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Detection of Glucose Level In Human Body

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ABSTRACT: One of the common diseases among the citizen is diabetes mellitus. Maintaining healthy blood glucose concentration levels is very important for the prevention of diabetes and obesity. Present day technologies limit such monitoring to patient who already have diabetes. The purpose of this project is to design a non-invasive glucose level detector. This is being developed using the fingertip detection. This is being detected by checking the Chromaticity of the finger when being place on the portable device with certain constraints being taken into account like your age & gender. The above proposed system will provide the subject to detect their glucose level at real time and thereby insisting them to control their glucose level. Whereas the existing systems were partly Invasive and Non-invasive method which might detect the glucose level accurately but increases the complexity of the process in subject's side.

KEYWORDS: non-invasive,Finger, Glucose, Chromaticity,intensity,segmentation, Region of Interest.

I.INTRODUCTION

THE overall number of diabetic patients is currently about 420 million and this number will reach 642 million by 2040 [1]. A number of snags caused by diabetes will bring serious damages to human beings like leading to comma Stages[2].The detection process of glucose level started it way ahead from 1960's[3].This serious complication can be avoided only if the glucose level is monitored continuously. But in this present generation monitoring the glucose level continuously is difficult. They are so many methods to detect the glucose level but the maintaining and using those devices are difficult and takes a lot of time in processing. So we provide a innovate approach to detect the glucose level in the human body with less maintenance and more efficient and this system can also be accessed easily by the individual and it does not require any expertise to access this method as they are required for the existing system.

An Implantable RFID Sensor Tag toward Continuous Glucose Monitoring

In this existing system it uses the wireless electro chemical sensor tag for monitoring the glucose. This system uses an ISO 15693 **(RFID)** standard for communication[4]. The major process involved in this system is the sensor is placed in the human body and it continuously checks for the glucose level and update in the server system by using the sensor tag. But the major difficulties are periodically the sensors has to change and they may a delay in the standard communication to the server system.

Disadvantages

This methodology needs more improvements on system-on-chip performance and clinical tests.The above system will help to detect the blood glucose level accurately but the difficulty faced by them is it is non-portable.This is mainly suitable for the Health Centres and cannot be accessed by individual easily it increases the complexity for accessing it in person Time Complexity is High because of the complex design.

Is nonlinear model predictive control with fuzzy predictive model proper for managing the blood glucose level in type I diabetes?

In this existing system it used to regulate the glucose level in the human body and tell us the level or the amount of insulin required to inject in to the particular patients body to regulate glucose level [5]. Thought this system is useful it is applicable only for type-1diabetic patient. The major difficulties faced is this can be accessed and used only by the doctors and expertise. If there is a fault in the communication system then it may forces to inject the wrong level of insulin the human body.

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Disadvantages

Considering the glucose level the level of insulin required to inject varies. The glucose level may periodically where by injecting high level of insulin causes to decreases the glucose level and low level of injecting the insulin causes to increase the glucose level. This process has to determine the accurate glucose level which is very difficult and a small change in the glucose level causes to disturb the entire system may lead danger to patient health.

Design of Digital PID Controller for Blood- Glucose Monitoring System

The main concept driven out here is to design a PID controller[6] that uses programmable gate array and the Nichol method to tune the controller as a diabetic patient model in MATLAB and Simulink environment.

Disadvantages

Since the speed of the control system depends on the system performance, stability and complexity FPGAs are the choice they should bevery much taken care of. There can be vast differences produced by different tuning procedures.

Diabetic diagnose test based on PPG signal and identification system

This methodology was introduce to achieve a greater classification of health and glycaemic persons by means of generating the Photoplethysmogram (PPG) [7]and then working upon the criticalities of the ARMA model values. The parameters of Auto-Regressive Moving Average (ARMA) models.

Disadvantages:

There may be false up detection levels shown up due to the disturbance occurred to the PPG Signal.

Accu-Check - Live life. The way you want.

This one of fast selling product in the market which detects the glucose level accurately by pricking. After pricking in the finger the sample blood is placed on the tube and this tube is placed on the device to check for the glucose level[8]. The result produced in this product is efficient but it require an additional maintenance for the tube where improper maintenance may lead to inaccurate results, and pricking continuously may cause wound in the person finger.

