Remote Patients Monitoring System(Heartbeat and Temperature) using Arduino

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Abstract— With the prompt development in wireless communication, In addition to the evolution of wireless patient monitoring system, And to reduce the death of a big number of patients who endear as a result of heart failure or sudden high temperature in children. This paper proposed a sophisticated method of observation human body parameters like heartbeat rate, temperature with employ an ATmega328 microcontroller (Arduino Uno). The suggested system contains on heart rate and temperature sensors where these sensors read the heart average and temperature of the patient and send these readings to the person treated by RF to be received and presented on the LCD screen.

Index Terms— Arduino, Heartbeat Sensor, Temperature Sensor, nRF Module.

1 INTRODUCTION

The development of the medical field largely resulted from the rapid development of technology. This has led to an increase in the average age of human beings and low mortality rates, especially in industrialized and developed countries [1]. The lack of modern medical equipment that helps diagnose and treat patients has led to poor medical services in developing countries and weak technology such as Third World countries. wireless communication technology is readily accessible by ordinary people. In 2003, after the fall of the former regime in Iraq, the modern technology of Iraq, such as mobile, networks and satellite, came after it was the monopoly of the influential in that system. Now, it is necessary to use these techniques in the service of the Iraqi street, especially as it suffered from the wars so much that led to the spread of many diseases and epidemics, which have led to increased mortality rates, especially the high heart rate of older people, and high temperature in children, and to design a system that will discover these sicknesses early and minimize the number of deaths give rise to from them.What happens when wireless and medical sensor technology is common? This paper, discussing a design that can be worn by patients and which can monitor the patient's vital processes. Where information is sent from the device to a remote end and displayed in a LCD screen. Medical staff or family members will receive information sent from the
system.

2 PROPOSED SYSTEM

The tele-health monitoring system consists of three main modules, such as the data sensor unit, the data-processing unit and the data-communication unit. The data sensor module consists of a temperature sensor and a heartbeat sensor that senses changes in the physiological parameters involved. The information is then transferred to the PIC controller of the data processing unit. The data processing unit analyzes input signals.

The communication unit is used to transfer data between person and equipment. This contains basic components such as message, sender, receiver, mediator and protocol through which the message is sent to the doctor via mobile phones via the information gateway for treatment.

2.1 COMPONENTS OF PROPOSED SYSTEM

1. Arduino (UNO)
2. Body Temperature Sensor(MLX90614)
3. Heart Beat Sensor (KY039)
4. nRF24L01 Module (x2)
5. LCD (I2C)
6. Voltage Step Down (X2)
7. Power Supply (batteries x2)

