



WIRELESS ELECTRODE FOR ECG MONITORING SYSTEM

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ABSTRACT

Due to dynamic life style problems related to Heart are increasing every day and it's vital that diseases related to heart should be diagnosed by simple medical techniques. The heart diseases can be diagnosed by (ECG) Electrocardiogram signals. ECG measures electrical potentials from the body surface with contact electrodes, thus it is considered as one of the important signals. As the people are needing to be more conscious about their health problems, the need for well-equipped hospitals and diagnostic centres is increasing day by day. Motivation of this paper is tantamount to understand the development of efficient & affordable wireless biometric systems that can monitor multiple patient's health parameters simultaneously and can effectively deliver the data to a patient monitoring system. Now a day in wireless communication network is impossible transmit biomedical signal through wireless technology. As population increases diseases also increases so demand of ECG monitoring is mandatory. To monitoring heart activity, the ECG signal is used. Our system consists of three subsystems 1.ECG Acquisition 2. Processing in Arduino 3. Bluetooth module. This is really time system. In this project we will design for monitoring of ECG data using Arduino controller and Bluetooth module. Here first data is acquired using Arduino which is further sent wirelessly using Bluetooth. The device will be economical. It will be useful for the patient and doctor for easy Monitoring. It will be less dense as compared to other technology. Less Power is needed for its operation and control of the device. This device is used in Hospital, Military, Homecare Unit, and Sports Training.

Keywords: Electrocardiogram signals, Mat-lab program, GSM and ECG sensor.

1. INTRODUCTION

The Electronics technologies are entered in the day-to-day life. People are more conscious about their health because of very dissolute life so there is need for hospitals and diagnosis centre. Heart disease is major problem to threaten human life. Our system is important role in presentation of heart diseases. Patient requires continuous monitoring and this requires number of nurse keeping all these aspects we have developed "Wireless ECG monitoring system". In critical health conditions, a valid time

health monitoring system of patient based on Bluetooth is designed and developed in this project. This finds immense application in the remote places where the people are out of reach from the experienced doctors. Patient Monitoring Systems play a vital role in the monitoring of patients in ICU and other in-patient wards in hospitals, providing uninterrupted data acquisitions, analysis, amplification and display of the patient's vital functions. Currently there are number of health monitoring systems available for patients. All these

systems work mainly when there is any emergency occurs. This information is forwarded wirelessly to the doctor through Bluetooth technique. The sensors measure the information and transmit it through Bluetooth Module on the same frequency.

2. RELATED WORKS

[1] This system presents ubiquitous vital signs sensing using wireless medical sensors are promising alternatives to conventional, in-hospital healthcare systems. The advent of modern age has shown a drastic shift in the way humans have worked leading into sedentary lifestyles. Change in dietary pattern where fresh food is replaced by processed and fast food along with the increase of stress has led to rise of cardio-vascular disease which is glaringly evident in developing countries. Especially, Asians are more prone to cardio-vascular diseases genetically. The ECG device is a diagnostic medical instrument which determines the electrical activity of the heart. The conventional ECG devices are powered by mains electricity, thus they are not energy efficient. Transformers used make the device bulky and expensive. Optimum isolation amplifiers have to be incorporated in these devices for patient safety, adding to the cost and complex circuit. In this work, a wireless ECG sensor is proposed.

[2] In their study, Nihal Fatma Guler, Ugur Fidan examined the ECG signal were measured as noiseless with Ag/AgCl electrodes, then converted digital data using pulse code modulation (PCM) technique. The digital data were then sent to receiver where it is in 433 MHz FM/FSK transmitter, which has 10 mw output power and 9.6 KPS transmission speed. At the receiver, the digital data were reconverted to Analog signal to monitor and record on the PC with Sonic Foundry Sound Forge 6.0 program. The power spectrum of measured ECG signal was formed using Mat-lab program. As a result, the medical supporting system is realized for monitoring the ECG signal on PC of human with chronic heart disease in their living surroundings.

[4] In their study, wireless communication network it is possible to transmit biomedical signal through wireless technology. As population increases diseases also increases so demand of ECG monitoring is required. To monitoring heart activity, the ECG signal is used. Our system is divided into three subsystems 1.ECG Acquisition 2. Processing in

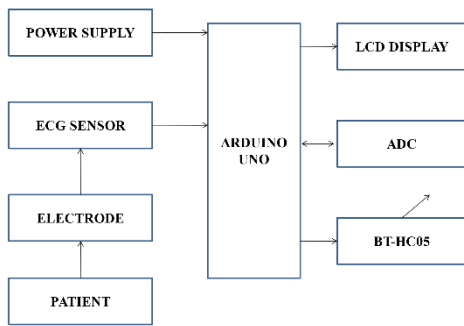
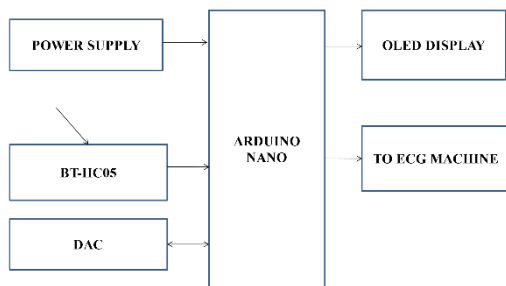
ARM7 3.GSM.This is real time system. In this project we will design for monitoring of ECG data using ARM7 LPC2148 and GSM module. Here first data is acquired using ARM7 which is further sent wirelessly using GSM. The device will be economical. It will be helpful for the patient and doctor for easy Monitoring. It will be less complex as compared to other technology. Less Power is required for its operation and control of the device. This device is used in Hospital, Military, Homecare Unit, and Sports Training.

