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BITC

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Sponsor : MEDICAL COLLEGE OF GA/AUGUSTA, GA

Division Id: 400

/ 5785

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Title: DEVELOPMENT & DEMONSTRATION OF EXPANDED ELECTRONIC HOUSE CALL SYSTEM

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Administrative comments -

INITIATION OF 4-MOS COST-REIMBURSEMENT CONTRACT.

Closeout Notice Date 20-NOV-1997

Project Number B-03-633

Doch Id 47358

Center Number 10/24-6-R0468-0A0

Project Director BURROW, MICHAEL

Project Unit BEC

Sponsor MEDICAL COLLEGE OF GA/AUGUSTA, GA

Division Id 5785

Contract Number BITC-1715

Contract Entity GTRC

Prime Contract Number

Title DEVELOPMENT & DEMONSTRATION OF EXPANDED ELECTRONIC HOUSE CALL
SYSTEM

Effective Completion Date 17-JUL-1997 (Performance) 17-JUL-1997 (Reports)

Closeout Action:	Y/N	Date Submitted
Final Invoice or Copy of Final Invoice	Y	
Final Report of Inventions and/or Subcontracts	N	
Government Property Inventory and Related Certificate	N	
Classified Material Certificate	N	
Release and Assignment	N	
Other	N	

Comments

Distribution Required:

Project Director/Principal Investigator	Y
Research Administrative Network	Y
Accounting	Y
Research Security Department	N
Reports Coordinator	Y
Research Property Team	Y
Supply Services Department/Procurement	Y
Georgia Tech Research Corporation	Y
Project File	Y

B-03-633
#1

Project No. B03-633

DEVELOPMENT AND DEMONSTRATION OF EXPANDED EHC SYSTEM

FINAL REPORT

September 10, 1997

Submitted To:

MEDICAL COLLEGE OF GEORGIA

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SUMMARY

Under Project B-03-633 with the Medical College of Georgia, the Georgia Institute of Technology conducted an effort to expand and enhance the capabilities of the Electronic House Call system. The new system can operate in different clinical modes, over a variety of communication links, and in lower cost configurations. Efforts have concentrated on developing a new client/server database structure, breaking the dependence on a particular video conferencing product, adding ISDN and POTS capabilities, and introducing two new medical devices. The results of these efforts are summarized in this report and can be demonstrated on new EHC prototype systems.

BACKGROUND

The initial prototype of the Electronic House Call system demonstrated many important features for telemedicine in a home healthcare application. Emphasis was placed upon creating and evaluating a prototype to discover what telemedicine features were essential, desirable, or unnecessary. During this evaluation study, the prototype provided many capabilities that were routinely used, but some features were not as frequently utilized, and there were also a variety of limitations that were identified. Under this EHC follow-on effort, a new revision of the Electronic House Call system has been developed that both improve the capabilities and address the limitations of the initial EHC prototype.

Cost, reliability, monitoring features, accessibility, conferencing quality, ease of use, and ease of installation are some of the issues that determine whether the EHC will become a practical clinical tool, and there are trade-offs between all of these must be balanced. Some limitations of the initial EHC system were the size, cost, and lack of flexibility. It relied upon proprietary Intel ProShare communications for both video conferencing and data transfer, and the configuration was fixed to support no more or less than six specific vital signs measurements. The lack of flexibility limited the application to homes that had high speed network connections, and patients who could be monitored with the fixed diagnostic device configuration.

Under the new EHC development efforts, the plan has been to create a scalable architecture with "plug and play" components. The flexibility of this new system will support a much wider range of clinical applications and pave the way to the future, as new components become available. The new design supports a variety of communication links through TCP/IP connections over local or wide area networks (LAN or WAN) or over dial-up to plain old telephone service (POTS) and ISDN. A major emphasis has been placed on creating a client/server database structure that is not dependent upon the video conferencing product. This database structure provides more reliable system administration, for immediate information updates, and access to patient data from any authorized node on the network.

TASKS COMPLETED

The goals for this project were to expand and enhance the capabilities of the Electronic House Call system and demonstrate the EHC potential as a scalable, cost-effective telemedicine platform. Efforts were focused on expanding the capabilities of EHC to operate in different modes, over a variety of communication links, and in lower cost configurations. The specific tasks included

- 1) developing a client/server database structure for the EHC,
- 2) providing support for ISDN and POTS,
- 3) upgrading the user interface,
- 4) developing a reduced cost version of the EHC that uses a television for the patient monitor,
- 5) adding two new medical devices, and
- 6) providing demonstrations of the new EHC capabilities and the future potential of a more scalable telemedicine platform.

