Remote Healthcare Assistance And Automatic Ambulance Service

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Abstract- *Telemedicine plays a dominant role in the field of health care. It proposes to provide an expert medical care where the health care is an emergency. This project outlined a design of a system using LabVIEW, MICROCONTROLLER, ARDUINO and GSM module which measures different physiological parameters of patient and in case of any emergency situation, quick ambulance service is provided. A telemedicine System is designed using LabVIEW, Microcontroller, Arduino and GSM module that helps in tele-diagnosis over long distance and supports in teleconsultation of patients by expert physicians. The system is designed for transmission of essential data from the emergency site to the consultative site. The system can telemetrically communicate to an ambulance for shifting the patients to the hospital in case of emergency. Computer based medical facilities have become indispensable part of the medical care and it is considered as a boon to the society. Database of patient information is maintained and vital bio-signals such as body temperature and is monitored using sensors, wireless microcontroller and LabVIEW. In emergency situations there will be wireless communication between care unit and hospital and location will be shared so that the ambulance can be sent to the spot by SIM808 module.*

Keywords- Physiological Parameters, LabVIEW, Wireless Microcontroller ,Sensors, Simulation, GSM Module, Router , Cloud Server, Serial Communication.

I. INTRODUCTION

Nowadays, computer based medical facilities have become indispensable part of the medical care and it is considered as a boon to the society. It is not possible to have a big hospital in every province. This paper is dedicated to this problem. There is one care unit where a database of patient information is maintained and vital bio-signals such as body temperature and is monitored using sensors, Micocontroller and LabVIEW. Since time immemorial healthcare has been an issue of prime importance. Earlier people used to be taken to hospital whenever they had any health problems; they were used to be clinically checked, diagnosed and treated at the hospital or the medical care center itself. All of this took a huge amount of time in the medical procedures of cure which often lead to the death of some critical patients. With the advancement of technology, healthcare facilities have changed to be better nowadays. The flow of information has brought about a revolution in this sector of utmost importance. In remote areas, people have hospitals far away from their location and no immediate medical facility is available when needed. In remote areas, people have hospitals far away from their location and no immediate medical facility is available when needed. People either suffer for days before reaching a nearby hospital for diagnosis and treatment or either die on the way. This was the main motivation behind this innovative idea of ours, which measures proportionately more than is customary. Different physiological parameters are monitored. In emergency situations, for example, if heart shows abnormal behavior, then there will be wireless communication between care unit and hospital and location will be shared so that the ambulance can be sent to the spot by SIM808 module.

II. ANALYSIS OF MODELING AND THEORETICAL

To design:- Remote Health Assistance And Automatic Ambulance Service is outlined for a system using LabVIEW, ARDUINO and GSM module which measures different physiological parameters of patient and in case of any emergency situation, quick ambulance service is provided.

- A data acquisition and signal-processing system for real-time bioelectrical signal recording and analysis is described. The hardware is designed to accommodate a variety of bioelectric signals: EKG, EMG, EEG, action potentials, movement, and respiration. The flexibility of the unit is achieved by software control of amplifier gain, bandpass filter bandwidth, and sampling conditions.
- Heart rate changes and a posture change can cause similar manifestations in the ST segment, lowing the sensitivity and specificity of the detection. A different method, based on time-frequency analysis of heart rate variability, was proposed to evaluate the possibility of detecting the existence of ST-segment deviation episodes and the classification of them

- The replacement of wires in a prototype medical body area network by wireless data links. Continuous multiparameter health monitoring has applications in telemedicine, rehabilitation, home care, sport, firefighting and other life-threatening situations. Current implementations rely on wires for data collection, energy distribution and management, and measure synchronization in paper.
- The emergency call applications utilize a dual-band cellular phone for data exchange and Global Positioning System (GPS) antenna. When the cellular phone antenna is transmitting in close proximity to the GPS antenna, the GPS low-noise amplifier (LNA) is expected to be not affected, i.e., remain linear during the operation.

  NI ELVIS II Series uses LabVIEW-based software instruments and a custom- designed workstation and prototyping board to provide the functionality of a suite of common laboratory instruments.
- In this study, we describe adaptive time-frequency distribution (TFD) as a robust approach to TF signal decomposition for non-stationary signal processing. This approach has not been utilized for TF signal analysis other than feature extraction.
- The absence of Medical facilities coupled with financial constraints and lack of transport facility in remote areas leads to immense problems in care and follow up. Telemedicine is a unique way of overcoming these barriers in management. This is a preliminary experience to reach out to PWH spread out in different geographic locations.
- Vernier Surface Temperature Sensor, Vernier Blood Pressure Sensor, Vernier Hand Grip Heart Rate Monitor, Vernier ECG Sensor and Vernier Spirometer, provided by National Instruments are employed for measuring the body temperature, Blood Pressure, Heart Rate, ECG and oxygen consumption respectively. The sensors are interfaced with the computer using NI ELVIS prototype board. The output of the sensors is processed using LabVIEW software and is displayed on the computer screen .
- Physiological parameters like heart rate, body temperature and respiration rate of a patient is measured using the biomedical sensors.
- A database is also designed where the patient's data is saved and is password protected.
- If any emergency situation occurs, the designed system shares the location of the patient using a GPS module
- It use GSM module which will carry the patient to the hospital.
- The medical data is uploaded in the server so that the doctor can check the patient's medical conditions.
- In order to store and send physiological data to remote physician a Mysql database and XAMP is used along with LabVIEW. The physiological parameters are captured by the sensors and stored in mysql database.

