uWand, YouDirect the SmartTV

uWand

The next-generation TV interaction

PHILIPS

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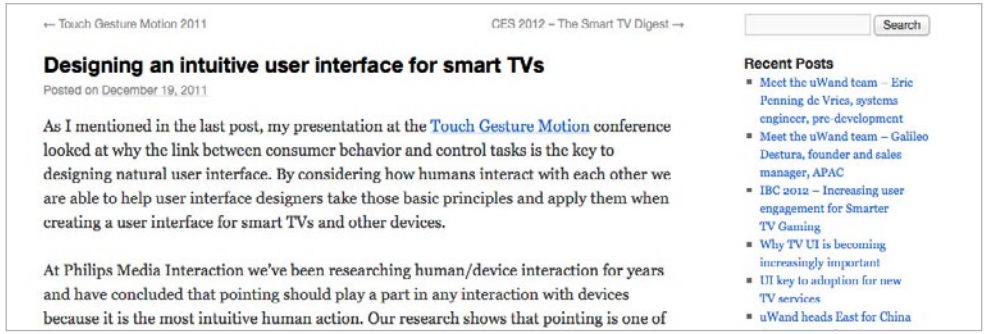
Introduction:
user experience is the differentiator

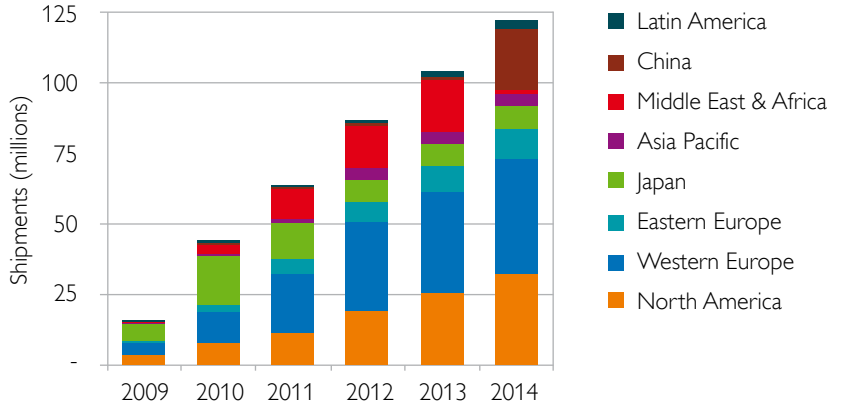
With the pace of change in living room technologies now moving so quickly it's hard to imagine what the next 5 years will bring to the television. What is certain is that content will remain key and we'll see significant growth in on-demand service delivery. However the TV viewing experience is about more than content alone. New platforms, applications and services for TVs are launched virtually every month but if the content is difficult to find or use for the consumer, the effort spent on service enhancements will be lost. The user experience is therefore the only long-term differentiator.



With this in mind, a complete revision of the traditional TV user interface and EPG needs to happen. The conventions of the existing user interface, such as the traditional control device, is the biggest current hindrance to the improvements in experience that users should get from having new services and content on the TV. Indeed the lifecycle of the TV is too long to take full advantage of the 'smarter' applications that are gradually being added to it using current remote controls. In fact, most value-add services still come via peripheral devices like the STB and OTT so in order for the TV to retain its position at the heart of the living room, the way in which we discover and navigate content on it, whether traditional live broadcast, on-demand programming, games or apps, needs to change. Today's remote controls are optimized for an orthogonal user interface, where navigation is done using the four way keys of the remote, but are typically not well suited to navigate the multi-dimensional user interfaces now required.

In addition the Smart TV industry is expected to grow exponentially. Analyst firm DisplaySearch, for example, predicts the market for Smart TVs and Connected TVs alone will grow to nearly 125 million global shipments by 2014 (figure 1). At the same time, the company predicts that the ease of use delivered by the combined graphical user interface and the kind of remote used by the user will have a significant and understandable impact on the use of 'smart' services. At Philips we believe this is the next battle ground for platform differentiation and that it has been largely overlooked. We have addressed this with a new user interface control technology called uWand.

Figure 1: Connected TV Shipment Forecast



Source: DisplaySearch Quarterly TV Design and Features Report

Introduction to the technologies

In this document, we compare several technologies including touchpads and trackballs. These are typically well understood. In addition we benchmark gyroscope and camera based controllers. It's with the latter two where the confusion starts.

We distinguish between motion and pointing controllers. The sensor to detect motion is the accelerometer; it measures the acceleration of the controller in 3 directions. Usually this is good enough to play motion games such as tennis and racing. Wii revolutionized gaming by introducing motion control to the game console. The accelerometer in the controller was used to sense the motion and most games to date (even with newer generation controllers having multiple sensors on board) still only uses the accelerometer for their game play.

