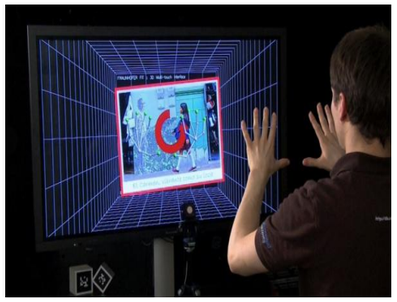
In recent years, hand gesture recognition is gaining great importance in human-computer interaction (HCI) and human-robot interaction (HRI).*Hand wearable devices*such as sensor gloves have been used although they are usually expensive and user intrusive. Cameras and computer vision have proved to be useful tools for this task. In addition, other contact-free sensors have emerged lately to detect hand motion and interact with different devices. However, despite all the previous work, a reasonable solution to the gesture recognition problem has not been found yet.



This article presents a new method for hand gesture recognition based on an RGB sensor. The proposed approach takes advantage of depth information to cope with the most common problems of traditional video-based hand segmentation methods: cluttered backgrounds and occlusions.

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USABILITY AND HUMAN INTERFACE

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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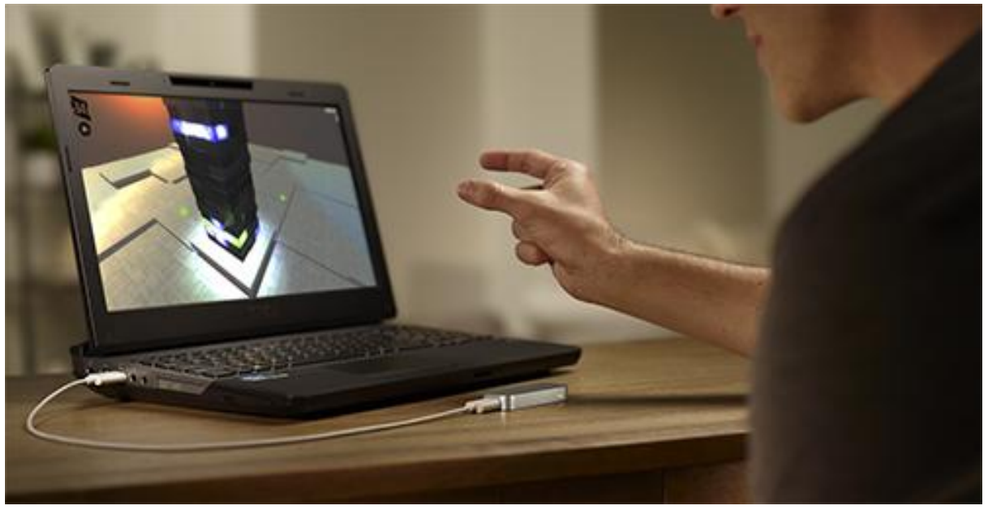
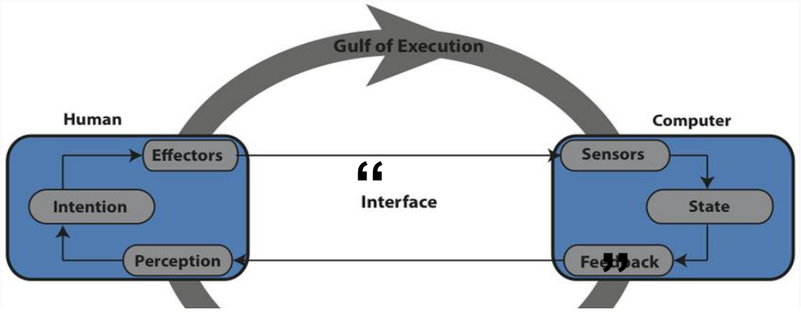
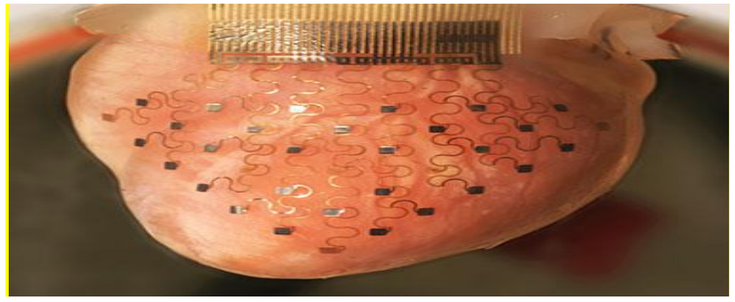
RGB SENSOR



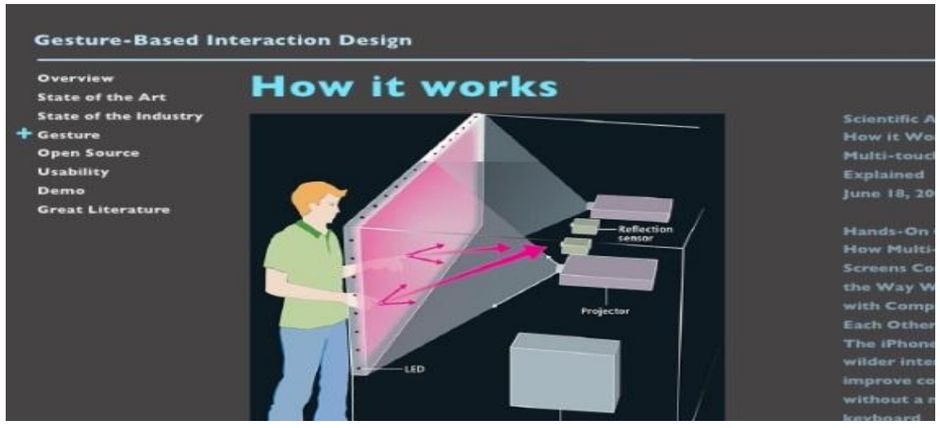




Modern approaches to gesture recognition usually acquire information from the lately developed colour and depth-sensing devices. The first colour and depth sensor called Kinect was developed by Microsoft for the Xbox console and released in November 2010. This sensor projects an infrared pattern of 307,200 dots in a 640 × 480 mesh and receives the reflected pattern through a CMOS monochrome sensor. This structured light application allows the device to measure the depth of every point by means of triangular. Moreover, an RGB camera provides synchronisedcolour information of each point.

Microsoft Kinect was formerly developed for full-body tracking to interact with video games by means of body movements and gestures. This sensor and its followers have proved to be suitable for such task and many body-tracking methods have appeared lately. Furthermore, many authors have developed applications of gesture recognition using these sensors in different fields such as interactive displays , physical rehabilitation, robot or sign language recognition.

Current BCIs have maximum information transfer rates up to 10–25 bits/min. This limited capacity can be valuable for people whose severe disabilities prevent them from using conventional augmentative communication methods.



HOW EXACTLY?

In order to recognize hand gestures, the hand pixels have to be identified. Hand regions are smaller than 64 × 64 pixels when the user stands approximately 3 meters away from the sensor.Thus, the user should not hold his hand nearer than this distance since the sensor does not return any measurement. In this work, we address the problem of differentiating the hand between all the skin regions segmented by a colour filter.First, we find the faces and the hands of the users, if they appear. Afterwards, we determine the position of the palm and the wrist to accurately separate the hand from the forearm.