

Lab VIEW Based Monitoring of Indispensable Parameters for Diabetic Patients

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Abstract : The main aim is to monitor the vital parameters like body temperature, heart rate, Spo2, glucose level by a non-invasive method. GSM technology is used for patient monitoring and dosage control of insulin unit. Monitoring of various parameters is done remotely and an alarm system is connected to it which gives alert during serious conditions. This implemented real time monitoring system plays an important role in patient care dosage monitoring. The doctor can monitor the various parameters of the patients in remote areas as well as when he is away from the hospital. This proposed system also helps the doctor to control dosage unit by a feedback system with respect to the patient health. Messages are received from the system to the physicians by an SMS with helps them in further diagnosis. The inbuilt memory of the monitoring system allows the doctor to know the patient's previous health history.

Keywords : Wireless patient monitoring, Heart rate, spO2 level, Insulin level, GSM

1. INTRODUCTION

Wireless Telemetry is used for the examination of patient under normal conditions. It is used in place where no cable connection is feasible. Multi-channel Telemetry is used for the transmission of various parameters. It is mainly useful in athletic training programs. By this we can monitor several physiological parameters of the patient. The advantage is that individual patients can be managed in remote areas. Hypoglycemia is a serious condition where glucose level in the body is low. Diabetic people taking medicine skipping meals taking too much medication can cause glucose level high.

When blood glucose level is below 70 mg/dl it is considered as hypoglycemia. The symptoms are sweating blurring vision, rapid heartbeat, loss of consciousness etc. Hyperglycemia on the other hands occurs when blood glucose level increase it affects people with type1 and type2 diabetics.

Fasting glycemia where glucose level is higher than 130mg/dl tested without having anything to eat or drink for at least 8 hours. In post-pradial hyperglycemia where glucose level is 180 mg/dl two hours after eating.

Hyperglycemia is because of reasons like consuming too much of carbohydrate consumption, skipping medication, stress etc. symptoms include headache, fatigue, blurred vision and so on.

2. MEASUREMENT TECHNIQUES

Sensed signal is amplified because it is of milli voltage and cannot be used in other components directly. It is amplified to an extent until it can be processed by other components. Signal conditioner is used for conditioning the signal for microcontroller. The components are powered by separate power supply circuit which converts the supplied voltage to 5V and 12V. Input signal is converted into volts with respect to glucose value by the programmed microcontroller. The values are then displayed in LCD.

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A. Heart Beat Sensor

It is used to read the patient's heart beat is a customized sensor of low cost and small. Near infrared spectroscopy (NIR) technique is used for measuring the heart rate which involves the usage of the light waves range from 700-900nm for calculating the blood volume. In this range only hemoglobin absorbs the light which allowed the designing of non-invasive low cost sensor. Sensor consists of a phototransistor and a diode made up of Gallium Arsenide Infra Red emitting diode. With respect to the patients pulse rate the light absorbed in the phototransistor varies.

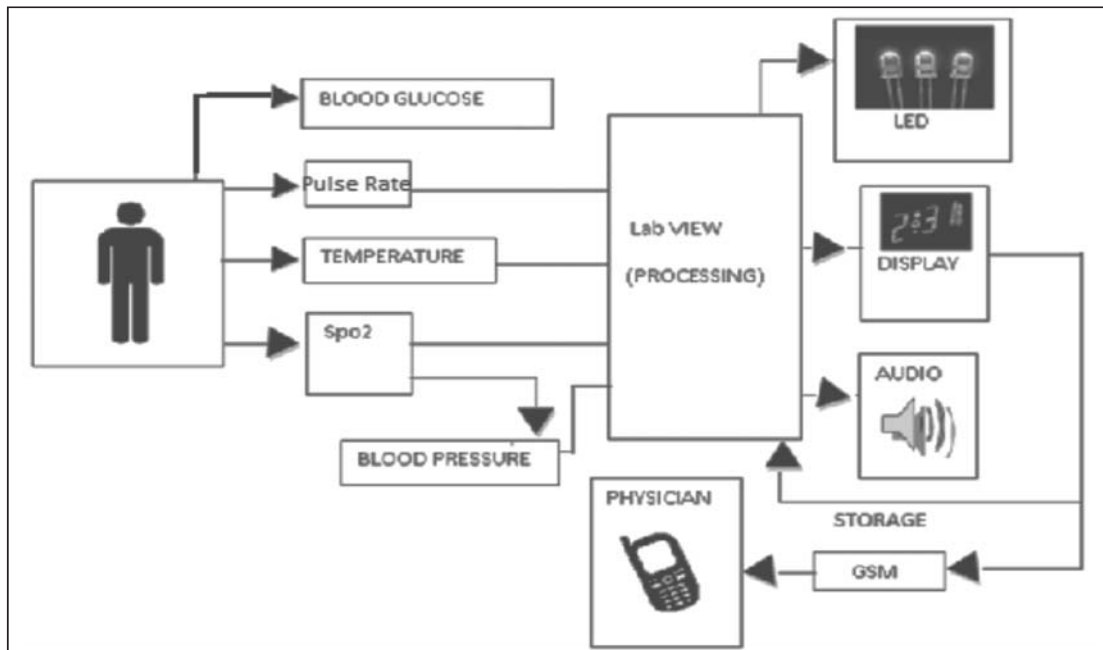


Fig. 1. Block Diagram of proposed system

B. Temperature sensor

By using an integrated circuit, the skin temperature measurement can be done, MAXIM-Dallas semiconductor sensor is used. An analog output is produced by the sensor with respect to the measured temperature. The microcontroller measures the voltage by using 12-bit ADC. A wrist strap is used to place the sensor to contact with the skin. From the measured skin temperature the body temperature is estimated.