When it comes to cursor control, the sensors that can be used are gyroscopes and cameras. Gyroscope measure the angular movement of the controller. It only measures the angular displacement of the controller and has no context of the original direction of the controller. A camera, however, does have contextual information and as such there is always a connection between the orientation of the controller and where the cursor is.
This difference is typically named "relative" (gyroscope based) vs. "absolute" (camera based) pointing. For the latter, sometimes "direct" pointing is used.

uWand: The solution for Smart TV interaction

uWand is an intuitive 'remote touch' technology. When embedded in remote controls it gives users fluid and accurate direct pointing touchscreen like experience and 3D gesture control on TVs and set-top boxes. Unlike controls based on touch pads and gyroscopes, it is an inherently intuitive experience for point-and-click control and provides far greater accuracy for controlling the TV than gestures. This is because uWand does not need hand recalibration to be able to stay in direct pointing contact with the TV screen. The sophisticated camera in a uWand remote can see where the TV is located and locks in. Combined with the other uWand sensors, gesture movements are also detected and accurately translated onto movements on the TV. Other solutions can only sense a hand movement and approximate where the user might be pointing.

In addition uWand opens the door to significant revenue generating opportunities. The technology delivers a touchscreen like controlling experience for gaming and VoD. In addition it maintains the core, recreational, passive TV experience which means device manufacturers, service providers, application developers and content owners can design for all Smart TV use cases.

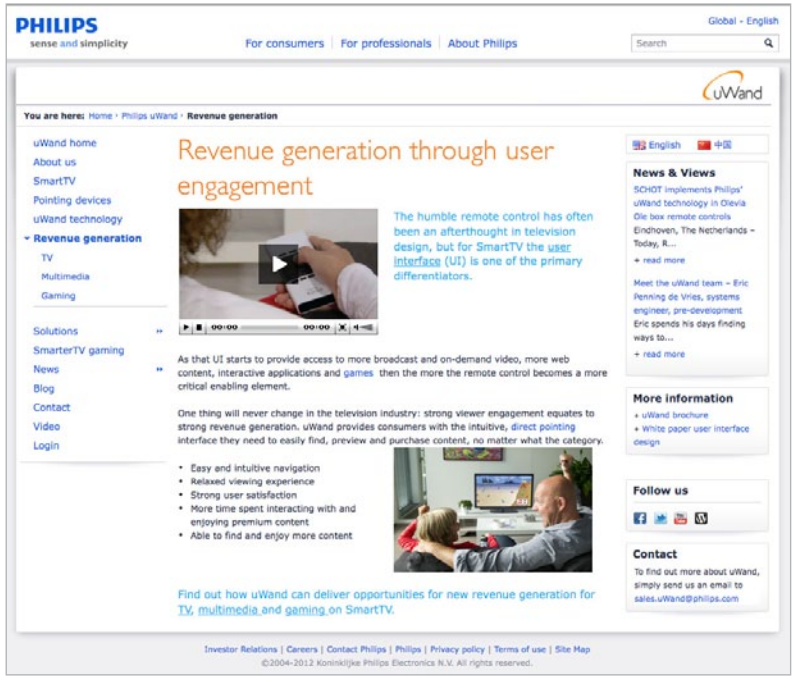
The unique benefit of uWand is that it provides a more effective and accurate means of controlling smart TVs than traditional remote controls. As the user experience improves, so does the opportunity to increase ARPU particularly for gaming and VoD services.

Similarly uWand technology means manufacturers can design for all smart TV scenarios using a hybrid (gaming control and remote control) controller that delivers both an active experience for gaming as well as passive navigation for VoD, apps and TV use cases by means of gestures and regular button presses.

Integrating uWand to increase ARPU and Retention

Integrating uWand technology into remote controls can bring significant benefits to every stakeholder in the television ecosystem – consumers, Smart TV makers, MSOs, OTT device makers and more.

It's clear that consumers need a more mature interaction method but one that is easy-to-use and takes just moments to learn. By delivering pinpoint, practically touchscreen, accuracy with a comfortable and natural pointing control, uWand encourages exploration, enhances enjoyment to maximize revenues whether through gaming, VoD or OTT services.



uWand provides:

- Satisfaction: It's a win for consumers; 89% of respondents researched in five countries rate their experience with pointing and gesture control as good to excellent
- Retention: It's a win for MSOs who can reduce churn by better user experience, by offering more attractive content, and by allowing better discovery of content thus showing the value for money
- Market share: It's a win for TV and STB manufacturers, who can easily build in simple and accurate point-and-click control for a superior UI
- Revenues: It's a win for Smart TV providers, MSOs and OTT box providers who can see a direct connection between effective UI navigation and increased revenues that are driven by users watching more VoD content and playing more games.