Task 1. Client/Server Database

A major component of the EHC enhancement is a new client/server database structure that is independent from the videoconferencing product. The initial EHC system transferred patient using the proprietary ProShare data path, and it required the doctor or nurse to go to the central monitoring station to view the patient data on the local database. The new client/server database structure supports remote access to patient data by an authorized user from any site with network connections or dial-up modem connections. This database structure is similar to the GSTP database structure, and it is designed with an option for merging these applications in the future. The client/server structure also lays the foundation for Internet support. Web based tools for accessing this database were tested.

The SQL tables for the new EHC client/server structure have been created on the BITC server. The tables include vital signs data, patient and provider information, and patient and provider station information. Data is passed to the server over the TCP/IP network connection, whether establish through a dial-up connection, ISDN modem, direct connection, or cable modem. New Visual Basic forms provide patient lists, icons, buttons, and instructions. The help screens are displayed in the video conferencing window.

Task 2. ISDN and POTS Support

An ISDN version of EHC using ProShare was completed for the Ludowici project. This version supports the functionality of the original EHC system, but it is limited to the proprietary data pathway through ProShare.

The new version of EHC has removed the dependency upon ProShare, and ISDN support will be provided through a TCP/IP network connection via an ISDN modem or router. The video conferencing mode is not yet complete for this option, but Microsoft NetMeeting appears to offer an attractive low-cost solution that scales from POTS to approximately 360Kbs depending upon the bandwidth availability.

A variety of video conferencing options have been evaluated during this effort. We have tested NetMeeting on different computer platforms and over communications links ranging from POTS to ISDN to direct LAN connections. Several video options have also been investigated including the Matrox Mystique, Osprey, ProShare 3.0, and VTEL. Video conferencing products continue to evolve rapidly, and it is difficult to achieve flexible design for switching between video conferencing options. The current plan is to support scalable video conferencing through NetMeeting over TCP/IP.

Task 3. Upgrade User Interface

Under this task, both the patient and provider station user interfaces have been redesigned to provide more flexibility and scalability. The patient side can now be setup to accommodate different device configurations, and all of the screens have been redesigned to work within the resolution limitations of a standard television. Software tools were implemented to add and remove medical device options - and their associated menu/buttons - from the patient display. The software for the provider's station was upgraded to allow the provider to access patient data from any computer with a modem or network connection to the central database. This option is made possible by the new client/server database structure, and it eliminates the limitation of the original system that required the doctor or nurse to go to the CMS to see the patient data.

A new EHC screen design has been created that works on both a TV and a computer monitor. A new button configuration eliminates the need for a mouse or expensive touch screen monitor; however, systems with either user interface devices can still work with the new design. The new EHC database is ready to support a client application for reviewing patient data. Client applications are being created under Visual Basic, and plans are underway to create secure Web Browser interfaces for both the providers and the patients.

Task 4. Low Cost Configuration for television

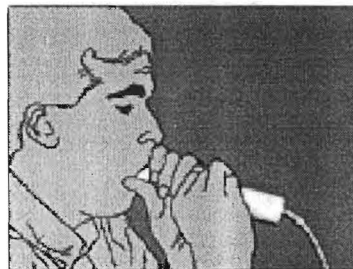
Efforts under this task were focussed on exploring low cost alternatives to the original EHC without sacrificing the primary system capabilities. One of the more expensive components of the original system is the ELO touch screen monitor. This technology simplifies the user interface, but a version of the EHC that utilizes the home television may provide an adequate and much more affordable solution. Another part of this task was to investigate alternative input control devices to the touch screen.

A low-cost TV based demo of the EHC is nearly complete. The new screen design works at TV screen resolution, and we have already run test versions using a scan converter from the computer video output to the TV display.



Task 5. New Medical Devices

Two new medical devices have been incorporated into the EHC: a spirometer and a blood glucose monitor. Georgia Tech worked closely with the Medical College of Georgia to prepare patient instructions and video help screens for these new devices.



The LifeScan blood glucose monitor and the QRS spirometer have been added as new devices to the EHC system. Software to communicate between these devices and the EHC computer has been written. Patient instructions and help videos have been developed for both of these new devices.

The new EHC screen design can display up to nine measurement options at a time. Configuration controls have been implemented to select which devices are on the system and to display the appropriate buttons and help screens that are associated with that device configuration. A problem that has been discovered with the EHC design is that only a limited number of serial ports are available on the current EHC platforms. This can be overcome by adding an eight port (or higher) serial board to the computer, but a better solution in the future will be to use the universal serial bus (USB) to support many devices. One of the patent applications seeks to protect the use of a USB for connecting multiple medical devices together in a Telemedicine/Tele-Homecare environment.