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2.2 BLOCK DIAGRAMS

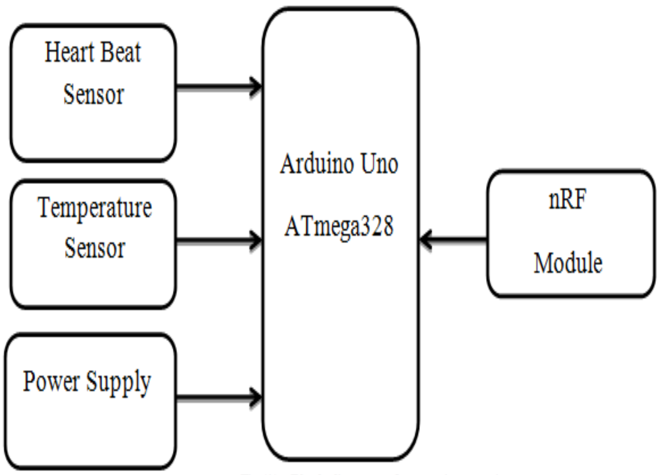

Fig.(1): Block diagram of transmitter section

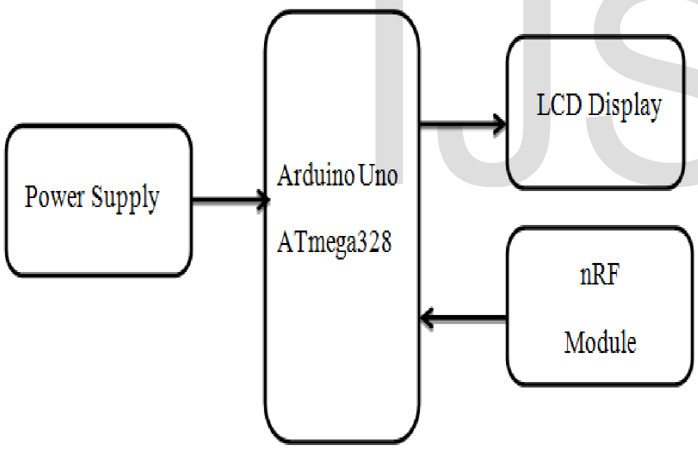

Fig.(2): Block diagram of Receiver section

2.3 WORKING

The objective of this proposed system is to monitor the temperature and heartbeat of the patient's body which should be displayed to the person being treated using NRF technology. In hospitals, Patient veracity is watched by hospital staff. The temperature and heart rate of the patient's body is checked constantly and a record of it is kept. The suggested system consists of two parts that have been explained and explained in detail, one for the transmission part and the other for the receiving part. In both schemas, the controller, which acts as a central processing unit, connects the remaining parts. The diagram of the transmitter is composed of the controller. This controller is supplied with a capacity and the temperature sensor is connected. Patient temperature and heart rate sensor controlled by the controller. The LCD is also connected to the patient's temperature, pulse rate and RF transmitter to send it to the remote end (the receiving circuit) with the controller. The schematic diagram of the receiver is made of a microcontroller fed by a power supply and connected to the controller. A rack circuit to receive the signal transmitted by the transmitter and processed by the controller and then display it by a screen to plug the doctor.

2.3.1 TRANSMITTER SECTION

The Sender contain of:

- Heart Beat Sensor

We connected the Heart Beat Sensor with the Arduino where it contains of (three pin) connected the Pin (GND) to

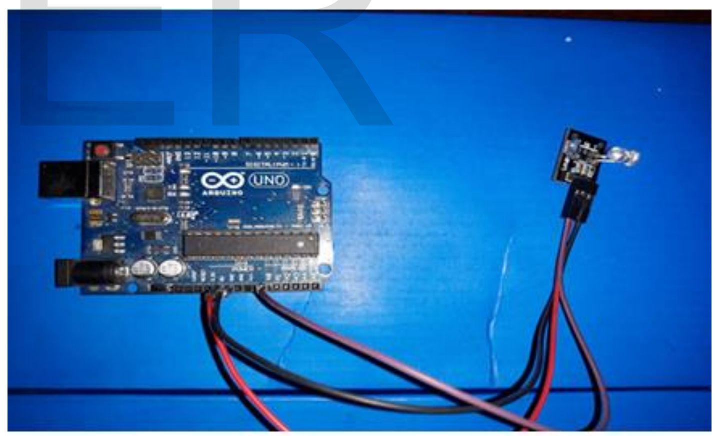

Fig.(3): Connecting Heart Beat Sensor

(GND) in Arduino and the Pin(VCC) to (5V) in Arduino and the Pin (S) to pin(A0) in Arduino.

- Body Temperature Sensor

this sensor contains of (four pin) which (GND,VCC,SCL,SDL), connected the Pin (GND) to (GND) in Arduino and the Pin (VCC) to Pin (5V) in Arduino and the Pin (SDL) to Pin (SDL) in Arduino and the Pin (SCL) to pin (SCL) in the Arduino.

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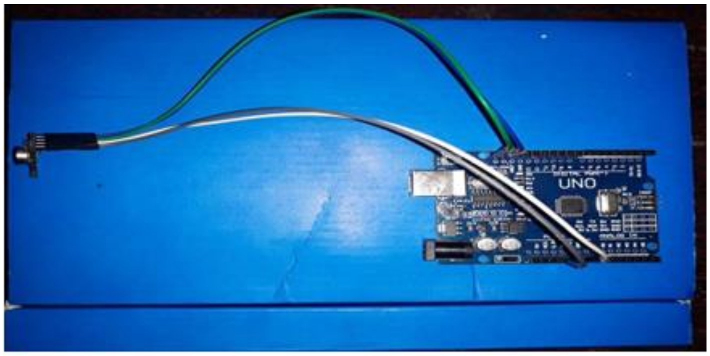