Using uWand to enhance the TV experience

> "…a more intuitive remote control will help owners of Smart TVs solve the navigation and content discovery problem and simplify the search for apps within widget stores"

(Strategy Analytics, July 2011)

Today, interacting with a Smart TV with a traditional remote is slow, inaccurate and frustrating for consumers which leads to fewer interactions and potentially lost revenue. In contrast, a Smart TV with uWand-enabled pointing technology improves the user experience by utilizing an easily pointable user interface and a more intuitive navigation peripheral. Whether deployed on its own or in conjunction with other interaction technologies such as voice, uWand makes interacting with, exploring and searching for, content easier whether the user is:

- gaming,
- viewing OTT video and VoD,
- browsing the internet,
- or viewing content on the TV via the home network.

While uWand technology has been developed to cope with the changing environment of consuming entertainment, Philips believes that different control functionalities e.g. voice and keyboard will need to exist simultaneously to retain the innately 'relaxing' experience associated with TVs.

It is clear that familiarity with directly interacting with devices is growing among consumers: Touchscreen mobile phones and tablet devices, as well as gesture controlled games consoles, are mainstream products. However it remains to be seen which form of direct interaction wins out when it comes to experiencing content on TV sets. In the meantime it is the traditional user interface and the remote control that need modernising to allow them to cope with the new 'smart' services on TVs that are being offered widely in response to changing user behaviors.

1. Gaming on Smart TVs

Select and click style gaming, such as quizzes and puzzle games, have proven very successful on the TV set. In fact, over 600,000 games are played via PlayJam on Sky every day and we are seeing more subscription models emerge. One French operator offers two packages: a basic one at €4.99 and a premium package at €9.99. The conversion rate of subscribers is up to 10%. The right user input device helps to increase both the conversion rate and the upgrade rate to the operator's premium package.

Developments in TV and STB technology are accelerating fast to provide sufficient processing power for sophisticated video graphics. Smart TVs provide the opportunity to expand the market away from puzzle based games, and provide access to motioned based, casual gaming on demand. However, Smart TVs today lack the intuitive controls needed to deliver the experience.

According to ABI Research, online gaming is expected to grow to over $29 billion by 2015 so most operators see games as an important source of revenue for Smart TVs. In fact, data from implemented casual gaming engines shows that 16% of Smart TV owners are paying for gaming content with the average spend for these casual gamers of around $80 per year.

uWand enhances the gaming experience

Integrating uWand technology in a regular style TV remote control instantly expands the market opportunity for gaming-on-demand (GoD) via a Smart TV. It increases the types of games available and the potential uptake of these games by enabling a more intuitive game control environment.

In addition, deploying a controller that incorporates uWand technology means consumers do not need to purchase additional or separate gaming peripherals in order to play games via the TV set, which is particularly relevant for a casual gaming audience. Providing a usable gaming controller in the box at the point of purchase ensures that gaming on Smart TVs is more engaging and potentially increases both the number of gamers and their associated spend.

Similarly, an intuitive interface is key for any type of game, but being easy to learn and intuitive is especially important for simple games whose appeal to consumers lies in the fact they can be played casually, without a steep learning curve to get started. As the Nintendo Wii has shown, a game controller that can immerse the player quickly can have wide appeal, and incorporating motion control can attract new user segments to gaming.

2. Viewing over-the-top-content and VoD on Smart TVs

With over a million hours of over-the-top-content (OTT) available, and thousands of hours of VoD and catch-up TV, content discovery is challenging enough, but it is even harder using a traditional button-based remote control.

On the PC, the challenge of managing a wealth of OTT content has been solved by a graphical user interface and cursor control paradigm that has created an active, 'lean-forward' experience. However, the TV experience is completely different, in that users prefer to be relaxed and inactive. Even on the TV, however, the search for content is more active than the consumption of content. Therefore some concepts from the PC interface can be used in Smart TVs.

uWand enhances the OTT and VoD experience

The problem with 1-Dimensional channel lists (e.g. channel up or down) is they are difficult to navigate to look for choices. A grid-style 2-Dimensional EPG is preferable to a 1-Dimensional channel list as it enables better content discovery and fully utilizes the TV screen area. Instead of scrolling through pages of listed information, details are presented in the form of a grid that can include previews of the content alongside running times or related content. However, without an appropriate controller that allows the user to simply point and click on a particular cell a, grid style UI could hinder a viewer from quickly selecting content by adding additional steps to go through a jumping highlight with lots of button presses before selection.

Using a controller with direct pointing technologies, such as uWand, enables an immersive yet "lean-back" environment that provides users with the ability to directly point and click, making it easier to navigate through EPGs and VoD libraries. In addition, the 3-Dimensional user interface means uWand detects movement in the Z-axis as well as X and Y, creating accurate and simple hand/wrist movement gesture controls for in control searching and navigation; such as rewind, fast-forward and volume controls.

