

# Wearable Computing in Medicine

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## Abstract

Physicians wearing a PC connected wirelessly to a keyboard on the arm and a retina display device on the head — Is this a scene seen only in science fiction movies? Certainly not! In this brief article we explore how these futuristic devices look like and what they can do for the field of medicine.

## WEARABLE COMPUTING

Wearable computers in medicine are computer devices that can be attached to a healthcare provider or a patient at the point-of-care. This is a relatively new field in health information technology and will certainly expand in the future. In this brief review, we will discuss the different applications for which wearable computers are being used today.

## APPLICATIONS

Wearable computers are currently used for the following medical purposes:

- Data processing
- Patient monitoring
- Digital imaging
- Remote guidance

## DATA PROCESSING:

Wearable computers allow users to work with word processing and spreadsheet programs on the go. Better voice recognition will allow dictation into small wearable devices while performing medical procedures. The technology will integrate data real-time with other applications on the network such as billing or patient record keeping. A variety of text or imaging data can be transferred to the physician's retina without risking contaminating a sterile field.

**Figure 1**

Figure 1: Wearable computer device from Xybernaut



## PATIENT MONITORING:

Vital data from the monitor can be transferred directly to the anesthesiologist's retina. The physician can now concentrate on the medical procedure rather than paying attention to a monitor located away from the patient. A study performed at

the University of Washington in Seattle and presented at the 2002 Annual Meeting of The Society for Technology in Anesthesia [1] revealed results from using a device called “Nomad Personal Display” in the operating room. The investigators found that the anesthesiologists increased their time focusing on their patients by 48%, decreased the time to perform their tasks by 29%, decreased the amount of times switching their attention to the monitor by 89%, and decrease overall change in attention by 54%. Test subjects stated that the see-through head-up display felt natural and did not disturb them during procedures such as intubations.

### Figure 2

Figure 2: Retina display “Nomad” device from Microvision (Image from Microvision)



### DIGITAL IMAGING:

Retina display projectors can be used to access digital images while performing medical procedures. The devices have already been used successfully during angiography allowing the physician to overlay fluoroscopic images with the operating field.

### REMOTE GUIDANCE:

Wearable data transfer devices combined with retina display projectors are being used by paramedics in emergency medicine for remote guidance and point-of-care access of medical information. First experiences are encouraging. Users judged the devices to be very useful and not disturbing despite their bulkiness.

### FUTURE

As computer technology gets smaller and lighter many more applications of wearable computers or sensors will emerge. Retina display devices will allow anesthesiologists to concentrate on the patient rather than on computer monitors placed on the anesthesia machine behind their back. Voice activated information retrieval will provide instant access to relevant visual information at the point-of-care. This should prove useful for treatment of patients in the out-of-the-hospital setting.

### SUMMARY

Wearable computers are not a futuristic dream anymore. Their applicability is currently being tested in operating rooms or other point-of-care locations. Due to the early stage of the technology the devices are still bulky and not very light. Once they reach a mature stage they will easily integrated into equipment and professional clothes. The future will show how well wearable computers will be able to increase patient safety and improve real-time interactive data transfer.

### References

1. Ross B, Nalwai-Cecchini A, Ormerod D, Fine M, Hyde JP. Use of a Head-Mounted Display of Patient Monitoring Data to Enhance Anesthesiologists Response to Abnormal Clinical Events. 2002 Annual Meeting of The Society for Technology in Anesthesia. Santa-Clara, California, USA. Online at <http://www.microvision.com/pdfs/medcase1.pdf>

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