Fig.(4): Connecting body temperature sensor

- nRF24L01 Module (Transmitter)

That contains of (Eight pin) connected the Pin (MISO) to Pin (12) in Arduino and the Pin (MOSI) to Pin (11) in Arduino and the Pin (CSK) to Pin (13) in Arduino and the Pin (CSN) to Pin (8) in Arduino and Pin(CE) to Pin (7) in Arduino and connected the Pin (VCC) to(Vout) in Voltage Step Down and Pin (GND) to Pin(GND) in Voltage Step Down and connected the Pin(GND) of Arduino to the (GND) in Voltage Step Down (For synchronization purpose).

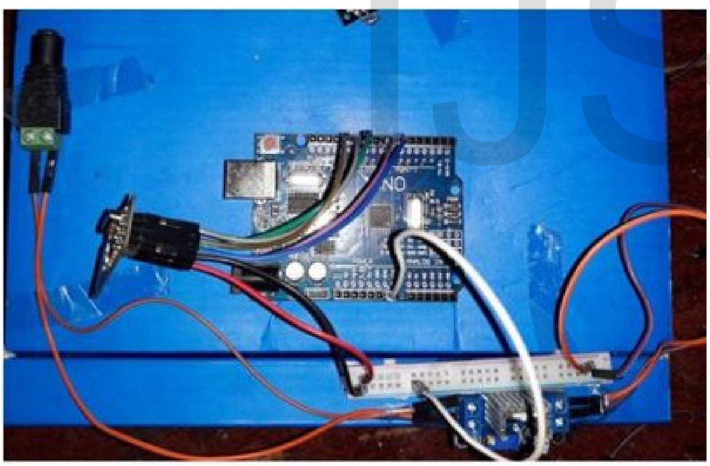

Fig.(5): Connecting nRF (TX)

At the end we connected the battery (9V) to the Step down voltage and connected The Arduino with this battery.

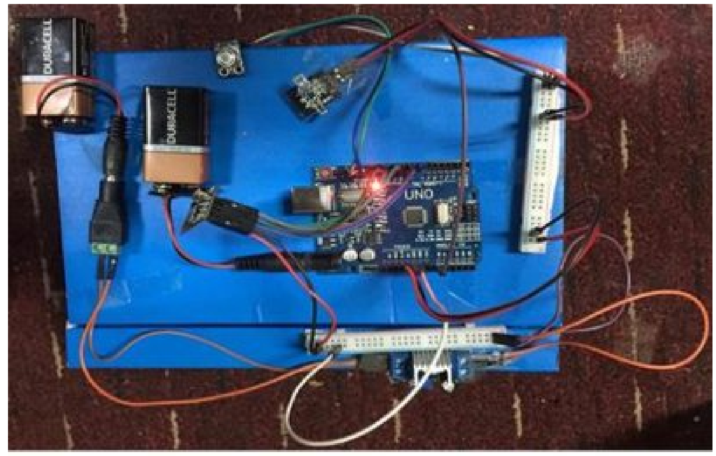

Fig.(6): Transmitter Section

2.3.2 RECEIVER SECTION

The Receiver contain of:

- LCD

To connected the LCD that contains on (Four Pin) to Arduino, Connected the Pin (GND) to (GND) in Arduino and Pin (VCC) to pin (5V) in Arduino and the Pin (SDA) to Pin (SDA) in Arduino and the Pin (SCL) to Pin (SCL) in Arduino.

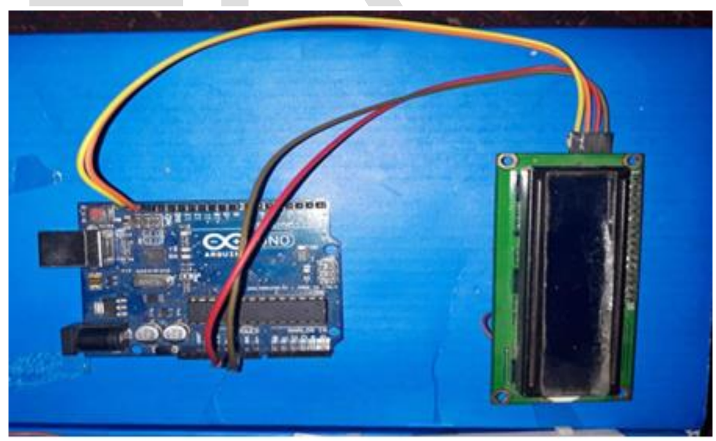

Fig.(7): Connecting LCD

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- nRF 24L01 Module (Receiver)