3. Browsing the Internet on Smart TVs

Many consumers automatically expect that a connected TV set will support browsing of regular Internet pages however websites create a new set of challenges for 2-D navigation. The challenges in delivering web browsing on the TV include supporting HTML5, Flash and other Internet standards, and the lack of freedom to install new software. But even with these software challenges resolved, Internet pages still follow a lay-out suited for PC or handheld interfaces, and are designed to be operated with a table-top mouse or touch interface and not a TV remote control.

Using a traditional remote control makes navigation inaccurate and slow, as a user is required to scroll through each interactive point on that page in order to navigate, or select, the required link. In addition the user is required to type website addresses or input information via an alpha-numeric keypad.

uWand enhances Internet browsing

The uWand technology was designed to enable a user to click accurately anywhere on the screen, enabling fast navigation and easy selection on websites. A remote control that integrated direct pointing technology and a QWERTY keyboard for easy text input, for example, would become a complete solution for navigating interactive TV interfaces such as web pages. Similarly voice input may filter into consumer interactions with the TV; however it's important to understand where some of the technology's limitations lie.

4. The home network

Part of the opportunity for Smart TVs is the enablement of streaming and sharing the user's own content across the home network, to the "lean-back" environment of the living room, without the need for tethering a separate device to the TV set.

Managing this content, such as images, music or video, on the TV set via a remote control can prove clunky and slow, particularly if content needs to be adjusted in any way; the rotation of an image for instance. As with web page browsing, part of the challenge is that a user needs to scroll between a number of interactive zones before clicking on the required one to complete the action.

Direct pointing and gesture control technology such as uWand removes the step-by-step navigation and provides a simple and easy to use control interface to scroll, adjust and manage a user's own content on the TV set.

uWand explained

Usability

Pointing with uWand provides the same experience as using a touch screen; the cursor appears where it is pointed – and learns where the cursor is expected over time. Instead of moving the visual feedback (i.e. the cursor) from one point to the other, the user is actually pointing to their intended spot on the screen. Since the camera in uWand technology sees where the user is pointing at, the user does not need to look for the cursor any more than you have to look for your finger when touching a touch screen.

This contrasts with the experience of relative pointing technologies that have to rely on detecting changes of the user's hand movement and tries to map these changes to a cursor movement on the screen.. In that instance the user needs to focus on the cursor on the screen, and tries to constantly match the hand movement and hand pointing direction with where the cursor is on the screen.

This has been the primary differentiator for why users prefer uWand technology when asked to compare it with gyroscope based pointers.

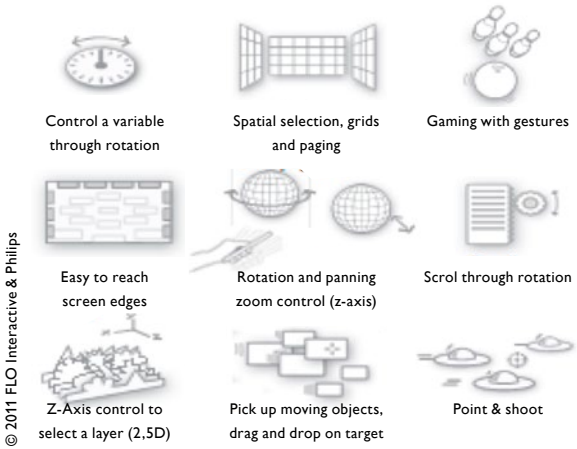
Design

uWand can be designed into almost any remote control form factor. It offers maximum flexibility for the amount, function and lay-out of buttons (minimum button requirement is one).

The uWand reference design has the flexibility to add peripherals, such as:

- IR transmitter (and database) for legacy IR control
- Accelerometer for motion games applications
- Force feedback for rumble effects
- QWERTY keyboard for text input

New control tasks enable by uWand



We tested absolute pointing against other input technologies. Users found these illustrated control tasks to be natural and well suited to the uWand technology.

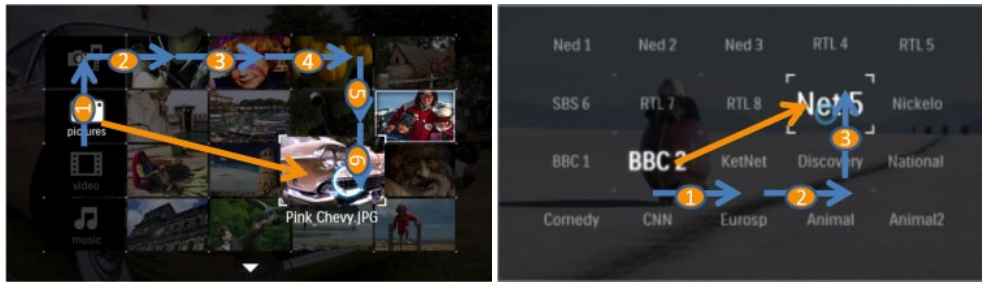
When applying to learn tasks in a UI take into account:

