

# **A GESTURE BASED TOOL FOR STERILE BROWSING OF RADIOLOGY IMAGES**

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## **LITERATURE SURVEY**

### **1.A Gesture-based Tool for Sterile Browsing of Radiology Images**

#### **Authors:**

- Juan P. Wachs
- Helman I. Stern
- Yael Edan
- Michael Gillam
- Jon Handler
- Craig Feied
- Mark Smith

#### **Abstract**

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.

## **2.Hand-gesture-based sterile interface for the operating room using contextual cues for the navigation of radiological images**

### **Authors:**

- Mithun George Jacob
- Juan Pablo Wachs
- Rebecca A Packer

### **Abstract**

This paper presents a method to improve the navigation and manipulation of radiological images through a sterile hand gesture recognition interface based on attentional contextual cues. Computer vision algorithms were developed to extract intention and attention cues from the surgeon's behavior and combine them with sensory data from a commodity depth camera. The developed interface was tested

in a usability experiment to assess the effectiveness of the new interface. An image navigation and manipulation task was performed, and the gesture recognition accuracy, false positives and task completion times were computed to evaluate system performance. Experimental results show that gesture interaction and surgeon behavior analysis can be used to accurately navigate, manipulate and access MRI images, and therefore this modality could replace the use of keyboard and mice-based interfaces.

**Keywords:** User-Computer Interface, computer vision system, infection control

### **3.A Gesture-based Tool for Sterile Browsing of Radiology Images**

**Authors:**

- Juan P Wachs
- Helman Stern
- Yael Edan
- Michael Gillam

**Abstract**

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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

## **4. Hand Gestures Recognition Using Radar Sensors for Human-Computer-Interaction**

### **Authors:**

- Shahzad Ahmed
- Karam Dad Kallu
- Sarfaraz Ahmed
- Sung Ho Cho 1

### **Abstract**

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.

**Keywords:** hand-gesture recognition; pulsed radar; continuous-wave radars; human-computer interfaces; deep-learning for radar signals

## **5. Touchless computer interfaces in hospitals**

### **Authors:**

- Seán Cronin
- Gavin Doherty

### **Abstract**

The widespread use of technology in hospitals and the difficulty of sterilising computer controls has increased opportunities for the spread of pathogens. This leads to an interest in touchless user interfaces for computer systems. We

present a review of touchless interaction with computer equipment in the hospital environment, based on a systematic search of the literature. Sterility provides an implied theme and motivation for the field as a whole, but other advantages, such as hands-busy settings, are also proposed. Overcoming hardware restrictions has been a major theme, but in recent research, technical difficulties have receded. Image navigation is the most frequently considered task and the operating room the most frequently considered environment. Gestures have been implemented for input, system and content control. Most of the studies found have small sample sizes and focus on feasibility, acceptability or gesture-recognition accuracy. We conclude this article with an agenda for future work.

**Keywords:** gestures, hands-free, infection control, sterile, touchless, user–computer interface