III. SIMULATIONRESULTS

In this section, the simulation results and experimental results of the entire model will be introduced. Use the formulas to calculate the parameters of the simulation and equipment used to test the proposed system. The main parameters used in the simulation and equipment are listed in Table

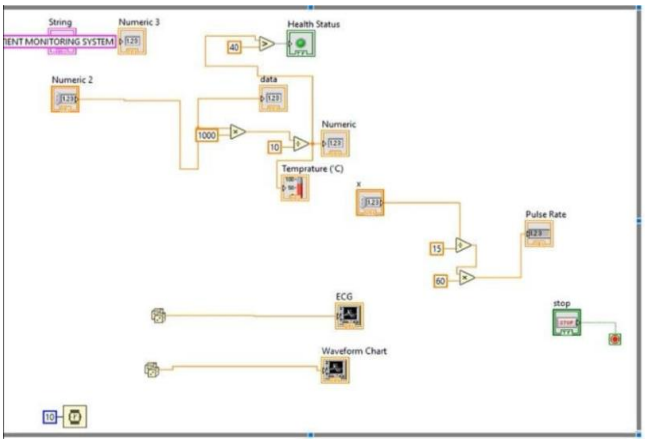

Fig 1.1: The Block Diagram of simulation in LabVIEW

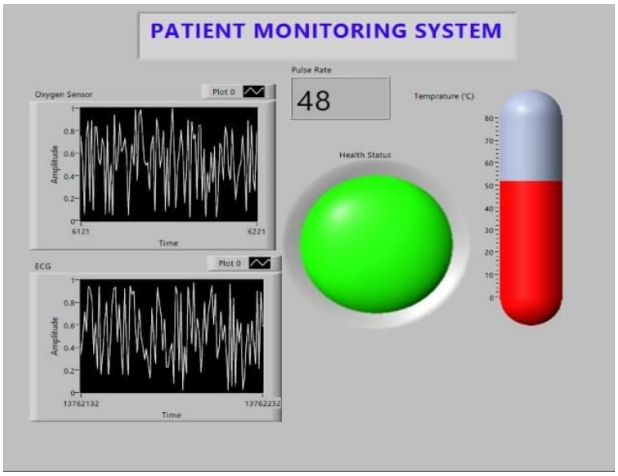

Fig1.2 :The result of LabVIEW Simulation

IV. IMPLEMENTATION

The various body physiological parameters are measured using different sensors. This measured values are then transported to an Microcontroller hardware System. Where this wireless microcontroller is the process of sampling signals that measures real world physical conditions and

converting the resulting samples into digital numeric values that can be manipulated by a computer.

The signals from the microcontroller are excited towards the cloud service through a wireless router in the patient side. From the cloud this result values are transmitted to the doctor side with help of another microcontroller. In the doctor side this results are interpreted by LabVIEW software which gives the real time values of the sensors to the doctor.

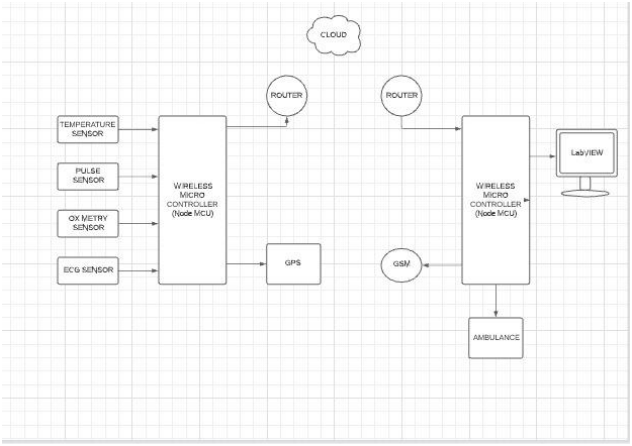

Fig 1.3 :The Block diagram of the entire project

The cloud server we using here is Google firebase. With the help of this cloud server we will create a app to which we will upload the details of the patient. From this cloud the thedoctors system will gather information from the patients side and interpret the details with the LabVIEW.