- Users have to learn them: visual cues and feedback are essential
- Combining actions can be tricky and may lower the performance
- Consistence is crucial. Applying a method in one case creates expectations for other use cases

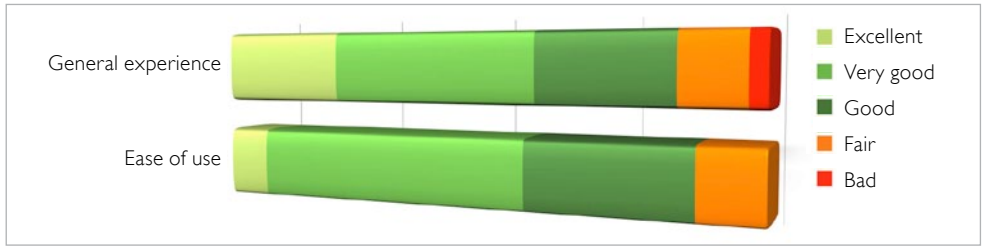
Benefits of uWand

Pointing, as a user input concept, makes a lot of sense for dynamic 2D or 3D graphical user interfaces. This is because browsing is typically easiest when the whole of the TV screen is used to present areas for users to point and click.

A good example is shown in the picture below. There are a lot of button presses involved with the standard button-based controllers, whereas the interaction shown in the diagram on the right using direct pointing technology is much more direct.



In addition, research carried out by Philips of more than 200 households found that for IP enabled interactive services shown on a TV screen, 89% of people rate their experience with pointing between 'Excellent' and 'Good' and find a pointing interface easier to use than the current up-down-left-right interfaces.



What makes uWand's technology unique is that its gesture recognition and pointing capability is in part based on camera vision. This means that when the uWand remote control is pointed towards the TV screen, the technology knows exactly where the user is pointing. Unlike other pointing technologies that do not know the cursor's starting point, the direct input uWand technology knows the absolute on-screen position at all times.

This means the technology sends the true X and Y values for the cursor which avoids 'hand drift' a common problem for gyroscope based pointers. Hand drift is a challenge often encountered by user interface designers where the hand pointing direction has no relationship with the cursor's location. As today's consumers are used to using touchscreens, they expect that cursor should appear where their hand/finger is pointing. Thus with gyro based relative pointers, users need to constantly adjust their hand position to correct the drift, which can result in tired limbs.

With uWand, the remote control locks into the screen location and does not drift thereby allowing the user to find and maintain a comfortable position resulting in a relaxed way of navigating.

In that sense uWand reduces the possibility of arm-fatigue because the user's arm does not leave its natural rest position: all movements are from the wrist. Conversely, controllers based on gyroscope technology can put strain on users' elbows and shoulders because it is not possible to keep maintain a raised arm position for long.

To summarize, gesture-based direct pointing technology is intuitive (and sensitive) enough to be capable of pointing accurately at a remote screen

Benefits for manufacturers:

- uWand technology makes it possible to ship TVs with a controller capable of operating all of the functions of a Smart TV including gaming
- uWand technology offers brand differentiation and advantage (based on perceived preferences), the potential for increased market share and a quick time to market with a new technology.

Benefit for Smart TV Manufacturers:

- uWand offers the potential for increased revenue and reduced churn. Given that available content and applications are becoming broadly commoditized, offering a device that provides the most accurate control, and that's easy and intuitive to use, will help to lock-in consumers

Benefits for consumers:

- uWand means that they never have to make big gestures to move the cursor from one side of the TV screen to the other regardless of the user's distance from the screen or the angle the person is positioned relative to the screen. This makes it much easier for them to unlock the potential of their Smart TVs, and navigate to find the content they want
- uWand appeals to a broad consumer audience:
  - For early adopters, uWand provides an innovative way to interact with the TV: it opens up possibilities for more advanced functionality; it can potentially become 'the one remote control for all'
  - For 25-35 year olds, uWand can make interacting with the TV more appealing as the control device enables similar interactions as with touchscreen devices and games devices
  - For 45-65 year olds, uWand brings all menus to one screen that can be controlled without fiddling around with remote control buttons or reading small texts (Philips research results)

Other business benefits include:

- High customer satisfaction (Net Promoter Score)
- Increased ARPU as uWand makes it easier to find, and interact with, the content consumers want
- New revenue generation opportunities such as those achieved by offering casual gaming services from a broad gaming catalogue
- Short time-to-market with readily available SDKs for various platforms
- An easy to demonstrate point-of-difference at point-of-sale to uplift retail sales
- A unique controller to prompt consumer word-of-mouth and create network-effect purchases
- An inexpensive value added extra to the total purchase that provides the consumer with an "excuse-to-upgrade" tipping point which increases frequency of replacement

Technical Information

Every human hand has a certain degree of tremor: no one can keep their hand completely still. This can sometimes result in a shaking cursor but uWand's patented technology eliminates hand tremor using a unique algorithm that gives a very stable cursor trajectory which increases accuracy without paying a penalty in higher latency. This means consumers can interact with smaller icons on the screen without sacrificing the lean-back experience.

