Literature Survey

S.NO	TITLE	AUTHORS	ABSTRACT	DRAWBACKS
1	Gesture-controlled image system positioning for minimally invasive interventions	Benjamin Fritsch*, Thomas Hoffmann, André Mewes and Georg Rose	This work examines how a touchless interaction concept contributes to an efficient, direct, and sterile interaction workflow during CT-guided interventions. Two hand gesture sets were designed specifically under consideration of the clinical workflow and the hardware capabilities. These were used to change the position of an X-Ray tube and detector of a CT scanner without breaking sterility and are compared regarding usability and performance in a user study with 10 users. The user study revealed that it is possible to change the angle of the gantry within 10 seconds average in an experimental setup. A straight hand gesture showed higher acceptance than a pistol motivated gesture. Furthermore, the sequences were not optimal and confused the users. It turned out that it feels more natural to activate and confirm the system with the same gesture.	To use the full range of human senses, ideally a combination of multimodal interactions concepts, as presented in [7] have to be further investigated.
2	Hand Gestures Recognition Using Radar Sensors for Human-Computer-Interaction	Shahzad Ahmed, Karam Dad Kallu, Sarfaraz Ahmed and Sung Ho Cho	Human–Computer Interfaces (HCI) deals with the study of interface between humans and computers. The use of radar and other RF sensors to develop HCI based on Hand Gesture Recognition (HGR) has gained increasing attention over the past decade. Today, devices have built-in radars for recognizing and categorizing hand movements. In this article, we present the first ever review related to HGR using radar sensors. We review the available techniques for multi-domain hand gestures data representation for different signal processing and deep-learning-based HGR algorithms. We classify the radars used for HGR as pulsed and continuous-wave radars, and both the hardware and the algorithmic details of each category is presented in detail. Quantitative and qualitative analysis of ongoing trends related to radar-based HCI, and available radar hardware and algorithms is also presented. At the end, developed devices and applications based on gesture-recognition through radar are discussed. Limitations, future aspects and research directions related to this field are also discussed.	Although radar sensors offer several advantages over the other HGR sensors , the adoption of radar-based HGR in our daily lives is still lagging behind these competing technologies. Attention must be paid to miniature hardware development and real-time recognition algorithms' development.

3	A Gesture-based Tool for Sterile Browsing of Radiology Images	JUAN P. WACHS, PHD, HELMAN I. STERN, PHD, YAEL EDAN, PHD.	The use of doctor-computer interaction devices in the operation room (OR) requires new modalities that support medical imaging manipulation while allowing doctors' hands to remain sterile, supporting their focus of attention, and providing fast response times. This paper presents "Gestix," a vision-based hand gesture capture and recognition system that interprets in real-time the user's gestures for navigation and manipulation of images in an electronic medical record (EMR) database. Navigation and other gestures are translated to commands based on their temporal trajectories, through video capture. "Gestix" was tested during a brain biopsy procedure. In the in vivo experiment, this interface prevented the surgeon's focus shift and change of location while achieving a rapid intuitive reaction and easy interaction. Data from two usability tests provide insights and implications regarding human-computer interaction based on nonverbal conversational modalities.	In addition, we wish to assess whether a stereo camera will increase the gesture recognition accuracy of the system. A more exhaustive comparative experiment between our system and other human–machine interfaces, such as voice, is also left for future work

In two brain surgeries at the Neurosurgery OR at the Washington Hospital Center, procedures were observed by the authors to gain insights about the use of current technologies and how they affect the quality of the surgeon's performance. We found that: (a) surgeons kept their focus of attention between the patient and the surgical point of interest on the touch-screen navigation system; (b) a short distance between the surgeon and the patient was maintained during most of the surgery; (c) the surgeon had to move close to the main control wall to discuss and browse through the patient's MRI images.

The hand gesture control system "*Gestix*" developed by the authors helped the doctor to remain in place during the entire operation, without any need to move to the main control wall since all the commands were performed using hand gestures.