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A Telemedicine Monitor Based On LabVIEW Web Services

MS.Archana Wasule *, Prof.Dr.M.S.Panse**
*(Department of Electrical Engineering, Veermata Jijabai Technological Institute , Matunga, Mumbai-19)
** (HOD Department of Electrical Engineering , Veermata Jijabai Technological Institute , Matunga, Mumbai-19)

ABSTRACT

This paper presents a new model of telemedicine monitor based on LabVIEW web services. We describe a vital sign telemonitor (VST) that acquires, records, displays, and provides readings such as: electrocardiograms (ECGs), temperature (T), and oxygen saturation (Spo2) transmits over the Internet .The physiological monitor center, is developed using the Laboratory Virtual Instrument Engineering Workbench (LabVIEW) . Through the internet the patient's physiological signals can be transmitted in real-time to Remote monitor the remote unit can access the data and the case history of the patient . The telemedicine physiological monitor using LabVIEW is superior to the currently used monitors both in mobility and in usability, and, therefore, is better suitable for monitor patients under the state of activities.

Keywords – Vital Sign Telemonitor [VST,]Web services, LabVIEW , internet protocol.

I. INTRODUCTION

Telemedicine is the use of highly developed biomedical instrumentation and telecommunication technologies for medical diagnosis and patient care, as well as distance learning. More and more intra hospital transport of patients is required in order to perform special examination or therapy .[1]The key to the success of all critical care transport is the continuous monitor of vital signs including ECG, oxygen saturation by pulse oximetry (SpO2), heart rate (HR), and blood pressure.

With advancements in bioinstrumentation, computer, and telecommunications technologies now it is feasible to design vital sign telemedicine physiological monitor systems to acquire, record, display, and transmit physiological signals from the human body to any location using web services .it has become more, practical and convenient for medical and paramedical personnel to monitor vital signs from any computer connected to the internet.

LabVIEW is a graphical programming language that uses icons instead of lines of text to create applications .LabVIEW has provided communication tools, including ActiveX, TCP, UDP, and Data Socket . In this paper, we have mainly utilized TCP and the related functions[6]. The signal processing is mainly completed using the signal processing nodes.

An important and commonly used web service is the World Wide Web service .The World Wide Web service is the universe of available information on internet. The access protocol of internet is TCP/IP protocol. With TCP/IP communication can be done over single network or over internet. The Internet protocol (IP) contains addressing information and some control information for packet routing.TCP provides reliable transmission of data[6].

II. System representation

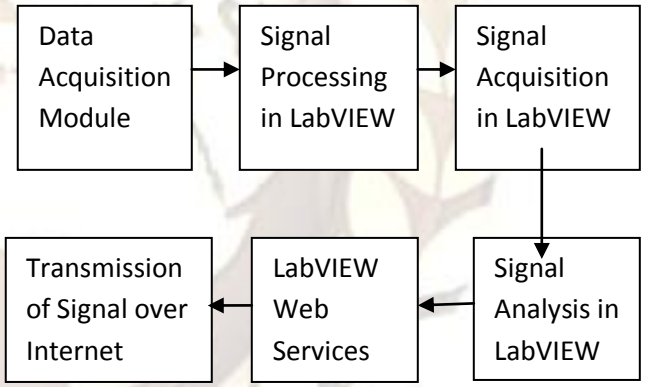

Fig 1.Block diagram of the proposed system.

The proposed block diagram is shown in the Above figure .It consist of a data acquisition module for acquiring signal .The acquired signal is processed using signal processing VI's of LabVIEW .The generated signal is analyzed and then transmitted using LabVIEW web services.

Lab VIEW web server can create HTML documents open front panel in web browser.The front panel can be remotely monitored and controlled through the web browser using TCP/IP services .This feature greatly expands the application as several persons sitting at different locations can simultaneously access the same front panel.

When developing a distributed application for the web several factors must be taken into consideration involving bandwidth and network traffic.An application that will be controlled by any remote

computer must be able to provide up to date information to all connected clients [3].

The easiest way to distribute large amount of data on the web is to use high end severs with large amount of bandwidth at its disposal .Because these resources are not always available. It is useful to examine other ways to optimize data transfer, such as reducing the amount of data sent and updating data rate.