Frequently Asked Questions

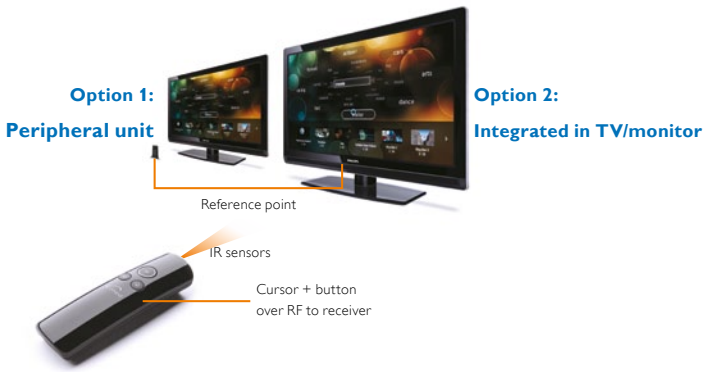


Figure 1: Description on how uWand works with a smart TV or STB

Q1 How does it exactly work technically?

The direct pointing and 3D capabilities delivered by uWand is achieved by having a camera embedded into the remote. As the user moves his/her hand, the uWand camera can see where the user is pointing to. Along with motion sensors that can capture 3D actions and gestures, the uWand camera is unique in that it can capture images faster than a human eye allowing it to deliver smooth direct (touchscreen like) pointing and capture 3D gestures and actions.

The uWand camera makes use of a small LED that emits infrared (IR) light, invisible to the naked eye, and is embedded into a peripheral unit for bundling the technology with a set-top-box or media player product (Option 1), or is embedded directly into the TV bezel (Option 2), see Figure 1. The uWand IR LED serves as the beacon on which the uWand camera can track hand movement with respect to the TV or set-top-box location. The tracking data in the camera is then converted to a pointing position on the screen for users to interact with the content, or games, shown.

To transfer the captured and interpreted data from the remote control to the TV or set-top-box, uWand is capable of transferring the pointing and 3D gesture data using IR (RCMM), or RF protocols (RF4CE, proprietary, or Bluetooth). This communication flexibility allows customers freedom to choose communication architecture as they see fit for their product and/or budget. Thus, the two main components of the uWand receiver technology are the IR or RF modules combined with the IR LED beacon.

2uWand Receiver

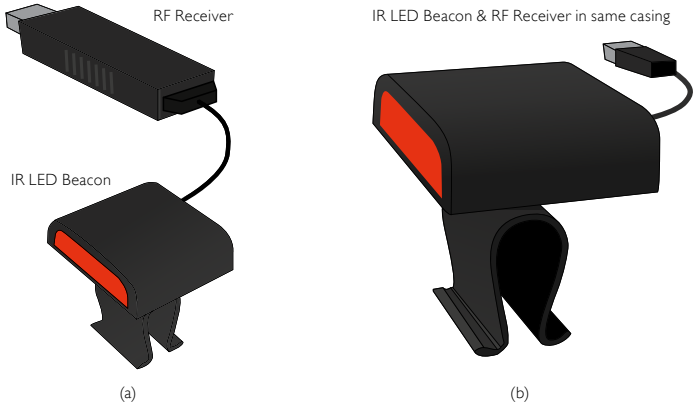


Figure 2: uWand Receiver examples are shown above with (a) showing that the communication module (IR or RF) is separate from the uWand LED beacon and (b) where both the uWand LED beacon and communication modules are integrated.

To help the uWand camera identify a uWand enabled TV or set-top-box, the uWand IR LED beacon emits a coded invisible light or light pattern. The uWand light pattern needs to be visible to the camera and hence the LED IR beacon embedded in either the peripheral unit or into the TV bezel, as shown in Figure 1, should be placed so that it is facing towards the user who is holding the uWand controller with the embedded uWand camera. A small MCU is needed to generate the light pattern required and the LED IR beacon can be connected to any MCU in either the TV or STB, which can be used to generate the light pattern.

If using RF to receive the uWand data, the RF receiver can be placed anywhere in the TV or STB. However, using IR means that the uWand IR LED beacon and the IR Receiver will be co-located on the same peripheral unit or same bezel area of the TV.

