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## “NON INVASIVE BLOOD GLUCOSE MONITORING SYSTEM”

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**Abstract:** Diabetes is an incurable disease that causes a variety of physical problems. It is a rapidly growing disease, numbering about 500 millions of people world wide and 50 millions people in India have diabetes. It can reduce all the problems associated with diabetes. Physical exercise, proper and balanced diet and medication. The current method of attack is painful and uncomfortable, this is because people have to put their finger to draw the blood to measure and concentration of glucose in the blood on a daily basis so it is not recommended for life. People living in villages do not have a facility to check their blood sugar levels and this is continued due to the unavailability of instruments for measuring glucose and practical cost. To deal with the difficulties caused by the attack we use non aggressive methods in our project. In this scheme, we show the glucose value on the LCD, which may be this data it is stored in the database and this data is sent to the doctors through the web/android application so that the patient can get the medicine earlier and precautions can be taken.

**Index terms:** Arduino, max30100 sensor, Temperature sensor, LCD display

### INTRODUCTION

Diabetes is a metabolic disorder in which the level of normal blood glucose (90 to 140 mg/dl) changes. This chronic disease has been shown to be highly contagious and incurable. One reason is the increasing sugar level may cause insulin production in blood cells or abnormal cell response to insulin or both causes. Diabetes can cause major complications in the human body such as heart attack and blindness. Hence regular monitoring glucose levels is important. There are three types of diabetes: Type1, Type2, gestational diabetes. Comes in Type1 under very severe diabetes. This mainly happens when the amount of beta cells produce in the pancreas is destroyed the body's immune system fails to produce enough insulin. Patients with this disease insulin injection or insulin pump should be worn.

It usually develops in childhood and adolescence. Much the most common type of diabetes in type2 it mainly occurs when the body over produces insulin and secretes insulin. The body does not use it properly or the cell does not respond to insulin. It often develops in obese and older adults. Pregnancy diabetes mellitus is the third type of diabetes.

This often happens when pregnant woman with no history of diabetes have high blood glucose levels. Mainly the level of glucose in the blood there are three types: hypoglycemia

It means low blood sugar conditions, normal blood glucose, and hyperglycemia. It means high blood sugar condition. Normal blood glucose level range from 70mg/dl to 100mg/dl

In children and 70 mg/dl to 150mg/dl in adults. This hyperglycemia is an increase in glucose levels above 150mg/dl. It can lead to diabetic coma and blindness when the glucose level is less than 70mg/dl, the blood sugar level drops. Low blood sugar can lead to stroke, coma, confusion, and irreversible brain damage to avoid complications, your blood glucose level should be checked regularly. Regular checkups can lower blood glucose levels adverse effects on the complications of diabetes.

