Gesture Control

Executive Summary

Gesture describes any physical movement for non-verbal communication which may be intended to transfer a particular message to another person. Gesture is one of the most important communication methods of human beings, which can effectively express a user's demands. Gesture Control is the field with the goal of interpreting human gestures and feeding it as an input to control XR devices. Communicating with the digital world in a way which is as natural as with the physical world makes the interaction fast and effortless. Hence gesture control is an Intuitive and more immersive way of human-computer interaction. Different techniques have been adopted to interpret a user's gestures, namely, using depth-aware cameras, stereo cameras, computer vision, sensors etc.

Key Players

1. [1]Company : Leap Motion (sold to UltraHaptics)
   Area of Focus : Hardware sensor solutions(camera and infrared LED)
   Does not require wearing external products and users only need to use their hands within the camera collection range. Leap Motion uses Binocular RGB camera which simulates the "parallax" of the human eye and produces stereoscopic images. It can reach millimeter-level detection accuracy for the user's hands

2. Company : Virtual Motion Labs
   Area of Focus : Data glove
   Data gloves can collect the posture and motion of the human hand in real time. The device detects the activity signal of each joint of the hand in order to locate the 3D position of the hand

[1] "Gesture interaction in virtual reality - ScienceDirect."
https://www.sciencedirect.com/science/article/pii/S2096579619300075. Accessed 24 May. 2020.

3. [2]Company : Intel
Area of focus : LiDAR camera (Depth camera)
Intel's RealSense technologies are aimed at providing gesture recognition by capturing millions of depth points per second.

Impact

Industries :

1. Healthcare : Gesture recognition can be very beneficial for simulating complex surgical procedures hence useful in the training phase. Such interfaces are also effective in navigating information without the risk of contamination during surgery. Also examination of detailed 3-d reports of the patient's body is convenient with hand gestures.
2. Gaming/entertainment industry : With good gesture recognition, it is really convenient to integrate complex controls through intuitive hand movements instead of using sequences of button clicks. Companies like ManoMotion have come up with SDK for ios and Android(upcoming) to facilitate developers to include gesture recognition in their apps.

Users :

1. Architects/Artists : Hardware devices like Leap Motion has started gaining popularity in design and creative fields as it breaks the conventional mouse and keyboard usage to bring far greater control to the hands of the artist or creator.
2. Physical disabilities : Such as visual impairment and hearing impairment to interact through gestures as it eliminates a lot of manual labor. One use case can be sign language interpretation.

Timeline

Upcoming milestones (not more than 5 years) Product launch, industry conferences (5)

[3]July 2020 : International Conference on Gesture Recognition

[4]October 2020 : LEAP Developer's day by magic leap

October 2020 : HTC Vive Cosmos release. New vive hand tracking SDK (hand positioning, gesture recognition, finger tracking) used for development on cosmos

---

[2] "Intel® RealSense™ Technology." https://www.intel.com/content/www/us/en/architecture-and-technology/realsense-overview.html. Accessed 24 May. 2020.

[3] "International Conference on Gesture Recognition in July 2020 ...." https://waset.org/gesture-recognition-conference-in-july-2020-in-stockholm. Accessed 24 May. 2020.

[4] "Announcing Magic Leap Developer Access Programs and ...." 11 Feb. 2020, https://www.magicleap.com/news/for-creators/announcing-magic-leap-developer-access-programs-and-dates-for-leap. Accessed 24 May. 2020.

[5]2021 : Facebook Oculus Quest headset (lighter version). Supports gesture detection
[6]2023 : Apple's AR glasses

Barriers to adoption

Recognition Errors : Sometimes accomplishing easy tasks on an object using gesture control can be difficult as compared to just a button click on earlier hand controllers. This can cause frustration among the users.

Discoverability : A named button on a toolbar has an explicit purpose and is also easy to find on the other hand gestures may be arbitrary and difficult to discover. Developer first needs to provide a proper tutorial to the user.

References

Bloomberg.com, Bloomberg,
www.bloomberg.com/news/articles/2020-05-05/facebook-s-oculus-developing-smaller-lighter-quest-vr-headset.

"Announcing Magic Leap Developer Access Programs and Dates for LEAP Developer Days." *Magic Leap*,
www.magicleap.com/en-us/news/for-creators/announcing-magic-leap-developer-access-programs-and-dates-for-leap.

Haselton, Todd. "Apple's Smart Glasses Said to Launch in 2023, Three Years Later than Originally Expected." *CNBC*, CNBC, 11 Nov. 2019,
www.cnbc.com/2019/11/11/apple-to-launch-ar-headset-in-2022-smart-glasses-in-2023.html.

"ICGR 2020: 14. International Conference on Gesture Recognition." *Open Science Research Excellence*, waset.org/gesture-recognition-conference-in-july-2020-in-stockholm.

"Intel® RealSense™ Technology." *Intel*,
www.intel.com/content/www/us/en/architecture-and-technology/realsense-overview.html.

LI, Yang, et al. "Gesture Interaction in Virtual Reality." *Virtual Reality & Intelligent Hardware*, Elsevier, 14 Aug. 2019,
www.sciencedirect.com/science/article/pii/S2096579619300075.

---

[5] "Facebook's Oculus Is Developing a New Quest VR Headset ...." 5 May. 2020,
https://www.bloomberg.com/news/articles/2020-05-05/facebook-s-oculus-developing-smaller-lighter-quest-vr-headset. Accessed 24 May. 2020.
[6] "Apple glasses said to launch in 2023 - CNBC.com." 11 Nov. 2019,
https://www.cnbc.com/2019/11/11/apple-to-launch-ar-headset-in-2022-smart-glasses-in-2023.html.
Accessed 24 May. 2020.