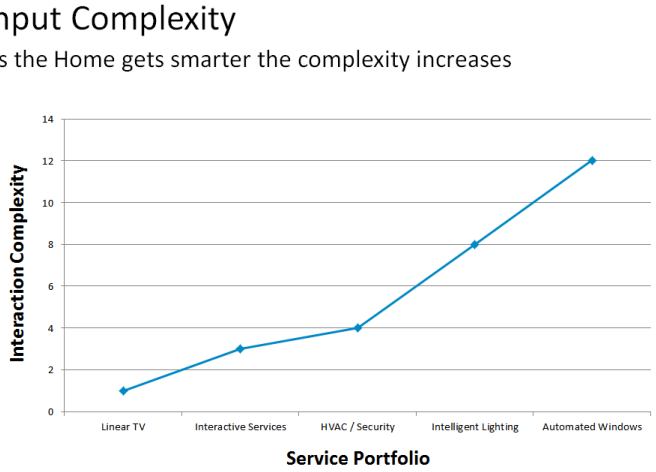
A better approach to smart home control is required, particularly as not all smart devices operate in the same way. Some act autonomously, others interface with an in-home network of related devices, while a select few are internet-enabled and learn from user inputs and environmental conditions. What all these devices have in common, however, is the need for user interaction. This could take the form of a panel built into a device, a centralised system, a web-based application for access via a smartphone, or as already discussed, a traditional remote control.

Ultimately, as there are many ways to approach the smart home, it's important to consider the level of interaction that the user will require. This will determine which control approach is most appropriate.

The suitability and convenience of the user interface depends largely on the complexity of interaction required. Most of the time simple interaction is what the user needs, such as switching a light on and off or changing the channel and volume on a TV. Only occasionally will the user need to perform more advanced control techniques, such as setting a timer or series record for a chosen program. Since these are distinctly different use cases, an optimal user interface will adjust depending on the level of control that's required.

A clever user interface (UI) will provide immediate access to simple control functions, while advanced functions will be hidden behind a graphical user interface with purpose-built navigation. Advanced control by its very nature is not time critical, i.e. it doesn't matter how long it takes to scroll or swipe through different screens in an app before you find the correct menu. However, when it comes to performing simple tasks like changes to temperature or volume, the user needs instant access.

To make this a reality, it's essential to choose an advanced control technology that can support both approaches.



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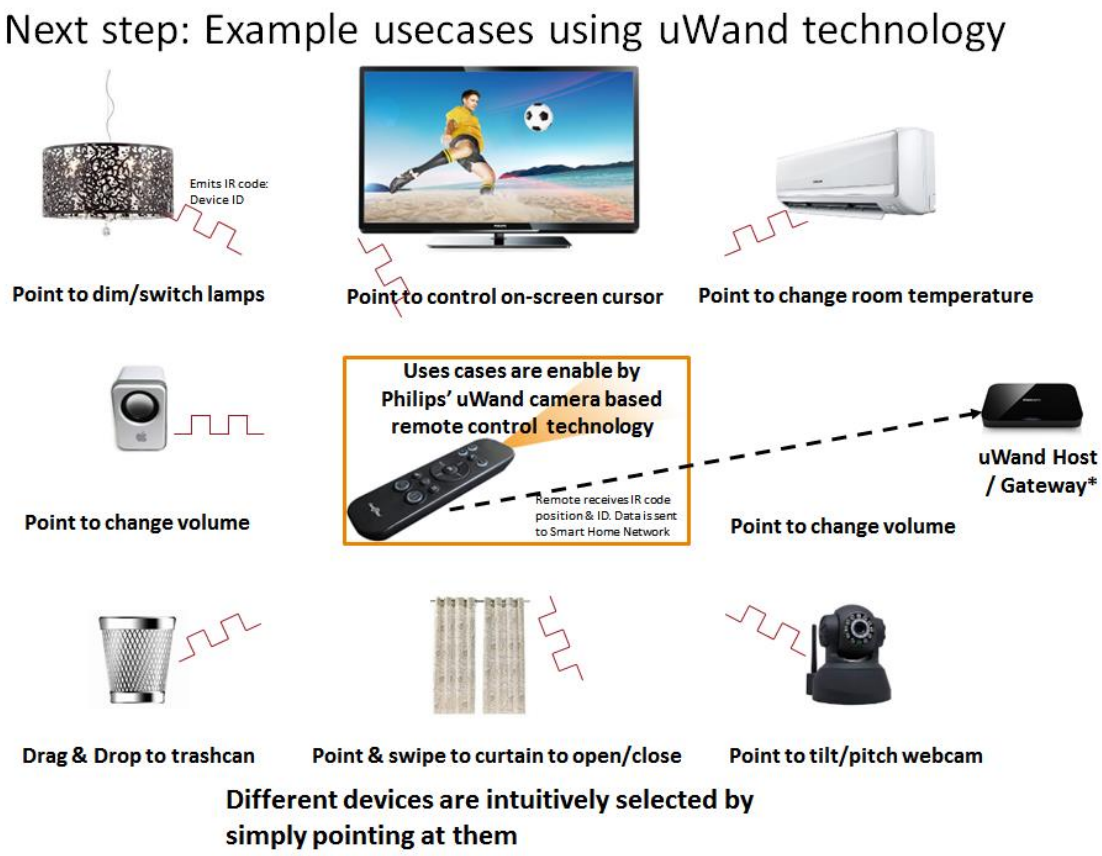
Apps: advanced and detailed control