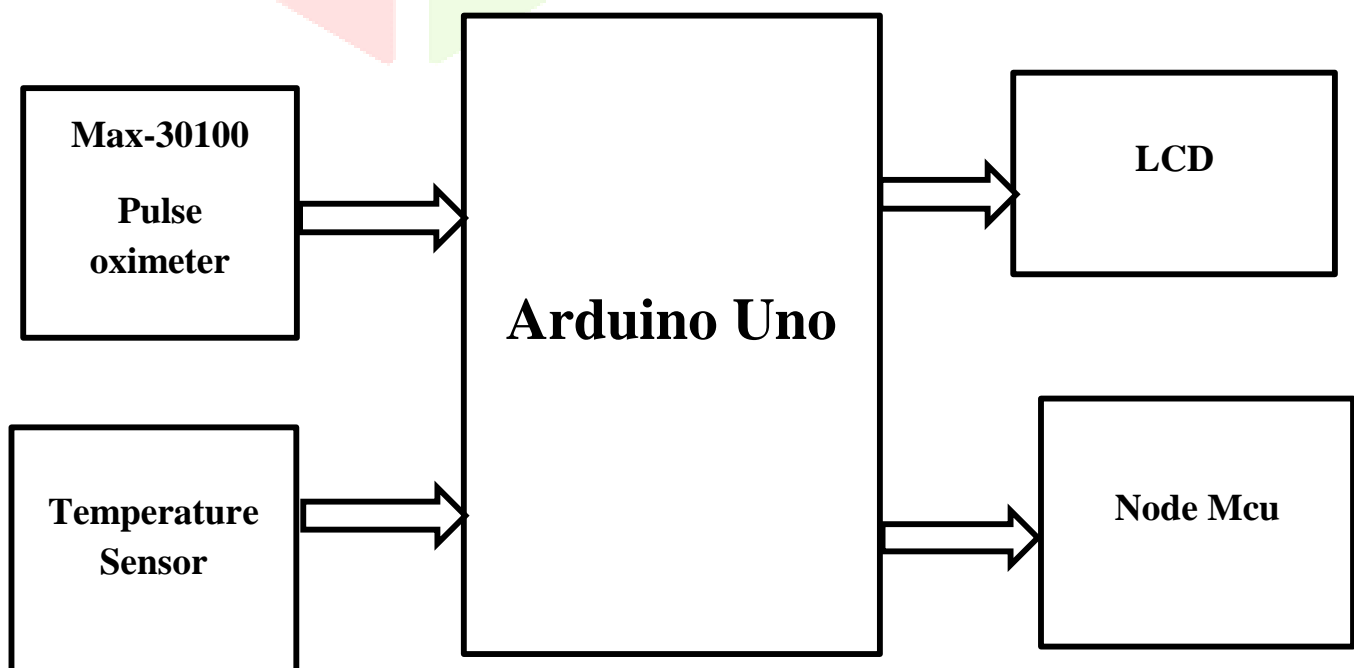
## LITERATURE SURVEY

SL. NO.	Topic	Author/year	Inference
1	A precise non-invasive blood glucose measurement system using NIR	Ravi maddila, Amit M joshi, prateek jain-2019	An efficient NIR wave based optical detection system is proposed with optimized post-processing regression model
2	Non-invasive blood glucose monitoring system based on near infrared method	HassanMauhadjer, Abdelghani lakhdari, Mustafa ayesh al-dhaheri-2020	This paper presents a method for developing a noninvasive technique to predict the blood glucose concentration based on the near-infrared light sensor.
3	NON INVASIVE blood glucose monitoring technology	Shwu jen chang,jen-tsay Liu, Liu Tang-2020	This paper reviews the research progress and major challenges of non-invasive blood glucose detection technology and divides it into three categories: optics, microwave and electrochemistry based on the detection principle
4	Review of non-invasive continuous glucose monitoring based on impedance spectroscopy	Ying Zhang, jayne Wu, jia mei huang-2020	This review summarises recent advances in non-invasive continuous glucose monitoring based on EIS, with emphasis on the devices that can potentially be integrated into wearable platforms
5	Non invasive monitoring of three glucose ranges based on ECG by using DBSCAN-CNN	Jingzhen li, igbe tobore, yuhang-liu, abhishek kandwal-2021	An ecg-based technique was proposed to achieve non-invasive monitoring with three BG ranges: low glucose level, moderate glucose level, and high glucose level.

## OBJECTIVES

- To do an extensive literature survey on existing implementation of non-invasive blood glucose level monitoring system and come up with a unique and innovation idea for implementation of non-invasive system.
- To learn the different hardware and software involved in designing non-invasive blood glucose level monitoring device and develop a platform to display the blood glucose concentration level.
- To make the device as portable and enable to data transfer with cloud.
- To design a portable blood glucose level monitoring device using non-invasive method.
- To design inexpensive, continuous self monitoring device for diabetic patients.
- To enable the doctor to remotely monitor the glucose concentration using web application.

