Working Hands: Embodying Interaction for Healthcare

Hideaki Kuzuoka [1], Jun Yamashita [1], Keiichi Yamazaki [2], Tetsuo Yukioka[3], Shoichi Ohta[3], Paul Luff[4]

[1] University of Tsukuba, Japan, [2] Saitama University, Japan, [3]Tokyo Medical University, Japan, [4] King's College, London

kuzuoka@esys.tsukuba.ac.jp, yamakei@post.saitama-u.ac.jp, yukioka@yc4.so-net.ne.jp, sho-ohta@tokyo-med.ac.jp, Paul.Luf@kcl.ac.uk

Abstract. This paper reports on two technologies we have developed to support rich interaction between distributed personnel, Developing on our previous investigations with remote projections and pointing devices we have begun to investigate how we might facilitate particularly complex interactions, namely when remotely instructing co-participants in emergency situations. We introduce two systems GestureView and GestureLaser that provide different ways of embodying actions in a remote location.

Introduction

Recently we have begun to develop upon our previous studies of advanced video-mediated communication systems to support remote instruction around physical artefacts. In particular, we are considering the support necessary for personnel, such as paramedics, who have to cope with emergency situations *in situ* but who may require support from remote personnel. Such medical tasks may require identifying particular features and symptoms, instructing another on the operation of a particularly difficult procedure and complex manipulation of the body. The tasks they may need to perform may range from the manipulation of surgical needles for sewing up a wound, binding a wound with a ligature, deploying a tracheoscope for intubation or a master probe for ultrasound image diagnosis. In

each case, in a disaster or emergency, a remote medical professional with expertise in these procedures could support local paramedics if they had some resources for seeing common objects and the actions being undertaken on those objects. Our previous work on advanced remote instruction technologies suggest ways in which we might develop support using remote projections, mixed moving images and remote pointing devices. We are investigating two systems with quite different properties: GestureView and Gesture Laser.

GestureView and GestureLaser: Embodying Interaction

GestureView consists of a head mounted display (HMD) with a small CCD camera mounted on it to be worn by the person being instructed (Fig. 1 middle). The image captured by the camera is sent to an instructor, the instructor's gestures are overlaid on the image and it is sent back to the HMD (Fig. 1, right). In this way, a person can see a remote instructor's gestures overlaid on the scene they see before them. Such gestures can help show who to pick up a medical tool correctly, how to position it in the hand and how to manipulate during a minor surgical procedure, as this happens.

Fig 1. GestureView HMD being worn (left) Right: what is seen through the HMD – the remote instructor's gestures are superimposed on the other person's view taken by the cameras.

GestureLaser (Yamazaki et al., 1999) is a slightly simpler system using a remotely controlled laser pointer. This provides a straightforward way for a remote instructor to point to particular locations in another domain.

So far, we have tested these systems to support remote instruction on a range of medical activities, including: ultrasound image diagnosis, sutura, thoracentesis, tintubation, and Cardiopulomonary resuscitation. Akthough more cumbersome than GestureLaser, GestureView provides for great expressiveness in the ways in which instructions can be embodied. We are currently developing systems that build upon the advantages of each approach.

References

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