INTERACTIVE EDUCATION SYSTEM FOR TEACHING PATIENT CARE

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of U.S. Ser. No. 09/560,949, filed Apr. 28, 2000, which is a continuation-in-part of U.S. Ser. No. 09/199,599, now U.S. Pat. No. 6,193,519, filed Nov. 25, 1998, which is a continuation of U.S. Ser. No. 08/643,435, now U.S. Pat. 5,853,292, filed May 8,1996.

BACKGROUND

The present embodiment relates generally to an interactive education system for teaching patient care, and more particularly to such a system having virtual instruments for use in conducting patient care activity on a patient simulator.

While it is desirable to train students in patient care protocols before allowing contact with real patients, textbooks and flash cards lack the important benefit to students attained from "hands-on" practice. Thus, patient care education has often been taught using devices, such as a manikin configured to simulate a patient, along with corresponding medical instruments to perform patient care activity. However, one disadvantage of such a system is that medical instruments are often prohibitively expensive, and consequently, many users must settle for using a smaller variety of instruments, even at the cost of a less comprehensive educational experience. One solution to the foregoing problem is using a set of relatively inexpensive, simulated medical instruments ("virtual" instruments), as taught in U.S. Pat. No. 5,853,292, the entire disclosure of which is hereby incorporated by reference.

Another problem in patient care education is teaching a user to locate and interpret certain patient body sounds. Charts or displays of audible locations are of little practical value, for they do not provide the user with some form of realistic feedback, such as audio, visual, or tactile responses to the user's activity. For example, knowing that an apex heart sound is heard at the fifth intercostal space along the midclavicular line is a very different matter from actually finding the location and recognizing the sound on a patient. In an attempt to provide a more realistic experience, prior methods have disposed speakers playing body sounds at locations throughout a manikin, but this is undesirable, as speakers have a tendency to reverberate throughout the manikin, thus allowing an unnatural juxtaposition of normally distal sounds. Moreover, even if only one sound is played at a time, the nature of a speaker results in the sound being heard over a wider anatomical area than would be found in a real patient, thus reinforcing sloppy sound location and detection by the user.

Therefore, what is needed is an interactive education system using virtual instruments, such as a virtual stethoscope, in cooperation with simulated patient treatment for rewarding the user with realistic audible, and in some cases, visual feedback, thereby enabling a user to learn comprehensive patient care skills.

SUMMARY

The present embodiment, accordingly, provides an interactive education system for teaching patient care to a user. The system comprises a patient simulator, as well as a virtual instrument for use with the patient simulator in performing patient care activities. The systems also includes means for sensing an interaction between the virtual instrument and the simulator, and means for providing feedback to the user regarding the interaction between the virtual instrument and the simulator.

One advantage of the present embodiment is that it provides an interactive education system using virtual instruments in cooperation with simulated patient treatment for rewarding the user with realistic audible, and in some cases, visual feedback, thereby enabling a user to learn comprehensive patient care skills.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1***a* is a schematic view of an interactive education system for teaching patient care using virtual instruments and a patient simulator.

FIG. **1***b* is a schematic view of an interactive education system for teaching patient care using software-generated virtual instruments and a software-generated patient simulator.

FIG. **2** is a schematic view of the interaction between a set of virtual instruments and the simulator of the system of FIG. **1***a*.

FIG. **3** is a perspective view of a virtual PA catheter instrument of the system of FIG. **1***a*.

FIG. **4***a* is a perspective view of a virtual stethoscope instrument of the system of FIG. **1***a*.

FIG. **4***b* is a perspective view with a cutaway of the virtual stethoscope instrument.

FIGS. **4***c* and **4***d* are a circuit diagram for an acquisition control device of the virtual stethoscope instrument.

FIG. **4***e* is a circuit diagram for a sound control feature of the virtual stethoscope instrument.

FIGS. **4***f* and **4***g* form a circuit diagram according to another embodiment of the circuits of FIGS. **4***c*–**4***e*.

FIG. **4***h* is a perspective view with a cutaway of a sensor for cooperating with the virtual stethoscope instrument.

FIGS. **5**–**7** are views of screen displays generated by a program of the educational systems of FIGS. **1***a*–*b*.

FIGS. **8**–**17***a* are schematic views of modules contained in the program.

FIGS. **17***b*–**17***f* are views of screen displays generated by the program for the Codemaker module.

FIG. **18** is a view of a screen display generated by the program relating to the interaction between a software-generated virtual instrument and a software-generated simulator of the system of FIG. **1***b*.

FIGS. **19**–**23** are views of screen displays generated by the program relating to virtual instruments of the systems of FIGS. **1***a*–*b*.

DETAILED DESCRIPTION

Referring to FIG. **1***a*, the reference numeral **10** refers, in general, to an interactive education system for teaching patient care protocols to a user. The system **10** comprises a set of virtual instruments **12** used to simulate medical instruments, and a simulator **14** used to simulate a patient for receiving patient care activity from the user. In this embodiment, the virtual instruments **12** and simulator **14** are tangible objects. Thus, the virtual instruments **12** look, feel, and operate like real medical devices in conjunction with the simulator **14**, which is understood to encompass a variety of forms, including a fully articulating and adult-sized manikin, as well as a fetus, a neonate, a child, a youth, or portion of a manikin, such as the arm, torso, head, or pelvic region.