To connected the board of the Receiver (nRF24L01) that contains on (Eight Pin) to Arduino, connected the Pin (MISO) to Pin 12 in Arduino and the Pin (MOSI) to Pin (11) in Arduino and the Pin (CSK) to Pin (13) in Arduino and the Pin (CSN) to Pin (8) in Arduino and Pin (CE) to Pin (7) and connected the Pin (VCC) to Vout in step down Voltage and Pin (GND) to Pin (GND) in step down voltage and Connected the Pin (GND) of Arduino to the (GND) in step down voltage (For synchronization Purpose) .

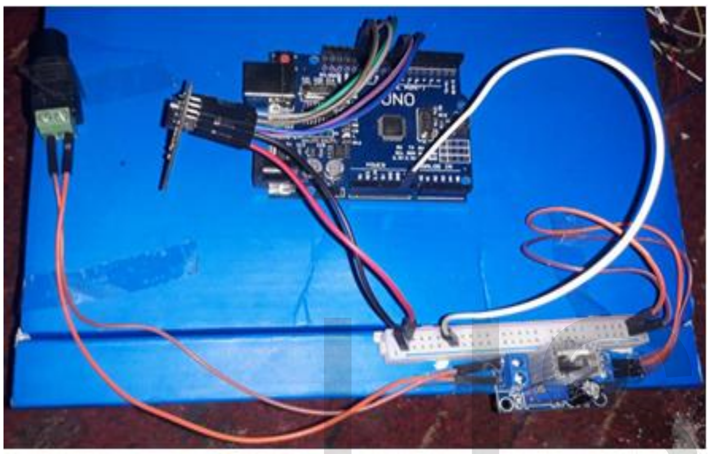

Fig.(8): Connecting nRF (RX)

There after connected the Voltage Step Down to the battery (9V) and connected the Arduino board to the PC by using USB connecter or same the battery.

