OPC Based Remote Patient Monitoring System With Android HMI

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ABSTRACT:

Real time parameter monitoring and efficient medical data acquisition and presentation is considered to be vital especially in the medical unit treating patients with severe infections and highly critical conditions. This paper proposes a monitoring system for the vital parameters like EEG, ECG, heart rate, pulse rate, temperature, blood pressure, oxygen saturation of patients hospitalized in an Intensive Care Unit (ICU) based on the OPC architecture. It is then uploaded into the OPC based serverand monitored by the doctor. It is also viewed by the patient's caretaker   using Android technology. Since this android application is an open source and platform independent, it can be installed on any smartphone.

Keywords: OPC server, vital parameters, Android

I. INTRODUCTION

The electronics technology has entered almost in all aspects of day-to-day life, and the medical field is not exception for that. The need for well-equipped hospitals and diagnostic centres is increasing day by day as the people are becoming more conscious about their health problems. In biomedical Fields special units are used, such as intensive care unit or coronary care unit. All of these units are designed to offer the advantage of the low Nurse -Patient ratio and concentration of the equipment and the resources needed, to take care of critically ill or seriously injured units. The medical world today faces two basic problems when it comes to patient monitoring, firstly the need of healthcare providers present bedside the patient and secondly thepatient is restricted to bed and wired to large machines. In order to achieve better quality patient care, the above cited problems have to be solved. As the technologies are advancing it has become feasible to design to Horne based vital sign monitoring system to display, record and transmit signals from human body to any other location.

This paper discusses the aspects of acquisition of physiological Parameters like pulse, SPO_2, body temperature, ECG, Blood pressureand Electroencephalographysensor (EEG) was processed via NI LAB view and be monitored by doctors, caretakers of the hospitalized patient based on the OPC application.

A. LITREATURE SURVEY:
Physiologic monitors have been in regular commercial production since about 1954.Monitors began using color displays,

monitoring networks became more sophisticated and monitors became computerized. Since the display size increased in the 1980's, the number ofwaveforms that could be displayed on a monitor increased over the course of the decade from approximately two waveforms to six waveforms.

Portable monitors evolved to become quite capable and the continuum of care monitor was developed.In the 21st century,the Siemens Infinity monitors also offered connectivity to the internet. This allowed the clinician to use the internet or the hospitals intranet to remotely view a particular bedside monitors real-time waveforms, vital signs and trends. Patient monitor will assess the physiological data, lab results, patient history and condition to interpret the patients' status and to relay this to the clinician. The clinician will undoubtedly want to verify the monitors' interpretation with their own assessment.

B. SCHEMATIC DIAGRAM:

The basic idea of this project is that the vital parameters such as temperature, heart beat rate, pulse rate, blood pressure and oxygen saturation of the hospitalized patient are measured using the respective sensors and the data collected are fed into the OPC server which can be monitored by the doctor in a centralized monitoring system and can also be viewed by the patients caretaker using android technology. This android app displays the vital parameters of the patients by accessing the OPC server.

ADVANTAGES:

- Smartphones can be used as HMI's.
- Patients status can be monitored from anywhere through an android app.
- Open source platform makes android app cost efficient.
- OPC provides protection against unauthorised data access.

COMPONENTS OF THE SYSTEM:

- Data acquisition unit: Acquire signals from various vital parameters monitoring devices. Arduino is used as the DAQ which is more cost efficient compared to NI DAQ.

