Architecture for Remote Training of Home Telemedicine Patients

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Abstract

In spite of efforts to develop easy-to-use devices, patients may require multiple training sessions to achieve mastery of advanced telehealth devices, especially those incorporating web-access. In geographically-distributed projects, such repeat training can be costly. A software architecture for simultaneous voice conferencing and remote device control over a single telephone line is presented.

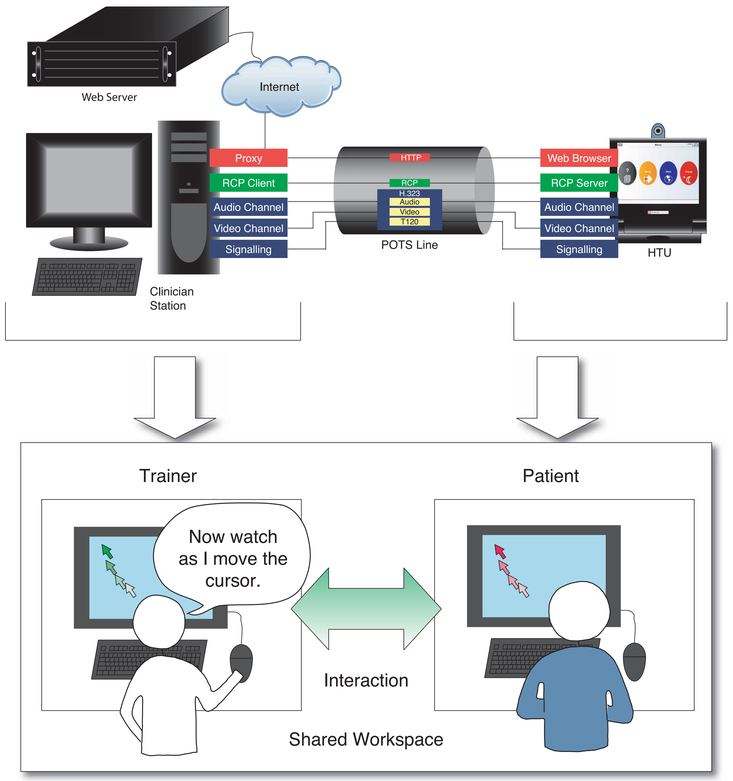
Background

The IDEATel project is an 8-year randomized controlled study of the efficacy of a home telemedicine system for diabetes care of the elderly rural and inner-city patients in medically underserved areas. Central to this project is the home telemedicine unit (HTU), which provides: videoconferencing, remote monitoring, secure messaging, data review, and web-based education. Few elderly patients were able to master complex functions, such as web navigation, in a single session. Conventional telephone support solutions are unsatisfactory.

Architecture

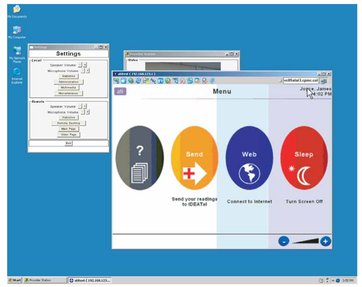
The new architecture leverages the existing H.323 VOIP audio chat infrastructure used by many home telehealth devices and adds remote control through the use of a remote display protocol (RDP). In conjunction with the HTU vendor, we selected Virtual Network Computing (VNC) as our RDP. VNC allows for remote control of a computer when used in conjunction with Windows. The system has been implemented on production home telehealth units.

	Telephone Support	In Person	Remote Training
See patient's screen	✗	✓	✓
See hand position	✗	✓	✓
Remote support	✓	✗	✓
Move patient's cursor	✗	✓	✓
Physicially position patient's hand	✗	✓	✗



Trainer

Patient



Trainer's Workspace

IDEATel Home Telemedicine Unit (HTU)

Evaluation

Evaluation of the remote training was performed by conducting a mock training session for the IDEATel data review website using expert evaluators. The remote control tool was demonstrated to the evaluators from the perspective of the patient. Next, the evaluator used the system as a trainer. After experiencing the remote training from both perspectives, the evaluators completed a 6 item questionnaire scored on a 5 point Likert scale, where 5 is best.

The overall response was favorable. Individual responses ranged from 3 to 5. Averages for questions ranged from 5 for the overall utility of the system, to 3.7 (range 3-5), on whether the system would reduce the need for home visits. The remaining questions on audio quality and remote control performance averaged between 4 and 4.6.

Discussion

A software architecture for remote telehealth training over narrow-band connections is presented. Pilot testing has shown that it supports basic training needs over a standard POTS telephone connection. We were able to maintain a H.323 audio chat simultaneous with performing a remote control session, while maintaining both acceptable audio quality and remote control performance. The evaluators overwhelmingly thought the system would be useful in patient training. Field evaluation of the system is ongoing.

Acknowledgments
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