C. SpO2 sensor

To measure the spo2 value by an non- invasive way we opt for pulse Oximetry. The sensor is placed on the thin part of the patient's body on the fingertip or earlobe or across foot. The device passes two wavelengths of light through the body to a photo detector. The change in absorbance is measured to determine the absorbance's due to arterial blood. By using this we can store and record both pulse rate and spo2 within a second.

D. Glucose measurement

Diabetes is a major concern which should be monitored regularly. Near-Infrared (NIR) technique allows us to measure the insulin level non- invasively. The NIR LED uses continuous waveform (940nm) to check systems response to various glucose levels. The sensor patch with LED and a photodiode absorbs the diffused reflectance spectra of blood.

E. Insulin pump setup

The insulin delivery to diabetic patients is provided by insulin pumps in a controlled rate. It is mainly used for person who need daily injections to regulate the blood glucose levels. The quality of life can be improved by insulin pumps. The complications are reduced by giving controlled insulin level. With the reflect like exercising,

sleeping, eating the insulin level are managed by using a firmware which allows in modification of basal rate and bolus dose. The pump consists of user replaceable cartridge which contains insulin. Piston with specialized syringe acts as a reservoir. The pump presses the piston slowly. The flexible tube connects the cartridge and the abdomen of the diabetic patient. A continuous blood glucose monitor with subcutaneous sensor allows real time monitoring of insulin level. This related product is left in place for couple of days which decreases the individual blood sampling of the patient. In future these two system can be combined which result in continuous monitoring of glucose level and adjusting the dosage level automatically.

F. Pumping And Sensing

Approaches Insulin is measured in terms of units per cc(or ml), by assuming the standard U-100 concentration. Every three to ten minutes the basal rates are in the order of one unit/hr is administered. Cartridge volume 200-300 units.

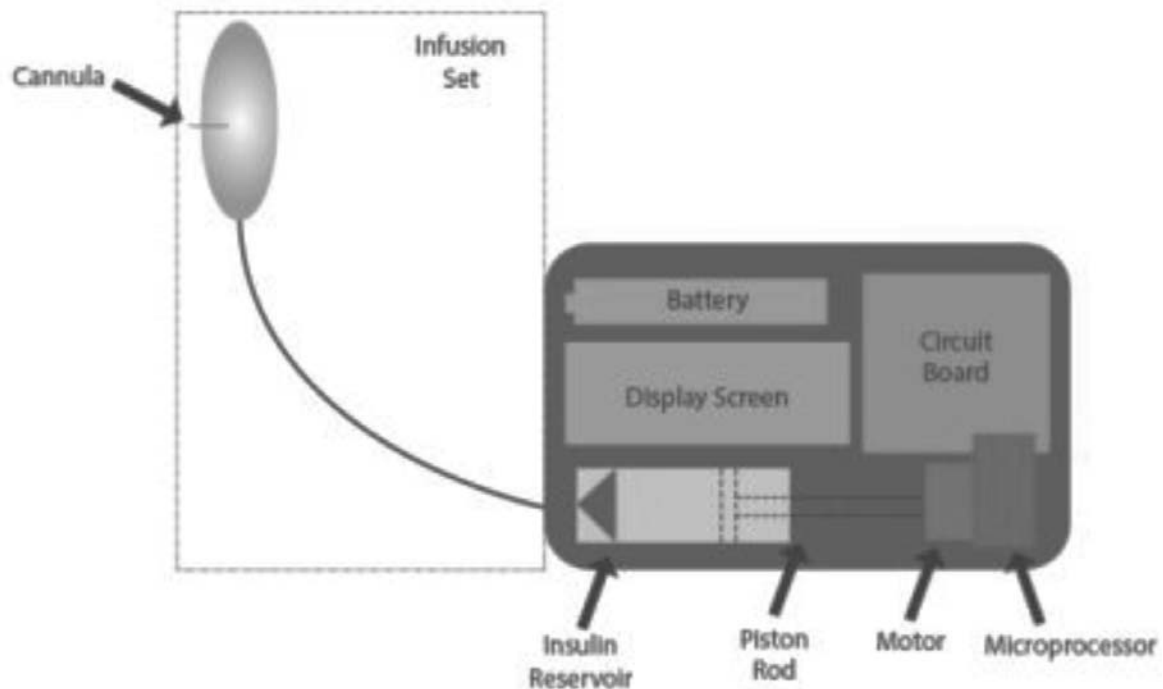


Fig. 2. Insulin pump setup

G. Dag

Data acquisition is a sampling process that measures patient's physical conditions and converting the samples into numeric value. It can be then manipulated by a computer DAC basically converts analog waveform into digital value for processing. It works as an interfacing between the physical hardware and PC.

H. Lab view

LabVIEW is virtual programming language which provides a platform for system design. The data flow programming language also known as graphical programming language is used in LabVIEW. By drawing wires, programmer can connect different function nodes. The drawing wires will be able to transmit one values of a palette to other palette serially.

3. CONCLUSION

This paper is dealing with the non invasive method for monitoring various parameters including the insulin level. The Blood Glucose monitoring system measures the insulin level accurately like any other system.

4. REFERENCE

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