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- Lab View HMI: Data acquired is updated to NI OPC server.
- Android based HMI: An android app is developed to view the vital parameters.
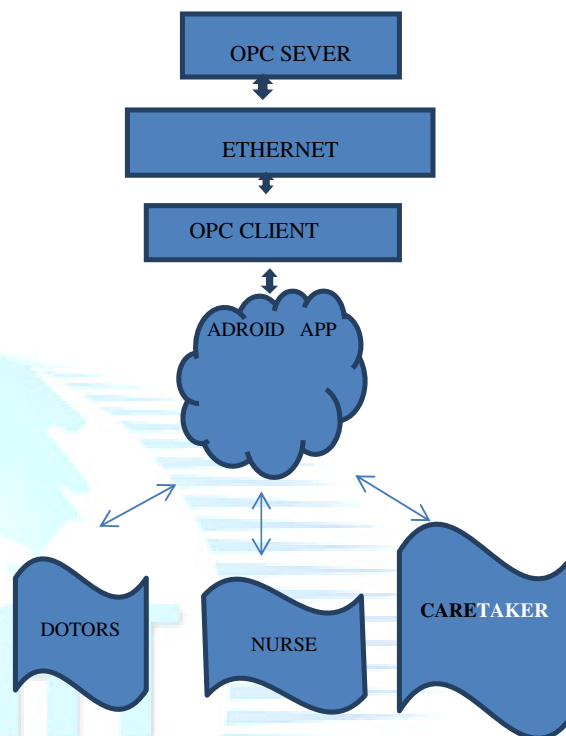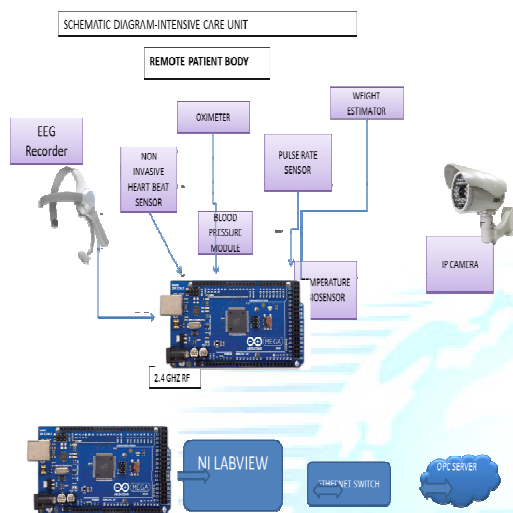
C. MAIN BLOCKS OF THE PROJECT:

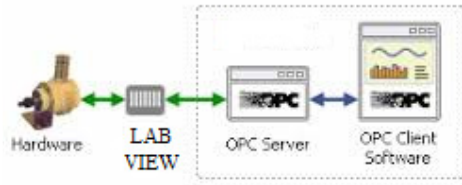The main sections of the project are:

1. Network hierarchy

2. Simulation section

3. Hardware Implementation

4. Lab View Implementation

5. Results

1. NETWORK HIERARCHY:

OPC SERVER:

The OPC architecture consists of two main elements: the OPC Server and the OPC Client applications. These two elements represent an intermediate layer in the communication process between a data source and data sink.

An OPC Server is a software application, a "standardized" driver, specifically written to comply with one or more OPC specifications.OPC Servers are connectors that may be thought of as translators between the OPC world and a Data Source's native communication protocol or interface. The OPC Client and Server applications relationship being bi-directional, this means OPC servers can both read- from and write- to a Data Source. The OPC Client/OPC Server relation-ship is also a Master/Slave one which means one OPC Server will transfer data to/from a Data Source if an OPC Client commands it to. The OPC Server allows the user to define communication channels within the distributed devices. Each channel is configured according to the remote devices com-munication interfaces and protocols. The next step of the OPC Servers' configuration is adding devices in their respective communication channels, which have been defined according to their specifications.

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OPC CLIENT:

OPC Client software is written to communicate with OPC connectors.it uses messaging defined by an appropriate OPC foundation specification.OPC clients represent a data-sink. They initiate and control communications with OPC servers based on the request of the embedding application.OPC Clients translate a given application's communication requests into an OPC equivalent request and send it to the appropriate OPC server for processing. In turn, when OPC data returns from the OPC sever, the OPC Client translates it back into the application's native format, so the application can properly work with data.

2. HARDWARE IMPLEMENTATION:

The list of bio-medical sensors:
1. ECG module
2. EEG module(Neurosky)
3. Heart beat sensor
4. Pulse oximeter
5. Temperature sensor

