ULPGC

Design of user interfaces
Remarkable GUI/device combination

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1. Controlling PC with hand gestures

1.1 From keyboard to hand gestures

As technology advances, there are more possibilities to interact with a personal computer or laptop. From the classic combination of mouse and keyboard we have moved to touchscreens, virtual reality and devices that can capture the motion of the human body. As I have tried to use Xbox One Kinect and Playstation 4, I have to say that these devices started the way to motion controlled system perfectly. User can play games in the comfort of his house and still actually feel like he's in the game. Of course, in this case, just on his TV.

Oculus and HTC took the user experience to the next level. With virtual reality, user is as close to being in the game is he can. User wears device similar to glasses on his head and device in each hand which works as his hand in the virtual reality (Can be seen in Fig. 1.1). In the room, there are sensors, which tracks the motion of these devices. At this time, there are two big companies, that focus on virtual reality:

- Oculus with his Oculus Rift

- HTC with his HTC Vive

So far, virtual reality is used mostly for gaming, but promises a large number of utilizations. But now let's focus on users, who want to use computer with hand gestures without wearing virtual reality devices, without wearing special gloves and other things, that were necessary until recently.

Figure 1.1: User in virtual reality with Oculus Rift
Source: Oculus, `https://www.oculus.com/rift/`

1.2 Leap Motion

So far, the longest way in enabling user to use hand gestures with bare hands took the company Leap Motion. Leap Motion believes, that hands are the best interface and focuses on providing user experience without use of keyboard or mouse. Only thing that is needed is a sensor that captures the hand movement (As can be seen in Fig 1.2).

1.3 How it works

The Leap Motion Controller is an USB device which is placed on a place under hands (usually table before monitor), facing upward. It can also be mounted onto a virtual reality headset. Using two monochromatic IR cameras and three infrared LEDs, the device observes an area to one meter. The infrared LEDs generate pattern-less IR light and the cameras generate almost 200 frames per second of reflected data. These data are after sent to the host computer, where they are analyzed by the Leap Motion software, in some way synthesizing 3D position data by comparing the 2D frames generated by the two cameras. This results into simulating hand movement in virtual reality transmitted to the PC.

Figure 1.2: Leap Motion Controller
Source: Leap Motion, `https://gallery.leapmotion.com/`

1.4   Future

In future, it is expected that devices similar to Leap Motion Controller will expand and will be used more and more. Microsoft believes, that the future is exactly in using hands as a user interface [1]. There are also ways to create your own hand gesture tracker using just Arduino and little bit of programming in Python [2].

I personally believe that using just hand gestures will lead to simpler use of computer, better user experience and faster work.

Bibliography

[1] Warren, T., Microsoft still believes hand tracking is the future of PC input, The Verge `https://www.theverge.com/2016/6/27/12038648/microsoft-hand-tracking-gestures`, 2016

[2] Raj, B.A., Control your Computer with Hand Gestures using Arduino, Circuit Digest `https://circuitdigest.com/microcontroller-projects/control-your-computer-with-hand-gestures`, 2017