What do I have to do to implement uWand in my service?

1. Identify the target multimedia platform chipset and corresponding operating system
2. Request for the right uWand SDK for the operating system chosen. The uWand team can either work directly with the chipset supplier or with your software team.
3. Identify the various use cases that needs to be delivered by the product as well as recurring revenue content suppliers, VOD, games, etc. and map the needed user interaction per given use cases to the various capabilities of the uWand. Should there be certain use cases that is not currently addressed by the uWand capability, please raise a request to the uWand team and this will be looked into for possibility to implement.
4. Implement and test the use cases with the uWand remote controller.
5. Identify the chosen remote control supplier. Should you not have a current preferred remote control supplier, uWand can propose to you a remote control supplier that will fit your needs.
6. Go to mass production, introduce to the market.

Q2 What is the battery life?

The power consumption in active pointing mode is around 20 mA. Philips has implemented various options to ensure the active mode is not switched on unnecessarily. Depending on the usage profile, the battery life is around 90 days.

Q3 Which usability features have been implemented in uWand?

When developing a handheld pointer, there are few critical to quality parameters. Latency, accuracy and ease of use to name a few.

Latency is one very important one. It determines how fast the cursor follows the user's hand movement. Unfortunately, this latency is determined by the entire system, incl. the TV set. Usually the TV set and its picture processing have a much higher latency than the uWand controller. As measure the time between the user moves the controller between the cursor update is passed on to the TV set's processor (incl. wireless communication latency, i.e. RF or RCMM) should be in the magnitude of 50 ms. The total system latency (incl. the TV set) should be below 100 ms (120 ms max). The uWand's latency is below 50 ms.

Although uWand is a direct pointer, it does not have the disadvantages of a direct pointer. A true direct pointer, such as a laser pointer is distant dependent. When the user is far away from the screen, the hand angle he needs to make a movement from edge-to-edge becomes smaller with an increasing distant. As a result the accuracy is negatively impacted. uWand, however, gives the same user experience and edge-to-edge angle independent of distance from the screen and angle at which the consumer is standing v.v. the screen. As a result: the benefit of direct pointing's superior intuitiveness but not the disadvantages. Finally, every human's hand has a certain degree of tremor; no one can keep his hand completely still. With a handheld pointer this could result in a shaking cursor. uWand eliminates this hand tremor giving a very stable cursor trajectory that increases accuracy: consumers can reach even smaller icons on the screen. Our tremor cancellation algorithm is speed dependent to balance between latency and accuracy: lowest latency on fast movements and highest accuracy on small movements (typically pre-ceding a button click).

Since uWand is a direct pointer, it's the only technology to output X, Y, Z and tilt co-ordinates. The Z-coordinate is especially well suited to navigate in 3D space.

"What needs to be done technically to implement uWand into my system?"

Q4 Do I need to integrate a beacon?

For the direct pointing system to work, the uWand device needs a light source that acts as a beacon. This beacon is usually a cluster of LEDs that need to be powered. Power supply ideally comes from the main board of the TV or STB and typical power consumption is 400 mA@5V.

A beacon can be provided either as an accessory or integrated within the bezel of the TV device. This will require an IR translucent opening of typically 12 x 6 mm minimum. Most bezel designs already have an area where they traditionally house the IR receiver for the remote control, and this can be reused. The range of the uWand is influenced by the quality of the IR window, and we recommend an IR translucency of at least 90% for light with wave lengths over 900 nm.

Q5 Do I need to install a driver to use uWand technology?

The uWand data is delivered by either UART or USB HID. The former does need a driver of which the uWand team can provide. The latter is a standard communication protocol.

uWand should be recognized as an absolute input device (HID Mouse). Not all operating systems recognize absolute devices out of the box. On Windows (XP, Vista and 7), uWand works plug-and-play and is also recognized as a touch input device on Windows 7.

Most Linux operating systems will correctly recognize uWand as a USB-HID device. In some cases when absolute input drivers are not built into a particular Linux variant, uWand provides either sample source code that customers can integrate into their Linux OS and build a new Linux image, or we provide a "user space" application that can be used as a starting point for development of uWand-enabled Linux based products.

Android does not support uWand out of the box as it historically supports only mobile devices. For this reason we provide example code/libraries based upon on Android that implement the Android API for sensors and uWand specific data. This can be used as a starting point for development of uWand-enabled Android products.

The Zigbee Input Device (ZID) profile (under the Zigbee/RF4CE standard), includes the relevant subset of the HID mouse standard. So any device that supports the ZID profile should recognize the uWand without the need for a separate driver. The same is true for the BlueTooth HID profile.

Q6 Do I need to make any changes to my system?

uWand integrates at the operating system level and is recognized as a direct pointing device. Co-ordinates are sent via the USB, RF4CE or UART interface. USB-HID, BTHIDand RF4CE (ZID profile) are standardized and uWand follows these standards closely.