The current favoured approach for smart home implementation is to control connected devices with a smartphone or tablet application. While mobile apps do provide an intuitive user interface that includes support for making changes when away from the home, this approach is not simple enough for day-to-day interaction.

Smartphones and tablets are 'heads down' devices, i.e. the user will be looking at their smartphone rather than the device they are looking to control. This isn't ideal.

More importantly, smartphone apps do not offer immediate access. First the user has to unlock their device, load the app, navigate to the correct screen and then select the function they want to perform. This is far too complicated and time consuming when most often all the user wants to do is turn a light on or off, or bump the heating up a few degrees.

uWand technology meets this need for instantaneous control over all devices in the smart home.



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uWand: direct pointing and technology explained

Controlling the smart home with uWand is extremely easy. Target devices can be operated by simply pointing at them, as a camera embedded in the remote can quickly identify at which device the user is aiming. A uWand-equipped remote is able to calculate its exact position in relation to a connected device and can communicate the co-ordinates of the remote (X, Y, pitch and roll), together with the user's button presses and gestures via a wireless link (Bluetooth, infrared or RF) to the target device, which then interprets these control commands and acts accordingly.

uWand technology is designed to provide consumers with the easiest and most intuitive interface for controlling smart home devices. With a single uWand-equipped remote control in the living room, it is possible to adjust the air conditioning, dim the lights, open the curtains and even play complex games on the smart TV, all through a single device.

The additional benefit of uWand: there is no pre-programming required, and the commands can be intuitive gestures or based on the press of a button. This could be a swipe to open the curtains or a twist of the wrist to turn up the heat.

Unlike the existing approach to controlling the smart home, the user doesn't need to find the right remote or fumble through their phone to find the right app. With uWand technology there is simply one remote that can interact with any connected device through pointing. It's incredibly quick and easy to use. Granted, there will always be occasions where a more complex set of interactions are needed, for which a smartphone or web application may be required, but it's important to recognise that in the home consumers crave simplicity rather than complexity.

uWand delivers that simplicity and unites disparate devices to create smarter homes.

A complete firmware solution

Philips' uWand direct pointing technology is a complete firmware solution that incorporates three primary elements:

- An infrared camera embedded in a remote control that can have as few as three buttons;
- A reference point embedded in or near to the smart home device from which the camera can calculate its position; and
- The Philips uWand firmware in the remote control for the logic.

Low cost and agnostic

uWand technology is network agnostic and can be added to any smart home device using standard, low cost infrared LEDs, either at the point of manufacturer or as an after sale upgrade.

In less than half a second, the uWand camera can uniquely identify a smart device among up to 64 different selectable devices in the same room.

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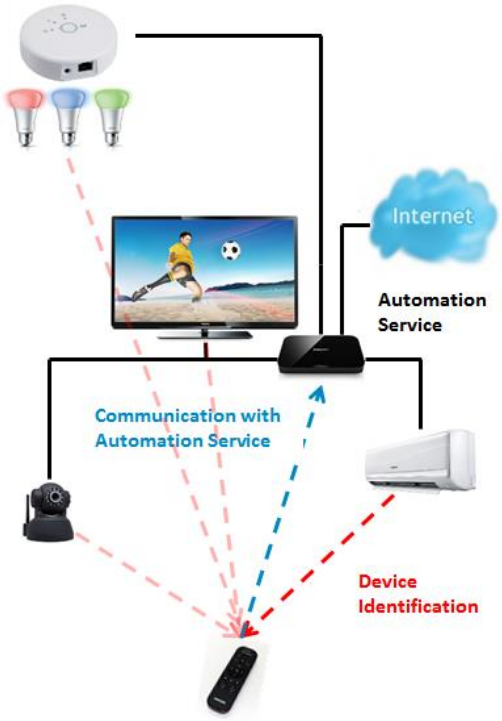
A uWand device's pointing co-ordinates and beacon codes can also be transmitted to a host system, or plugged directly into any other smart home network device[1].



Next steps and further information

A uWand evaluation kit and demonstration unit is available to help you get started with uWand for smart home applications.

Contact sales.uwand@philips.com for additional information.

[1] Depending on the network infrastructure used.

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Philips has been awarded a number of patents on the technology used in the uWand offering in Europe, Asia and the United States. These patents cover the position calculations using IR sources and an optical sensor, the robustness improvements using modulated IR beacons and the smoothing methods a.o.

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