## BLOCK DIGARAM



Block diagram of the proposed work

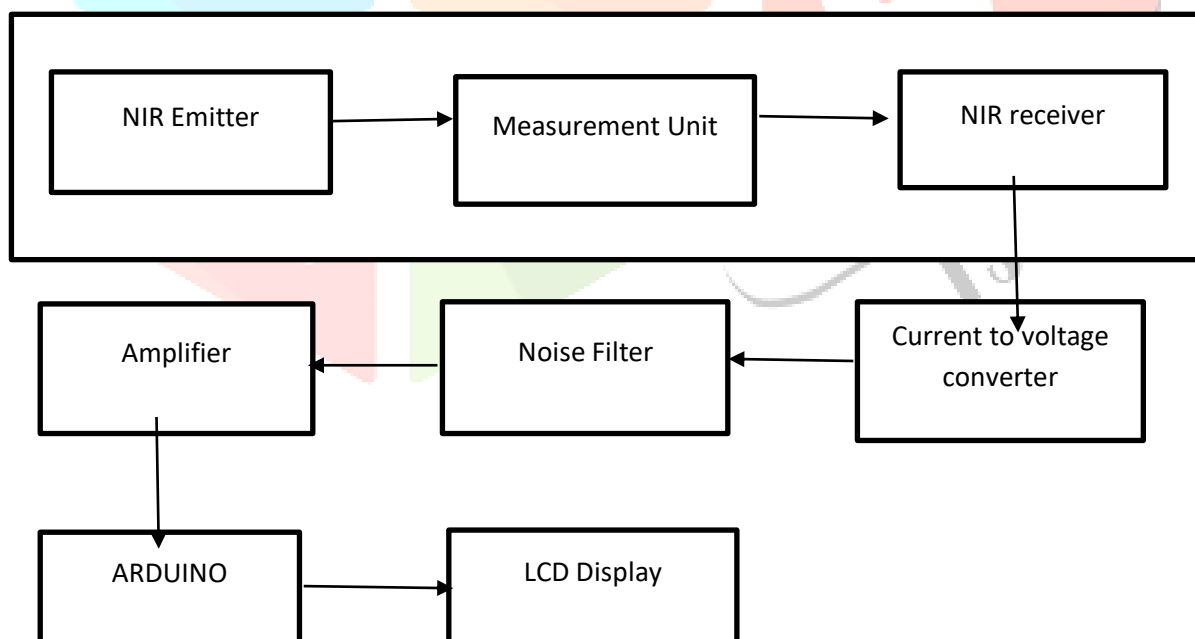
## COMPONENTS USED

1. Temperature sensor: It is one of the sensors. The LM35 series is a precision integrated circuit temperature sensor and this Lm35 sensor does not require any external calibration.
2. Node MCU: Node MCU is an open source firmware for which open source prototype board designs are available. It uses the ESP8266 module.
3. Arduino: Arduino is a microcontroller board that works on ATmega 328p. It is a low-cost microcontroller that is easy to use and program, open source and flexible.
4. Max 30100: Max30100 is a device and has two LEDs, one emitting red light and the other emitting infrared light to pulse frequency, and both red light and infrared light are used to measure blood oxygen level.
5. LCD: LCD is known as liquid crystal display is a flat panel that uses the properties of liquid crystal light modularity combined with polarized.

## System architecture and Methodology

In this project, a glucometer that can measure glucose painlessly, without blood sample or finger prick in seconds. The device checks the heart rate and is displayed on the LCD. The primary task is to identify the hardware components that are suitable for this project. Block diagram consists of hardware components that are interconnected specific task. When a light beam passes through biological tissues, it is both absorbed and scattered by the tissues. Scattering of light occurs in biological tissues due to a mismatch between the refractive index extracellular fluid and cell membranes.

Fluctuations in blood glucose levels affect intensity of light scattered from the tissue. The Beer-Lambert law plays a major role in absorbance a measurement that states that the absorbance of light by any solution is proportional the concentration of the solution and the length of the path traveled by the light beam.



## CONCLUSION

To conclude this project we have designed this using arduino board and max 30100 sensor for non invasive blood glucose monitoring system where before the proposed system was the exposure of sharp objects were used to prick the finger and put it on a test strip and then they would be able to check the glucose level of the patients whose sugar/glucose monitor is high or low with the help of invasive methods but this may cause patients inactive and infections would happen if they use same set of strips for other patients too , so we have implemented this project using non invasive method where there there is no use of using sharp objects to test the glucose level by using this max30100 sensor and more components we can check the glucose level of the glucose patients and the oxygen level of the patients. And this project will be less expensive compared to other invasive methods. Our main aim of the project is to design and implement the easily used non invasive blood glucose monitoring system.this device can be operated easily just by using sensors.

**REFERENCES**

1. Ravi maddila, Amit M Joshi , Prateek Jam- A precise non invasive blood glucose measurement system using NIR - 2019
2. HassanMauhadjer Abdelghani lakdari , Mustafa ayesh al-dhaheri - no invasive blood glucose monitoring system based on near infrared method -2020
3. Shwu jen chang jen-tsai liu,liu tang - non invasive blood glucose monitoring technology - 2020
4. Ying zhane, jayne wu, jiam ei huang - review of non invasive continuous glucose monitoring based on independence spectroscopy - 2020
5. Jinghen li, igbe tobore, vuhang-liu, abhishek kandwal - non invasive monitoring of three glucose ranges based on ecg by using DBSCAN-CNN - 2021