II.PROPOSED SYSTEM

The main ideology is here to find the glucose level at a faster reliable rate by detecting the Chromaticity of the finger when being placed on the input device with the constraints taken into account as follows: age and gender. The input value is then compared with the predefined one using the standby we have used .Thus, the glucose level is being calculated at a reliable rate.

Our Objective: Our Objective is that to mainly to design a system that get the fingertip image of the subject and display the subject's glucose level at a faster and efficient rate and sustaining the thought to have cost effective and simple design System

III.ARCHITECTURE DIAGRAM

The design of the proposed system that makes up to achieve the desired objective as mention above has the following sub systems and the architecture diagram of it is being given in the Fig 1.

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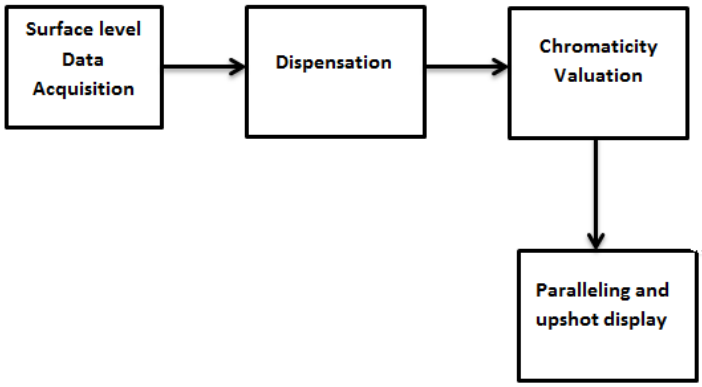

Fig 1:Architecture Diagram

Sub systems:
The above system has mainly four sub systems they are
A. Surface level acquisition
B.Dispensation
C.Chromaticity valuator
D.Paralleling & upshot display

A. Surface level acquisition
This is the initial Step where the input is being received from the subject from his/her fingertip. The input can be received from either a web camera or a mobile camera. Since the above system does not use any invasive device, we capture the image of the particular subject fingers and after capturing the image the image has to processed and enhanced to generate the values. This method gets name,age,gender and weight from the person so that they values are stored. And if they are an existing user a chart will bedisplayed the value is compared with past values and if they are a new user their details will be stored for future comparison.

B. Dispensation
Processing and enhancing the image is performed in this module. Here the input obtained from the subject is first filtered. The filtering process is done because the image may contain lots of distortion or noise. These noise have to eliminate and then it has to be enhanced for accurate result. noise reduction process is done using linear filtering algorithm where the gauss noise is ben produced and this can be eliminated using gauss filtering algorithm, since the noise produced here is very low. The gauss filtering algorithm first blur the image that we have taken and then it restores the image for three times and then it apply the smoothening to enhance the image. After enhancing the particular image, edge detection is performedwhere it is used to find the boundary of the objects in the image, where gradient and Laplacian methods are performed where gradient method finds the minimum and maximum value and Laplacian method is used to remove the zero crossing of the image, and then the background image is eliminated and the foreground image is alone obtained and it is restored. This method enhances the intensity and enlightens the image which produces us an accurate result.

C. Chromaticity valuator:
The third module is the Chromaticity valuator that involves the process of taking the central core part of the input image and storing the values. The module in it is the Background elimination where it fraction out the central part of the image from the completely filtered image being stored up in the matrix formatholding theRGB valuesThe intensity calculation process is where the RED intensity valueis being retrieved out and their values are being applied to a new matrix wherein they are being manipulated. In this process Region of interest and binarisation is performed .The filtered image is first segmented from the background and this process is called as region of interest or backgroundelimination. In this process the filtered image is projected using ROI where the particular part of the image is projected by using the threshold values, after projecting the image the RGB value is obtained and RED value is

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alone segmented and place in a separate matrix, this process is called binarisation. So this module is mainly meant for Projecting the ROI and Binarizing the segmented value

D. Paralleling and upshot display:

The final module is the paralleling part where the matrix ones are compared to normalizeone. Standby holds up a list of normalized values according to their AGE, GENDER, HbA Levels and WEIGHT thus helps in calculating the exact GLUCOSE LEVEL. The user gets the final value of his Blood Glucose LEVEL as a RESULT & GRAPH**.** The result gives the exact glucose level at that instance and the graphs are for user's comparisons. The graphs shows up a comparative study of the subject in adaily, also by weekly & Monthly basis one.

