

Non-Invasive Haemoglobin Measurement System Using IoT And Mobile Devices

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ABSTRACT: Technology has transformed the practice of medicine and surgery in particular over the last several decades. This change in practice has allowed diagnostic and therapeutic test to be performed less invasive. In this project, we propose a non-invasive approach to Haemoglobin measurement using in both IoT and mobile devices. The method in this project involves both hardware and software. The Haemoglobin is measured at the tip of any fingers, a Power LED and OPT 101 sensor are used as a light source. This light source is detected by the photo detector and data is collected through Arduino and shows the output in LCD display, which is also interfaced with PC system or other devices for IoT system. For the non-invasive Haemoglobin measurement, the hardware part has been used. This Haemoglobin measurement is ruling the investigation out of diseases. The invasive method is an expensive process as it involves the reagents for both the hospital and patients. It is also a risk to take the blood samples from the weak patients. Real time monitoring and infection free operation can be achieved through non-invasive method. This device could be effectively used by the physicians, and the patients for the implications of non-invasive Haemoglobin technology particularly in trauma.

KEYWORDS: IoT, Power LED, Arduino, LCD display.

I. INTRODUCTION

An Anemia is most common disease in the world. It is also the most common thing nowadays and in future, to finding the Haemoglobin level by taking the blood sample for the person. While not drawing blood, puncturing the skin, or inflicting pain or trauma. It is more irritating to the patients especially for children it gives more painful for them. For the diabetics and pregnant ladies has frequently a change the blood Haemoglobin level. For that there have to puncture the skin for every time. Haemoglobin is an iron-rich protein in red blood cells. When oxygen entering the lungs attaches to the Haemoglobin in blood, which carries it to the tissues in the body. The minimum level of Haemoglobin leads to Anaemia. This project is solving the major Haemoglobin measurement level by the non-invasive method. This method requires the no need of blood sample for measuring the level of glucose and Haemoglobin measurement. To finding the blood Haemoglobin measurement by using the power LED and Light sensor. The process the finger tip has to place over the sensor. Power LED and Light sensor calculating the density and thickness of the blood by passing the light spectrum into it. By passing the light to finger the small amount of current will generate and they will capture by the photodiode sensor. The current generate from the photodiode, to convert the current to voltage pass through the sensor output. The output of the sensor are connected to the Arduino Uno. This method is continuous measurement and pain Haemoglobin measurement system.

II. PROPOSED SYSTEM

This method, to finding the value of non-invasive Haemoglobin measurement using the power LED. The finger tip is placed between the high power LED and photodiode. The power LED emits the light through the photodiode. Photodiode get the light source from the power LED and convert a small amount of voltage will generate. Photodiode

gets the current voltage from the finger tip, by using the photodiode and power LED sensor reads the value from the blood thickness. And it converts the value to current pulse. The current passes through the band pass filter and to C-V convertor. Then the voltages are connected through the arduino controller. The output from the sensor block diagram is connecting to the arduino microcontroller. The microcontroller are process the output in the display, serial monitor and mobile phone via Bluetooth module. It is the continuous processes to display the value from the microcontroller.