III . Algorithm

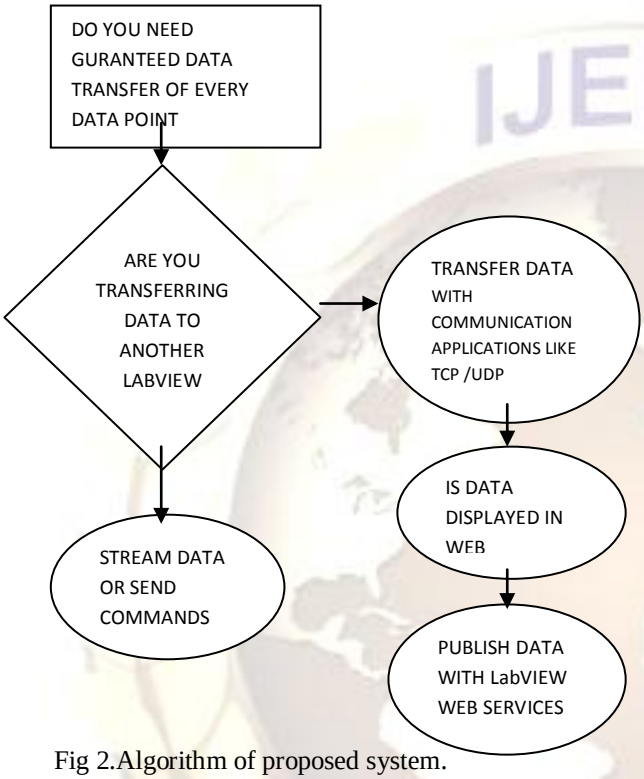

Fig 2.Algorithm of proposed system.

The patient data is transferred to a client computer on which LabVIEW is not Installed to be able to view and control remotely using a Web browser .The user at the server computer creates an HTML file that includes an <OBJECT> and <EMBED> tag that references the VI you want client computer to view and control. This tag contains a URL reference to a VI and information that directs the Web browser to pass the VI to the LabVIEW browser plug-in. Clients navigate to the Web Server by entering the Web address of the Web Server in the address or URL field at the top of the Web browser window. The plug-in displays the front panel in the Web browser window and communicates with the Web Server so the client can interact with the remote front panel. Clients request control by selecting Request Control of VI at the bottom of the remote front panel window in their Web browser or by right-clicking anywhere on the front panel and selecting Request Control of VI from the shortcut menu.

Because of the constraints of a Web browser, user interface applications that attempt to manipulate the dimensions and location of a front panel do not work properly when that front panel is displayed as a part of a Web page. Although the Web Server and the LabVIEW browser plug-in attempt to preserve the fidelity of complex user interface applications some applications might not work properly in the context of a Web browser. Avoid exporting VIs that have While Loops but no wait function. These VIs prevent background tasks from performing in a reasonable amount of time, making front panels unresponsive when viewed or controlled remotely.

IV.RESULTS

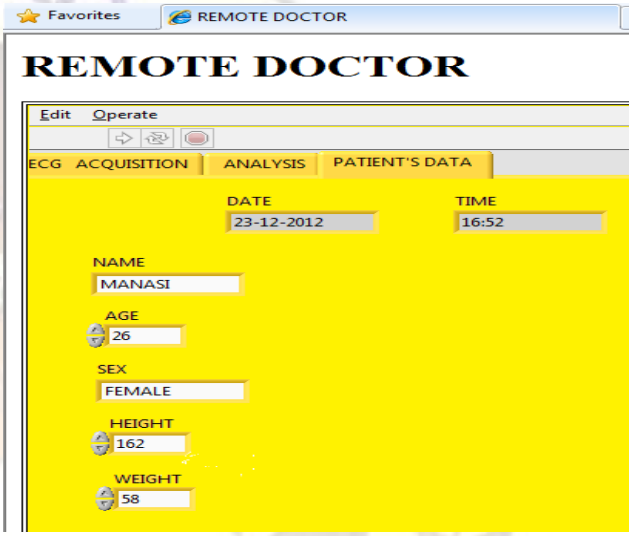

Fig 3.Patient personal data acquisition screen displayed on web using LabVIEW.