IV.PSEUDOCODE

Step1: Train up the standby with the normalized values of the subject's data with their required constraints.
Step2: Start up the testing module by capturing the fingertip image of the testing Subject's.
Step3: Dispense the image by performing the action of noise filtering, enhancing the technicalities of it and detecting the exact part of the image.
Step4: Now find the Region of Interest from the image to test for the RGB content values and training up to know the intensity of the RED color.
Step5: Now check- up the acquired image with the normalized image to find the exact glucose level of the subject.

V.SIMULATION RESULTS

The simulation studies involve the deterministic way of representing of how the flow of the detection process occurs from the training part to the testing part from where the actual detection part of the glucose level starts. The training part is where we load the normalized values are in the Fig 2, Fig 3 and Fig 4.The following figures namely the Fig 5,Fig 6 and Fig 7 are in the testing mode they will detect a subject's glucose level by entering up his basic vital signs like his age, Gender and his Hemoglobin level. The image shown in Fig 7 shows the demographic details of the subject and the detected level of the subject with

Fig 2:Getting vital details in training mode

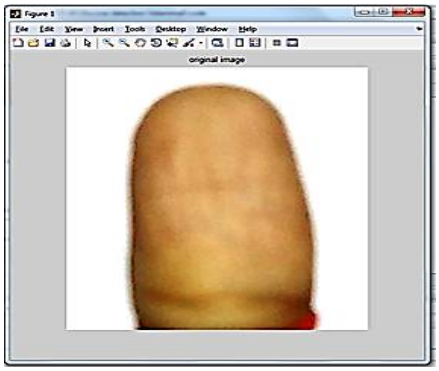

Fig 3: Loading the normalized data in Standby

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Fig 4: Setting up the normalized for the above given signs

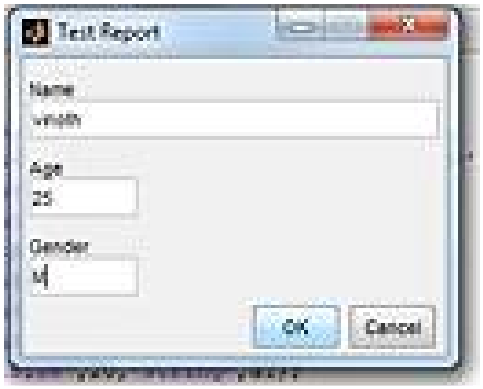

Fig 5: Entering detection mode and giving vital signs

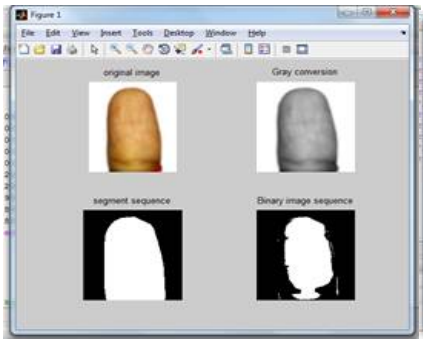

Fig 6: Processed image sections of the subject's data

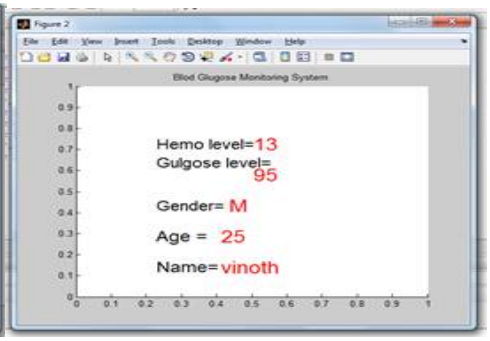

Fig 7: The final chart jotting his vital signs and his glucose level

VI.FUTURE WORK/CONCLUSION

The above system is non-invasive and detect and produce the result with high accuracy and portable. The time required to calculate the glucose level is very less. Even the individual person can access it very easily. The final result contains the glucose level in the human bodyand also contains the glucose value they should have in their particular age, gender and weight. Comparison chatcontaining the result of the old test and the current test this helps the particular person to understand their glucose level and monitor and control it regularly and our future work is to make this as an application (Mobile app) where it makes very portable, handy and easy for them to send up reports to their concerned doctors and return getting medications for it thus setting up a Mobile Health Care!

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