V. HARDWARE REQUIREMENTS

A. LM35 Temperature Sensor

The body temperature can be measured by several methods. Here for measuring temperature of the patient's body a thermistor is used.This is provided by vernier, which designs different sensors that are compatible with LabVIEW. .Here, we are using LM35 temperature sensor, the LM35 temperature sensor production voltage varies linearly by temperature, and is directly proportional to temperature.The characteristics of LM35 sensor are Measurable range is -55 to 150 degree. Linear with 0.50 certified accuracy at +25 degree. In this project, we are used +Vs used is 15 V.The production at 36 deg.C is 0.36V and the production at 21 degree is 0.21 V.

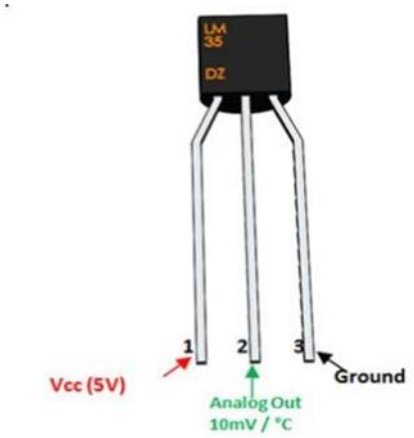

Fig 1.4: LM35 Temperature sensor

B. Pulse Sensor

For measuring the heart rate here the heartbeat sensor is used. It consists of a light emitting diode (LED) and a Photo detector like a light detecting resistor (LDR) or a photodiode (PD).This sensor is placed on the finger or on the earlobe.The output from the detector obtained in electrical form and which is proportional to the heart beat rate.

Fig 1.6: Pulse sensor

C. ECG Sensor

Ecgrecords the electrical activity generated by heart muscle depolarizations which propagate in pulsating electrical waves towards the skin.

The full ECG setup comprises at least four electrodes which are placed on the chest or at the four extremities according to standard nomenclature (RA = right arm; LA = left arm; RL = right leg; LL = left leg). Of course, variations of this setup exist in order to allow more flexible and less intrusive recordings, for example, by attaching the electrodes to the forearms and legs. ECG electrodes are typically wet sensors, requiring the use of a conductive gel to increase conductivity between skin and electrodes.

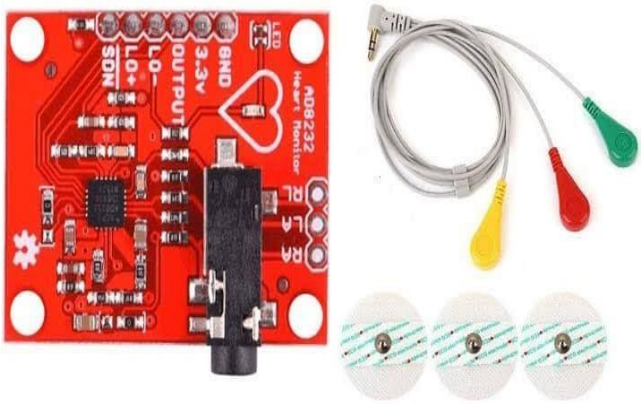

Fig 1.5: ECG sensing module and the lobes

D. Oximetry Sensor

Pulse oximetry is a noninvasive method for monitoring a person's oxygen saturation. Peripheral oxygen saturation (SpO2) readings are typically within 2% accuracy (within 4% accuracy in the worst 5% of cases) of the more desirable (and invasive) reading of arterial oxygen saturation (SaO2) from arterial blood gas analysis.[1] But the two are correlated well enough that the safe, convenient, noninvasive, inexpensive pulse oximetry method is valuable for measuring oxygen saturation in clinical use.

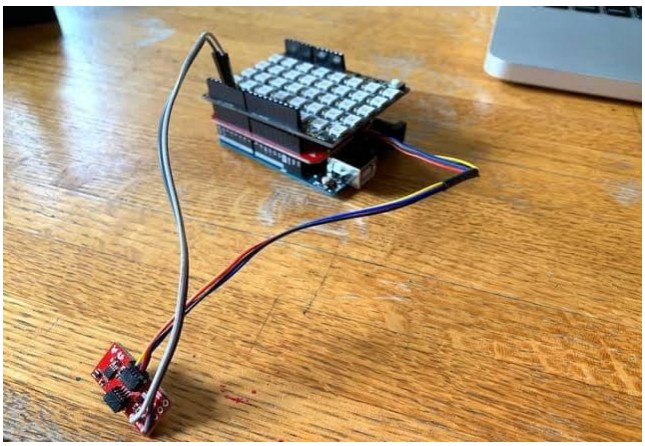

Fig1.7:Oxymetry sensor

E. Microcontroller

NodeMCU is an open source firmware for which open source prototyping board designs are available. The name "NodeMCU" combines "node" and "MCU" (micro-controller unit).The term "NodeMCU" strictly speaking refers to the firmware rather than the associated development kits.[citation needed]

Both the firmware and prototyping board designs are open source.