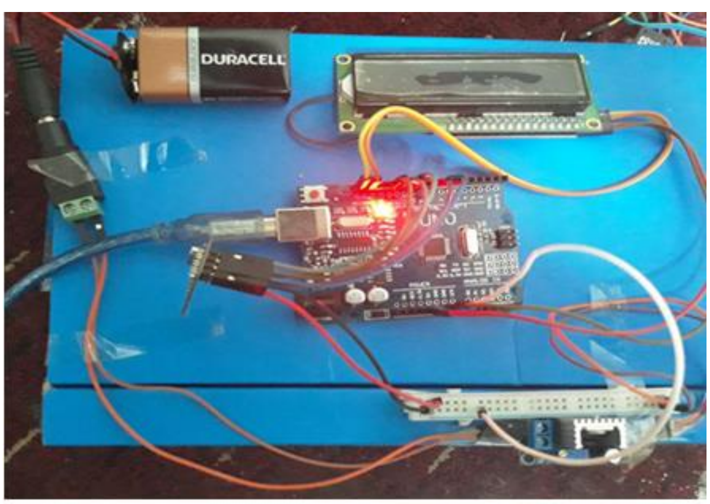

Fig.(9): Receiver Section

2.4 SOFTWARE PART

2.4.1 TRANSMITTER CODE

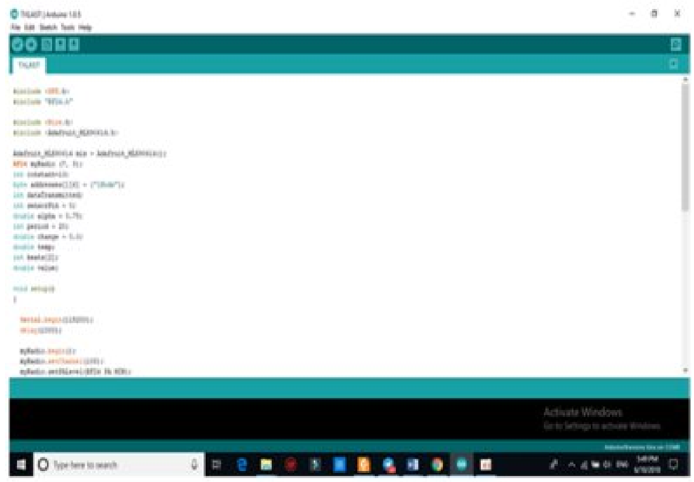

Fig.(10): Code Transmitter

2.4.2 RECEIVER CODE

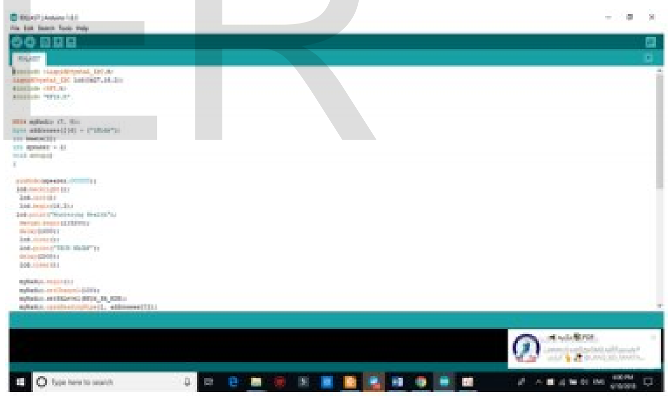

Fig.(11): Code Receiver

3 RESULTS

3. 1 TEMPERATURE MEASUREMENT

When turn on the energy, all the LEDs on PCBs begin glowing, indicating that circuit is working properly. Here there is a use of the industrial temperature sensor i.e. MLX90614 which gives us room temperature in °C and the Body temperature. On the LCD the result is displayed.

3. 2 HEART BEAT MEASUREMENT

To detect the heartbeat we place the patient's finger on a cavity consisting of an arrangement of LED and LDR where the finger is between them. To handle analog voltages again, we use an operating amplifier LM358, which has two integrated parts in OPAMPs. The final result is displayed on the LCD screen. In the

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Recipient section, the user is receiving these collected results.

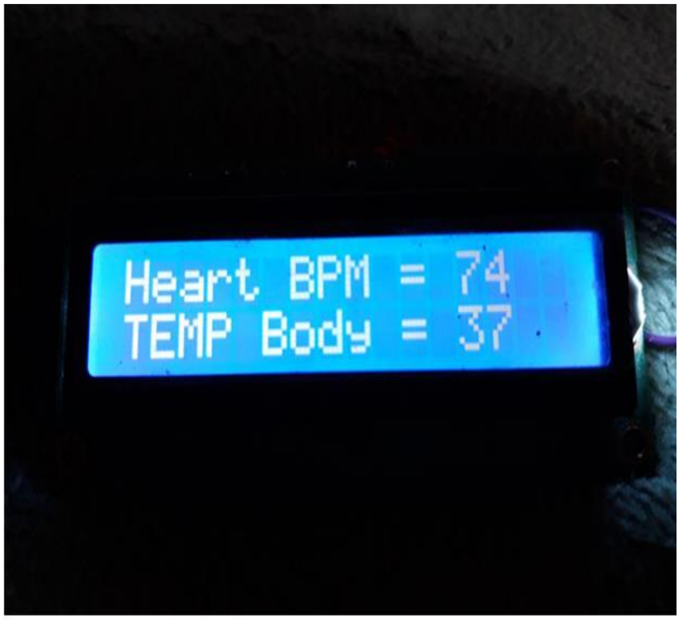

Fig.(12): Results of Proposed System

4 Conclusion

In this article, we proposed with analysis the remote patient's monitoring of temperature and heart rate. Where the temperature sensor type (MLX90614ESF) was used as well as the use of the heart rate sensor type (KY039), which connected to Arduino Uno where the results were processed and sent by a nRF24L01 technology to the remote end and after receiving them in the far side are processed using Arduino Uno and then show them on the LCD screen was used Wireless technology in this system in order to add greater freedom of movement of the person being treated.

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