The GuideView System for Interactive, Structured, Multi-modal Delivery of Clinical Guidelines

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Clinical Guidelines

Clinical Guidelines are stepwise instructions for performing diagnostic or therapeutic medical procedures. Typically, guidelines are available as text, designed for use by healthcare professionals.

Example: Disorders of the Elbow*

- When the Doctor is Really Far Away!
  - During space exploration, a physician may not be available if an astronaut needs medical care.
  - All astronauts cannot be physicians, or the physician may need medical care.
  - Autonomic physicians may be unfamiliar with a particular medical procedure.
  - Many other settings also have low physician density.
  - Rural areas, less developed countries, first responders, and battlefield situations.

Clinical guidelines can be a solution if implemented using technology and user interfaces appropriate to user’s medical training.

GuideView is a solution. It delivers clinical guidelines in an easy-to-understand and easy-to-use package.

Main Features of GuideView

- Complex guidelines are broken into simple steps in a process flow.
- Instructions for each step are presented in multiple modes.
  - Text
  - Voice and sound
  - Pictures
  - Full-motion video
  - Live action (with annotations)
  - Animation
  - GuideView interacts with the user in two modes.
  - Mouse clicks
  - Voice navigation: both hands can be free to assist the patient.
- GuideView interacts with medical sensors using Bluetooth (wireless) or wired connections.
- Automatically translates guideline pathways depending on data values received.
- Saves time and improves accuracy.
- GuideView is a multi-platform with consistent look-and-feel.
- Over the web on Windows and Macintosh clients running Internet Explorer.
- Stand-alone on Windows computers.
- On Windows Mobile PDAs (Pocket PCs).

GuideView User Interface

GuideView Design Goals

- Reduce Complexity
  - Each process step is a simple task that can be completed even by those with minimal medical training.
  - Decrease Cognitive Load
  - At each step only a small (5 maximum) choices to a next step.
- Support backtracking
  - No back is final. Can always return easily to a previous step and follow different path.
- Enable repetition
  - Provides instructions for any step as often as desired.
- Support modularity and re-usability of guidelines:
  - Guidelines can be developed in small modules.
  - Modules can be changed and nested as needed to create complex protocols.
- Reinforce learning by providing multiple instructional modes.
  - Each step is presented using multiple modes, text, voice, and visual aids.
- Look and feel as simple as possible over multiple platforms.
  - Achieve by using Flash technology from Macromedia.
- Support mobility
  - GuideView may need to be used by mobile professionals, either within a space habitat or on land.
- Separation of content and presentation.
- Content stored as XML.

GuideView supports mobility

- User interface identical to the desktop version.
- Full-motion video and voice output available.
- Multi-step and factor very desirable for mobile professionals and astronauts.
- Voice navigation is being developed.

GuideView Author

- Used to develop clinical guidelines and save them in a form capable of being played back using GuideView.
- Up to 5 branch points at each node.
- Path and zoom functions for navigating access complex, lengthy protocols.
- Supports insertion of text, voice, pictures and video.
- Content saved as XML.
- Can create GuideView-compatible protocols over the web.
- A graphical editor for creating, editing, and updating GuideView process flows.

GuideView Procedures

- So far two GuideView procedures have been developed:
  - Ophthalmic: Evaluation of redeye includes diagnosis and treatment of eye irritation.
    - Instructions for performing eye exam.
    - Diagnosis and treatment of foreign body in eye.
  - Airway triage. Diagnosis and treatment of acute breathing problems.
    - Heimlich maneuver.
    - Insertion of ILMA (Intubating Laryngeal Mask Airway).
    - Assisted breathing using Ambu bag.
    - Others.

Results of Usability Study

- Voice instructions rated useful to indispensable by 100% of subjects.
- Task Load Index significantly lower (p < 0.002) with voice navigation than without.
- Reason: Microphone and recognition software were oversensitive and interpreted external noises as commands.

Future Work

- Interface GuideView with electronic health record systems.
- Improve voice navigation.
- Add voice navigation to Windows Mobile version.
- Add an expert mode for use by physicians.
- Develop extensive module library with management and research features.
- Enable connectivity with medical devices and sensors.
- Explore engineering applications for GuideView technology.

References


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