Summary

Leap Motion is a hardware sensor that detects fingers movement and allows users to interact with a computer by waving their fingers and hands with no need for touch or the use of a mouse. It is significantly more accurate and less intrusive than other sensors like MS Kinect.

- Leap Motion comes with a selection of over 160 applications, some of which show potential value for teaching and learning in the university.
- The web-browsing feature is particularly interesting as it could be used in a wider variety of scenarios from training/lecture rooms to meeting rooms. It may also have the potential to be incorporated in labs, tills, field work scenarios, etc. to enable users operate hand free.
- Further testing and development may be required to adapt Leap motion to specific contexts in the University, e.g.: accessibility scenarios.
- Leap motion sensors are commercialised at a price of £69.99.

Product Overview

Leap Motion was first released in July 2013. It is a small USB peripheral device which is designed to be plugged to a computer via a USB cable. It has to be placed horizontally on a physical desktop, facing upwards. Compared to MS Kinect, Leap motion has a smaller observation area and higher resolution.

- Leap Motion is made up by a leap motion controller (size 79 x 30 x 11mm) and a pair of USB 3.0 cables – a 5 foot and a 2 foot cord
- It has two monochromatic IR cameras and three infrared LEDs, which use a complex algorithm to calculate the position
- The observation area covers a roughly hemispherical area, to a distance of about 1 meter (3 feet)
- Leap motion detects ten fingers movement and waving of hands/fists
- Price: £69.99

The installation of the Leap Motion controller is straight forward. Users will need to plug one end of the USB cable into the laptop and the other into the controller. The installation of the driver and application software is also required.

Leap Motion Software Package

The Leap Motion software package includes a diagnostic and status program (for reporting bugs and re-calibrating the device) and an applications portal called Airspace. An SDK is also provided for developers.

Developer SDK

The Developer SDK provides a platform to use in-house expertise to build new applications, for example,

- The Digital Humanities Hub is developing a Leap app for touch screen tables for wheelchair-bound users, to help them reach the other side of the screens just by hovering their hands over the Leap sensor.

Apps Store: Airspace

Similar to Apple Store, Airspace is a Leap applications store where the users can acquire new apps. There are 164 free and paid apps in the Airspace store. These apps are developed for use on Windows, Mac OS X and web. They cover a number of areas including: games, music, science, entertainment, productivity and utility tools. For the purpose of this review, we focused particularly around computer controls, education and creativity apps.

1. Computer Control Apps

Examples of applications: Touchless, Handwave, Better Touch Tool…

- Functions: Users can lift their hands or fingers to browse the web, open applications and documents, zoom in and out with one or two hands; provides a configuration window to allow users to customise the commands with the gesture.

- User experience: a novel way to interact with the computer, although the reliability and accuracy still need to improve and users will need a fair amount of self-training for better control of Leap.
- Potential use in the university: web browsing, gesture controlled presentations in meeting rooms, lecture rooms, training rooms, etc. Also, with further development prospective scenarios could also include: hands free functions in some particular situations like surgery, labs, field work or tills.

2. Science and Educational Apps

Most educational applications are aimed at nursery and primary school students to help develop counting, colouring, shape sorting and alphabet writing skills. Science apps are used to illustrate more sophisticated concepts such as molecule or skeleton/body structures. A detailed, interactive virtual experience helps the student understand these concepts more easily.

- Educational example applications: SORTEE, Caterpillar Count
- Science example applications: Cyber Science 3D Motion, Cyber Science 3D Motion Zoology, Frog Dissection
- Potential use in the university: these applications could bring gamification into the teaching environment and help enhance the students' experience. There are some ready-made applications that could directly be used in biosciences or medicine.

3. Creative Apps

Leap is also used as a creative tool in music making and drawing. With the movement of fingers, Leap collects the gesture information and transforms it into different beats to change and create music. Fingers can also be used as a paint brush in drawing apps. These creative apps may be of interest for the music department or the Barber Institute for situations such as public engagement activities, open days, etc.

Findings

- Leap is a new device in gesture control and a novel way to interact with the computer for end users. Applications are the key factors to drive the use of Leap. Defining the suitable application environment is the most critical factor.
- Leap performs significantly accurately in hand tracking, although it still suffers from some glitches. The latest software update tracks not only the fingertips and palms of the hands but each joint as well which improves its stability.
- Leap computer control apps provide a more intuitive way to perform some tasks like web and photo browsing, although the reliability and precision still need to improve and the users will need a fair amount of self-training for better control of Leap.
- Leap science apps may have potential to teach university subjects including biology, geology and medicine etc. They can provide a better user experience and an alternative solution for data visualisation.

Recommendations

- Further testing and wider range usage of Leap motion is recommended, this will help to define the most suitable areas to use Leap.
- Buy some sensors and invite a wider audience from different areas in the university to test them and provide feedback, including members of the IT Innovation Panel, Library, Barber Institute and other relevant members of the university.
- Further recommendations to follow after receiving the users' feedback.