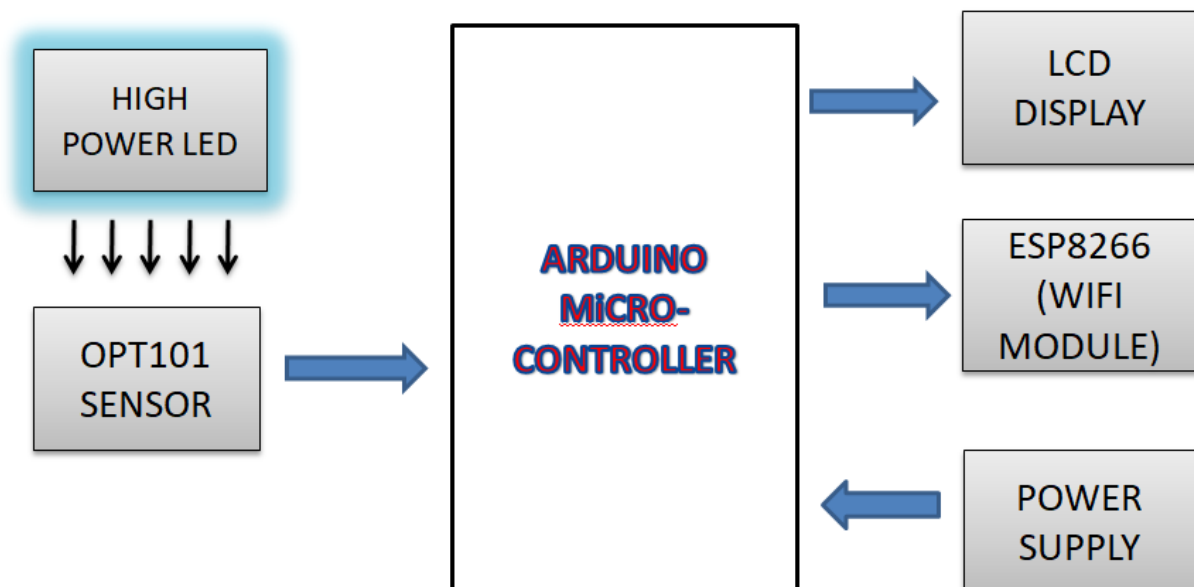
III.ADVANTAGES OF PROPOSED SYSTEM

- Low cost
- Convenient
- Painless
- Accuracy(80% efficiency)
- RMS errors are reduced.

IV. PROPOSED BLOCK DIAGRAM

The software and hardware tools require for the non invasive Haemoglobin measurement is

- Power LED
- OPT 101 Sensor
- LCD display
- ESP8266(WiFi module)
- Arduino
- Arduino software



A. High power LED:

Power semiconductor diode is comparable in brightness with the quality incandescent and group light-weight bulbs. This makes the ability semiconductor diode excellent for automotive, industrial, home and hobby applications. Not solely are they bright, they conjointly consume a fraction of power of associate degree incandescent bulb creating them extraordinarily energy economical. The ability semiconductor diode incorporates associate degree metal sink to dissipate heat. Merely connect the big + and – pads on the PCB to a current restricted power supply to change the semiconductor diode.



B. OPT 101 sensor :

The OPT101 is a monolithic photodiode which is a on-chip transimpedance amplifier. The integrated combination of photodiode and transimpedance amplifier on a single chip eliminates the problems commonly encountered in a discrete designs, such as leakage current errors, noise pick-up, and gain peaking as a result of stray capacitance. Output voltage increases linearly with light intensity. The amplifier is designed for single or dual power-supply operation. This sensor sense the refracted light in the finger which is used to evaluate the Haemoglobin values.

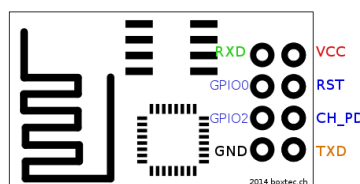
C. Arduino UNO:

Arduino Uno is an single-board and open-source microcontroller board. It is based on the microchip ATmega328p developed by Arduino.cc. The board is equipped with all sets of digital and analog input/output pins that may be interfaced to various expansion of boards and other circuits. It can be powered by the USB cable or by an external 9-volt battery The coding have to dump into the processor. The operating voltage is 5volts .The processor process the value from the sensor and generate the output result.



D. ESP8266:

The ESP8266 is also called as Wi-Fi module which is a low-cost Wi-Fi microchip, with a full TCP/IP stack and microcontroller capability. This small module allows microcontrollers to connect to a Wi-Fi network and it make simple TCP/IP connections using Hayes-style commands. ESP8266 is Wi-Fi enabled system on chip (SoC) module developed by Espressif system. It is mostly used for development of IoT (Internet of Things) embedded applications. ESP8266 comes with capabilities of 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2) and pulse-width modulation (PWM).



V. APPLICATION

1. Used in skin physiology.
2. Used in lack of Sophisticated labs and unhygienic rural areas.
3. IoT (Internet Of Things)

VI. CONCLUSION

The non invasive Haemoglobin measurement are using Power LED sensor has more efficient than the invasive method. Power LED Sensor has low cost, highly sensitive and able to detect very low concentration of Haemoglobin measurement. This non-invasive method, measure the parameters without blood samples. This method is more comfortable for continuous monitoring of glucose for the diabetic patient and children admitted in ICU in further implementations and this system is more comfortable for Haemoglobin measurement than the invasive method. Using this system public can measure Haemoglobin by their own without need any hospital or testing lab support without any discomfort. This system has less expensive than the existing invasive methods.

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