3.PROPOSED SYSTEM

In this proto type we implemented wireless technology for medical data transmission for ECG device. In this two parts are used transmission (Tx) and receiver (Rx).

Transmission Side (Tx) - Here we enable the ECG sensor to Arduino microcontroller. First ECG sensor will read the data from electrode and convert the data to Analog to digital using HX711 ADC converter. And given to microcontroller. Then controller send the collected data to LCD display and Bluetooth module HC-05.

Receiver Side (Rx) - Here Bluetooth module will receive the data and send it to digital to Analog converter (DAC) which interfaced to Arduino Nano controller and display Analog data in OLED display and the ECG device.

TRANSMITTER**Figure 1:
Block****RECEIVER****Diagram****3.1 WORKING**

The patient's physiological signal is taken up by the electrodes and sent to the ECG sensor for signal amplification. The signal is then sent to the analog pin of the Arduino UNO. The signal is then sent to an analog-to-digital converter. The signal is another time sent to the Arduino UNO before being sent to the Bluetooth transmitter module. The Bluetooth module receive the signal from the transmitter and sends it to the Arduino Nano's digital pin. The digital to analog converter is then used to receive the signal. The transformed signal is then send to the Arduino Nano's analog pin. After this signal is sent to the ECG device and the OLED display.

4. EXPERIMENTAL RESULTS

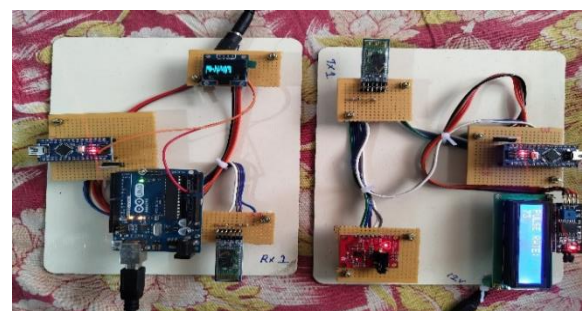
The Arduino platform is an experimental framework that is open-source in nature, and it is built around a user-friendly combination of hardware and software components. The system comprises a circuit board, often referred to as a microcontroller, which can be programmed, and a pre-existing software known as Arduino IDE. The Arduino IDE is used for the purpose of writing and uploading computer code to the physical board.

The ECG sensor is attached to the patient using disposable electrodes on the left and right side of the chest. The signal obtained from the body is filtered and amplified. The sensor outputs an Analog signal which is then converted by the Analog-to-digital converter (ADC). The serial-to-Bluetooth module transmits the digital output of the ADC to the cell phone. On the phone the sampled ECG is displayed. An electrocardiogram (ECG or EKG) is a recording of the electrical activity of the heart over time produced by an electrocardiograph, usually in a non-invasive recording via skin electrodes. Electrical impulses in the heart originate in the sinoatrial node and travel through the heart muscle where they impart electrical initiation of systole or contraction of the heart. The electrical waves can be measured at selectively placed electrodes (electrical contacts) on the skin. Electrodes on different sides of the heart measure the activity of different parts of the heart muscle. An EKG displays the voltage between pairs of these electrodes.

The HC-05 Bluetooth Module facilitates transparent wireless serial communication via serial port protocol (SPP). It offers seamless interfacing with controllers or PCs, simplifying setup and usage. This module is designed for effortless integration into projects requiring Bluetooth connectivity. Its serial communication protocol streamlines data exchange, enhancing ease of use and flexibility. With HC-05, establishing wireless serial connections becomes straightforward and efficient.

LCD 16x2 is a 16-pin device that has 2 rows that can accommodate 16 characters each. LCD 16x2 can be used in 4-bit mode or 8-bit mode. It is also possible to create custom characters. It has 8 data lines and 3 control lines that can be used for control purposes.

The Organic Light-Emitting Diode, or simply OLED, is the technology used for the screen in the Arduino Sensor Kit. The OLED uses in which the light is produced by organic molecules.

**Figure 2: Performance Evaluation**

5. CONCLUSION

Using wireless technology minimizes desk clutter and reiterates the strong market for technology that allows for simplicity in hospitals and within the home. A wireless ECG sensor which displays its output on computer using Lab view A device which employs efficient remote monitoring for real time, continuous, and accurate information of heart condition.

Large-scale data collection and analysis using wireless ECGs have the potential to advance research in cardiology and population health by providing a wealth of real-world data. Patients can benefit greatly from wireless ECG electrodes in terms of comfort, convenience, data accuracy, and accessibility. They have the potential to revolutionize cardiac health management and monitoring, making it simpler to identify and treat heart diseases in clinical settings as well as in the daily lives of patients. Wireless ECG electrodes have revolutionized the field of electrocardiography by offering several significant advantages over traditional wired electrodes.

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