The OS of the TV set or STB must implement the HID profile for absolute co-ordinates before the x, y, z and tilt co-ordinates can be received at the OS level. The application built on top of the OS can then use these co-ordinates for controlling and navigating an application.

Q7 Can I use any camera in the remote control?

Currently we use the camera sensor from PixArt Technologies, a Taiwanese specialist in CMOS image sensors. It has the right trade-off between resolution and frame rate so that it can be used in the uWand solution.

The remote control manufacturer is free to source the camera module (image sensor, lens, IR filter, connector and housing) from their preferred camera module maker. This camera module maker can source the PixArt image sensor after getting the appropriate approvals from Philips.

Q8 How do I enable my UI for pointing and gesture capabilities?

Most consumer devices make use of a standard remote control allowing for orthogonal menu navigation. The first step for adjusting the UI is to use a cursor to indicate where the pointer is (typically only selection highlighting or focus is enabled). Our recommendation is to have the update rate of the cursor as high as possible which enriches the experience. The pointing data is updated 120 times a second on the USB interface but the actual update rate implemented is dependent on TV or STB processor use. When the CPU is not powerful enough, reducing the update rate can ensure the CPU load does not become too high. To ensure smooth cursor movement we recommend the update rate does not go below 25 frames per second.

All content and widgets are best activated by a single click (as opposed to the double clicks used on typical PC systems).

Although a simple makeover of the UI, by overlaying a cursor already improves the User Experience, the best experience is achieved by a redesign with cursor control in mind.
For this reason uWand works with partners who are experts in creating pointing optimized UIs. The adjustments made to the UI are part of creating an improved overall UX and the uWand team can provide guidance on how best to achieve this.
See presentation on UI design with uWand

Q9 Can I design my own remote control?

uWand is a 3D pointing technology and since it is essentially a software product, it can be designed into almost any physical remote control casing. The uWand software offers maximum flexibility for the amount, function and lay-out of buttons.

The uWand reference design has the flexibility to add peripherals, such as:
- An IR transmitter (and database) for legacy IR control
- An accelerometer for game applications
- A force-feedback module for rumble effects
- A scroll wheels
- A QWERTY keyboard

When working with their remote control manufacturers, TV and STB manufacturers are still able to create an industrial design that fits their brand strategy. The physical camera, beacons and chips required to implement the uWand technology can be used in a broad range of TV remote designs.

Q10 Why is a Philips license necessary?

The uWand technology is a firmware solution that turns any button-based remote control into an advanced pointing controller. uWand is not simply a theoretical patent or technology license, it is a ready-to-integrate, complete software implementation that enables a fast time to market for adding the uWand pointing functionality to a controller.

uWand provides a unique 3-dimensional pointing technology that makes use of camera-based pointing. The license covers a copyright license to the uWand software and includes a non-assert to our relevant IP portfolio.

Q11 What other services does uWand provide?

The uWand software is highly configurable, for example, it does not prescribe the number of buttons, the function of those buttons, or the specific peripherals to deploy. Additional customization of the software – beyond what has been foreseen in the configuration file – may be subject to a non-recurring engineering charge which would be negotiated upfront.

The controller is one part of the UI equation and the GUI is the other. We have developed consulting packages that build on our long experience with pointing user interfaces in order to help customers kick start their GUI development.

Philips has worked with many partners in developing simple-to-use GUIs. The company has learned a lot and, where appropriate, will share our knowledge with our customers. The uWand team does not have dedicated GUI designers as part of the normal implementation team, but nevertheless can offer GUI development services through our partners, ranging from experience flow analysis to rapid prototyping and UI spec development.

Legal Information

Disclaimers

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Patents

Notice is herewith given that the subject device uses one or more of the following patents and that each of these patents may have corresponding patents in other jurisdictions.
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.

Trademarks

Notice: All referenced brands, product names, service names and trademarks are property of their respective owners. uWand — is a trademark of Koninklijke Philips Electronics N.V.

Definitions, Acronyms and Abbreviations

ARPU	Average Revenue Per User
CE	Consumer Electronics
EPG	Electronic Program Guide
GoD	Gaming on Demand
GUI	Graphical User Interface
HID	Human Input Device
NPS	Net Promoter Score
NRE	Non-Recurring Engineering
OS	Operating System
OTT	Over-The-Top
RF	Radio Frequency
RF4CE	Radio Frequency for Consumer Electronics – a Zigbee specification for remote controls
SoC	System on Chip
STB	Set Top Box
TTM	Time To Market
TV	Television
UI	User Interface
USB	Universal Serial Bus
UX	User Experience
VoD	Video on Demand
ZID	Zigbee Input Device

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