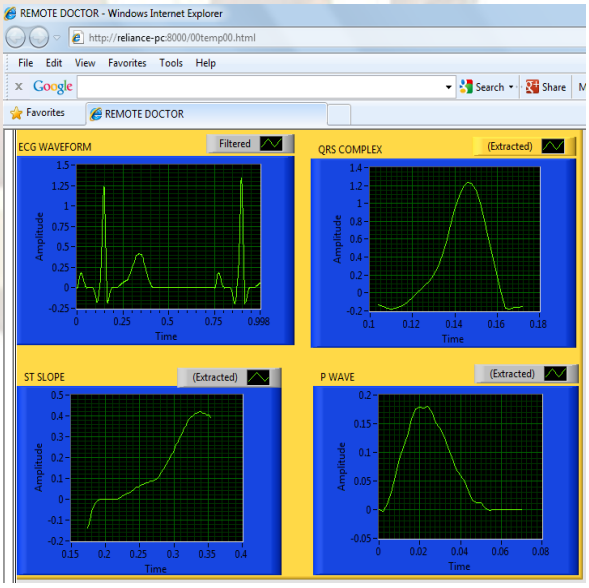

Fig 4. Analysis of ECG Signal displayed on web using LabVIEW.

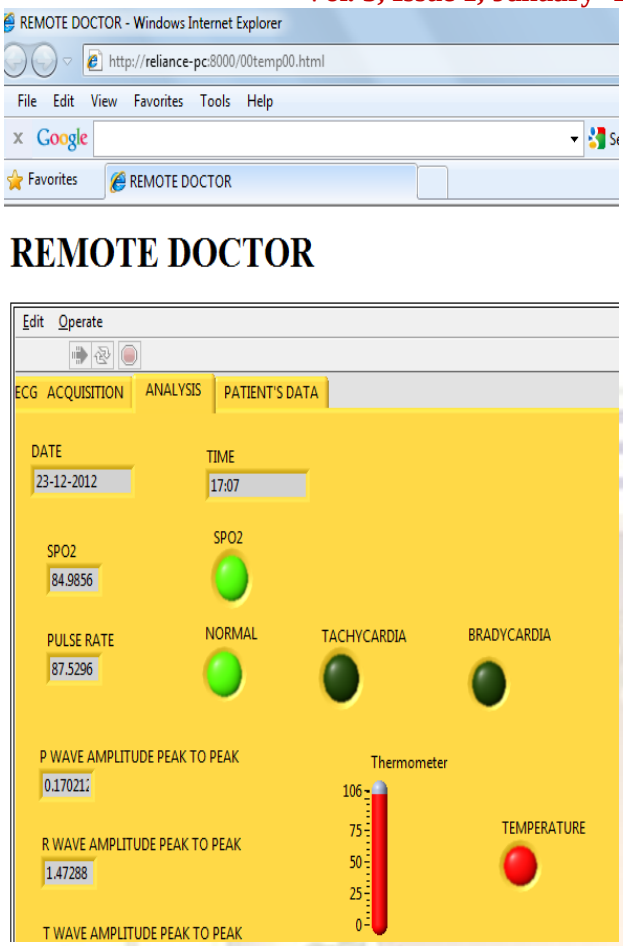

Fig 5.Vital sign monitoring screen displayed on web using LabVIEW

V.Conclusion

This system can be used to transmit the patient vital parameter information in real time to remote location and can be viewed by the care giver . Also a printable patient report can be generated any time as per the need. As this is medical application, reliability is needed in the first place. A reliable TCP protocol is used in this application and implemented in LabVIEW. The telemonitoring application which is proposed allows doctor to view his patient's vital parameter remotely and dynamically in a Web page in real time and does not need to have any special requirement on his PC; all he needs is an internet access. For the patient side, it is a home based LabVIEW application embedded in a home PC, during signal acquisition.

The proposed system is able to adapt itself to the patient, taking into account his personal data and his clinical history. In detail, such information is used to estimate the health status of the patient .The system assists the patient by keeping under control his health state and calling the emergency service for prompt intervention when a hazardous situation happens.

In future work the database can be secured using security tools , thus making it more secure, LabVIEW application. Various network protocols can be investigated for traffic management.

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