ECG MODULE:
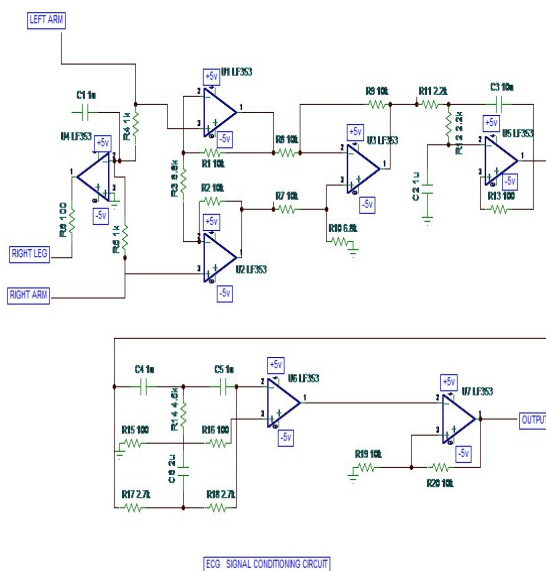
EEG MODULE (NEUROSKY):

NeuroSky's white paper claims the Think Gear technology has been tested at 96% as accurate as that within research grade EEGs. These are dry electrodes that can measure brainwaves millimetres from the scalp and thus can easily be worn over hair. These sensors are a significant technological break-through in that they are the only non-contact EEG sensors ever developed.
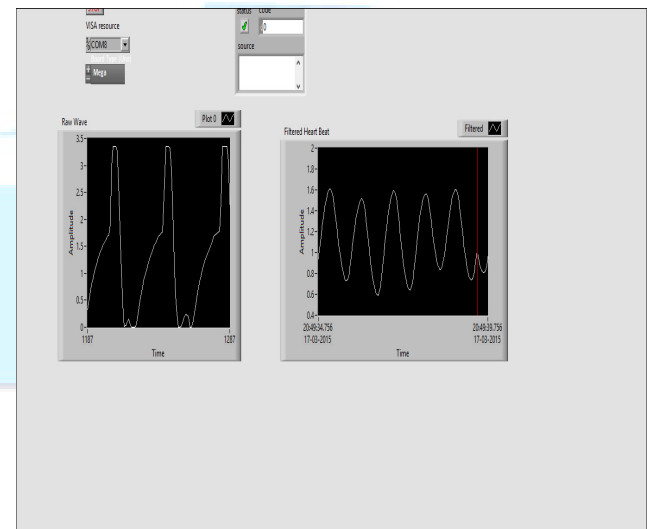

NEUROSKY

3. SOFTWARE IMPLEMENTATION:

In this paper, we have used NI labview for the real time processing of biomedical sensors. Instead of using DAQ, we have labview for aquistion of data signals. Here Arduino is interfaced with LIFA (Labview interface for Arduino).
Waveform shown for Heart beat sensor

Thermistor is connected with the bridge circuit and then interfaced with labview. We have used digital filters to filter out high frequency noise.

Result shown for temperature sensor
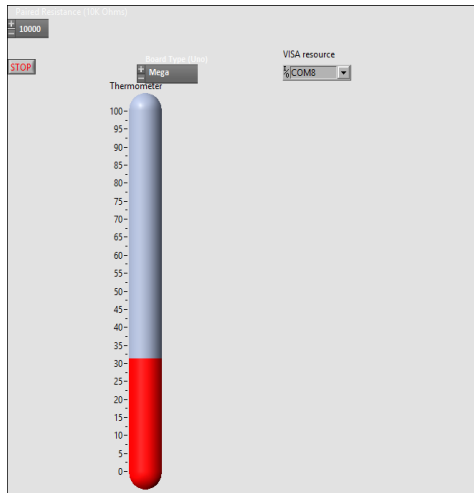
RESULTS:

On the background of applications of OPC in the smart embedded medical health management, mobile health management software based on the Android platform has been developed, which achieves the real-time monitoring by processing and displaying physiological information and the location of abnormal users. The health management software has the characteristics of strong instantaneity, convenience and practicality. The health management software has been applied to process and display the health information of users of a specific area and is convenient for user health information management.

REFERENCES:

- Monitoring system for a Medical facility based on the OPC platform by V.D. Zaharias and F.Dragan.

- IP based Patient Monitoring system by Syed Muhammad Yasir Jafri.

- International Conference on Advancements of Medicine and Health Care through Technology by Simona Vlad, Radu V.Ciupa

- Zigbee Based Patient Monitoring System-IJERA by K.Navya

- Affordable Healthcare Technology: Scalable ECG by Dr. Gari Clifford, Oxford University.