Development of Human Blood Flow Measurement System using the Laser Doppler Flow Meter Technique

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Abstract— An adequate amount of blood supply is necessary for the proper functioning of all body organs as blood carries all the nutrients and oxygen that our body needs to stay healthy. Various diseases cause an impaired supply of blood to the organs. The measurement of the blood flow can therefore provide essential information for the diagnosis of diseases. Since changes in blood flow occurs with the very initial stage of disease, with a fast, reliable. Previously they handle invasive blood flow measurement technique but this measurement is non invasive type. The physicians would be provided with new options for early disease diagnosis. In this paper to develop the measurement of human blood flow using laser Doppler Effect. Accuracy of this measurement is high and calculation speed is high and non invasive method. In this paper we used MEMS technique to reduce the power loss.

Keywords: blood flow, laser Doppler, low power consumption, micro sensor, wired method

I. INTRODUCTION

In hospitals common to measure the human blood flow heart rate, ECG heart those features are help to find out human health problems and early stage diseases[1]-[4].The aim of this paper is to develop a non invasive blood flow meter which has greater accuracy when compared with the quasi-elastic light scattering measurement. In quasi-elastic light scattering changes the volume of blood cell so it will change the rate of the blood flow. In this methods follow non invasive technique [4]-[7]. The physicians can be provided with new options for early disease diagnosis. One can measure the respiration rate .The whole set up of the sensor is 18 g.

The working principle of this measurement is Doppler flowmetry. Two type of sensor used to measure the blood flow .there is photo diode and laser diode, the laser diode emit the laser light towards blood then the back scattered light is collected by photo diode.

In previous technique (quasi-elastic light scattering measurement) to changes the volume of blood when we passing the light[4]. But this paper we introduced micro electro mechanical system (MEMS) it reduced the volume changes in the blood cells.

To place the finger tip on the sensor arrangement then the laser diode emit the laser beam to the object blood cell. The laser beam scattered by moving red blood cell and back scattered light collect by photo diode then it feed to the PIC micro controller then the analog signal converted into digital signal then it send to the pc for displaying purpose in between we used max232 for voltage conversion and also noise removing done.

II. BLOCK DIAGRAM

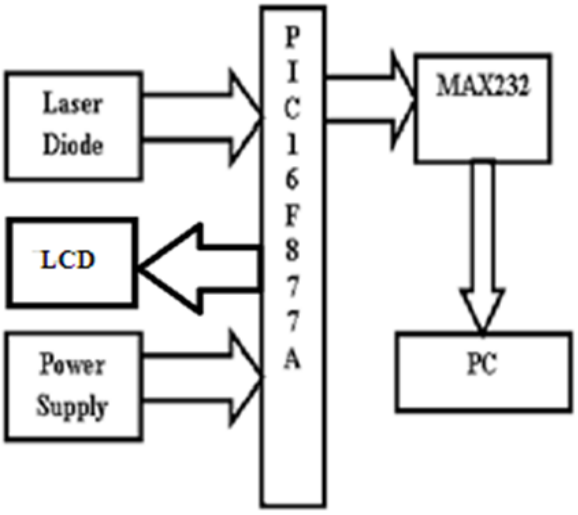

Fig. 1: Block Diagram

A. Power Supply:

In this laser Doppler measurement the whole setup consuming 5 volts so we used step down type of transformer. And it is given to bridge rectifier to withstand the over voltage.7805 is used to regulate the constant power supply.

B. Sensor:

The sensor arrangement give the low power consuming and long team measurement of blood flow .laser diode and photo diode are in this measurement, laser diode emit the laser beam to the object skin ,and beam reflect by moving red blood cell and photo diode collect the back scattered light and convert the beat signal to photo current[8] .Laser diode emit the laser beam towards the object skin then the red cell reflect the laser beam and it collect by photo diode.

C. PIC 16F877A4 Microcontroller:

PIC 16F877A micro controller is used because easily available and built in ADC. It perform 3 function such as capture, compare and pulse width modulation .PIC 16f877a support both parallel and serial communication but we required only parallel communication. And it performs high speed.

D. LCD:

16*2 type of display we used .and it advanced display to compare with previous method that is 7segment display. And it display both numbers and letters.

E. MAX 232:

Max 232 interface with pc and microcontroller. Because of the pc works on high voltage .Filter type of capacitor used to remove the noise in the blood flow measurement the

capacitor does not have any polarity. max 232 act as both drive and receiver .

F. RS232:

RS232 works in serial communication to connect with pc displaying purpose. Another name of the RS232 is compost and USART and also used in telecommunication. We cannot connect the micro controller and PC because it will damage the circuit.

III. RESULT

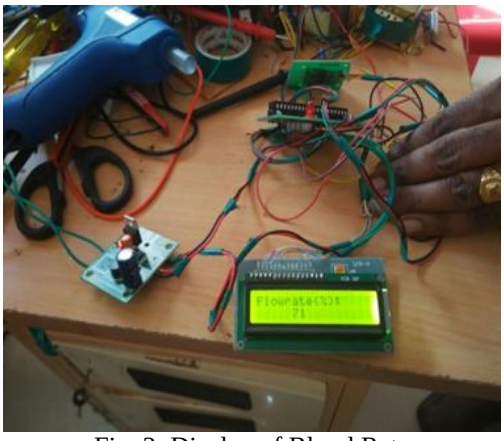

Fig. 2: Display of Blood Rate

IV. CONCLUSION

The sensor system is designed to obtain only a small number of values over a small time period to minimize interruptions due to spike noise, and is able to provide stable and reliable blood flow data. Introduction of an intermittent measuring system made it possible for us to achieve low power consumption, enabling long-term measurement of blood flow. The sensor system functions such that when a sensor detects an usual state in human it automatically send out an alerted to the pc from the datas were send to the doctor and ward nurse.

V. FUTURE WORK

This idea is already in practice for detecting chicken blood flow. The system can be implemented for human due to it's simplicity and quicker response in future.

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