The firmware uses the Lua scripting language. The firmware is based on the eLua project, and built on the Expressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson and SPIFFS. Due to resource constraints, users need to select the modules relevant for their project and build a firmware tailored to their needs. Support for the 32-bit ESP32 has also been implemented.

Fig 1.8: Microcontroller (Node Mcu)

F. Communication Module

A SIM 800 GSM module is employed in order to call the ambulance in case when the physiological parameter is exceeded from its save limit value.

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves.Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate.

As mentioned in earlier sections of this SMS tutorial, computers use AT commands to control modems. Both GSM modems and dial-up modems support a common set of standard AT commands. You can use a GSM modem just like a dial-up modem.

Fig 1.9:GSM Module

VI. LAB VIEW

- Laboratory Virtual Instrument Engineering Workbench.
- This software is created by National Instruments(www.ni.com).
- This is a graphical programming language that uses icon instead of lines of text to create applications.
- LabVIEW is systems engineering software for applications that require test, measurement, and control with rapid access to hardware and data insights.
- LabVIEW programs/codes are called Virtual Instruments, or VIs for short.
- LabVIEW is used for Data acquisition, signal Processing (Analysis), and hardware control – a typical instrument configuration based on LabVIEW.
- LabVIEW is used for real time controlling of instruments.
- In this software there are two windows.
- Front panel window
- Block diagram window

VII. LabVIEW SIMULATION AT DOCTORS SIDE

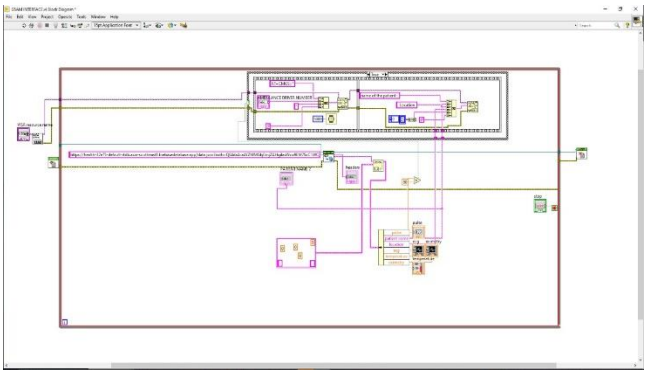

Fig 1.10: LabVIEW coding in block panel at doctor's side

This coding is done in order to separate the data that is collected in the doctor's side to differentiate between the readings of the sensors that present in the patient side. By doing this coding the readings can be separated and the output variations of the sensors can be viewed separately in the doctor's system. This makes doctors to interpret the data's easily and take necessary steps.

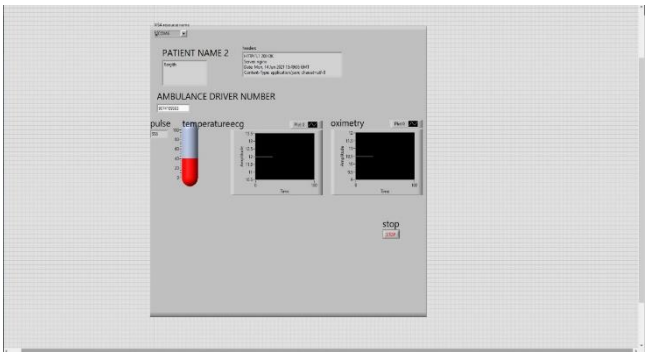

Fig 1.11: Font panel view at doctor's side

VIII. FUTURE SCOPE

There is always chance to improve any system as Research and Development is an endless process. Our system is no exception to this phenomenon. The following future enhancement can be done in the existing project in future.

In future we can add few more sensor to improve the working of the project. In these days of increasing pandemic situation it is difficult for the patients to reach the hospital for regular checkups. So by the help of this project the patients can visit the doctor from their houses itself.

IX. CONCLUSION

A platform is designed where a basic analysis of the data is performed and if any emergency situation occurs, the designed system shares the location of the patient using a GPS module and automatically calls an ambulance using a GSM module which will carry the patient to the hospital. The medical data is uploaded in the server so that the doctor can check the patients medical condition and in this way the whole system help the doctor in quick diagnosis and medical care. This system can also be installed inside an ambulance so that it can move from one place to another and the patient doesn't need to move from his home. In this way, basic medical emergency can be delivered at the door step of each patient. This system not only enhances patient comfort and also adds to the economy of the country.

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