Review of Non-Invasive Blood Glucose Monitoring

Priyank Sondagar[1], Ruturaj Chavan[1], Prathamesh Mestry[1], Neha Kunte[2]

[1]Department of Computer Engineering, Student, University of Mumbai, Atharva College of Engineering, Malad, Mumbai, India
[2]Department of Computer Engineering, Assistant Professor, University of Mumbai, Atharva College of Engineering, Malad, Mumbai, India

Abstract

Now a day, the broadly used glucose size methods are invasive which generally involves finger puncturing. These strategies show painful and frequent pricking reasons calluses at the skin and have chance of spreading infectious diseases. The occasion of noninvasive technique would considerably enhance the colitis of existence for diabetic patients, facilitate their compliance for glucose monitoring, and decrease trouble and mortality related to the disease. This painting is targeting improvement of non – invasive blood glucose size sensor device the usage of Near – Infrared (NIR) technique. Non – invasive approach which consist of near infrared (NIR) gives preferred result. This sensor is used to degree the glucose level of someone and depending on the persons BMI degree, it will show diabetic stage of person. The goal of this test is to bring back mild the troubles the prevailing one 1/3 populations are going through and to deliver an effective technique to the humanity.

1. INTRODUCTION

Diabetes may have been a significant concern in the 21st century, and the guideline for health epidemics of the current period have grown together. It is a metabolism of pathology that affects important frame organs, provided they are not recognized and processed in due course. Diabetes Mellitus is one of the world's most common and dangerous diseases. Owing to changes in human behaviors each year, the occurrence of large varieties increases. Diabetes findings can be most apparent six (6) to 12 (12) months after a consistent elevated blood glucose level. It may also cause many key health issues, including renal letdown. Cardiovascular disease, darkness, stroke and neuropathy. In diabetic patients a variety of factors may cause difficulties. For example, smoking can trigger a blocked lifeblood artery to amputate the leg. The narrowing of the Arteries leads to cardiac ailment. It is performed when the patients have elevated blood heaviness, malnutrition and unhealthy fats in the body. In fact, a stroke and retinopathy may also occur. In fact, binge drinking will result in harm to the nerves and hypertension, tall blood glucose and excess weight gain [1].

2. LITERATURE SURVEY

The current intrusive approach is equivalent to non-obtrusive approaches for tracking blood sugar rates. The organization is already strongly in demand for a compact and non-obtrusive glucose meter. Non-obtrusive glucose meters are built in several respects. For this one approach is utilizing a finger examination using a near- infrarot system which is secure as there is no clear electrical interaction among the individual and the tool. The glucose content in the lifeblood is calculated on the basis of blood diffusion and light assimilation. The concentration degree is seen on the LCD [2].

In this paper, Authors describes their opinion which leads to the latest non- obtrusive (sensor) technique which has been announced as substitute to minimal the hurt of body fluid withdrawal and insulin vaccination. Various techniques have been developed for measuring Body fluid glycogen, including Ultraviolet, optoacoustic, ultrasonography and visible radiation [3]. Many of this method shows a strong partnership among non-obtrusive (sensor) and obtrusive methods.

The key explanation for ongoing work energies in blood glucose calculation is that it is the only method by which pain free glucose monitoring can be established. This can be achieved without pain. Instead of blood intake, the glucose content is determined by direct measures of body tissue such as muscle, tongue and aqueous humour, or oral mucosa, and by utilizing certain substances such as saliva, urine or urinary substances as an substitute to glucose[4].

Diabetes is a disease that is endangering citizens of all ages. It does not only exist in adults and aged persons, but also in infants and babies. Intrusive or minimally invasive procedures are the most effective and easy measurement tools. Such procedures are extremely accurate, yet uncomfortable and high risk of thrombosis infections. As an option for pain free glucose tests, non-invasive methods

are suggested. However, this is computer-complicated and needs further data samples [5].

3. METHODOLOGY

The planned compact, non-obtrusive glycogen control device is shown in Diagram Fig.1. The device starts as soon as an infrared sign visible to cellulose solution or blood samples is passed to the sender. The infrared symbol in the solution (photodiode) indicates the glycogen molecule within the clarification. The ultraviolet signal is converted into the same voltage charge in the photodiode. The Arduino uses the voltage charge as a criterion for measuring the sugar attentiveness and for deciding the necessary amount of insulin, much like the BMI. Finally, on the LCD monitor you will show a calculated glucose and insulin dosage[6].

4. IMPLEMENTATION

The arduino uno microcontroller is employed to calculate the attention of sugar also because the specified adrenalin dosage like the frame mass index BMI of the customers. The output voltage obtained from the IR-receiver (photodiode) is hired as a parameter to training session the glucose awareness through using a mathematical equation obtained from the glucose calibration experiments. Figure Fig.2 illustrates the flowchart of the glucose and insulin calculation. The BMI values are divided into three groups; underweight BMI 30 the statistics are primarily based on subcutaneous insulin order set of banner appropriate samaritan clinical centre phoenix[3].

Firstly, the person is required to enter their peak and weight. The users BMI may be calculated to decide whether the consumer is in the underweight ordinary or obese category. The sensor will then start to stay the sugar attentiveness of the glucose answer sample. If the measured glucose attention is much less than 70mg/dl no insulin is wanted for the user. but if the measured sugar level concentration is more than 70 mg/dl a corresponding adrenalin dosage is needed primarily based on the tables
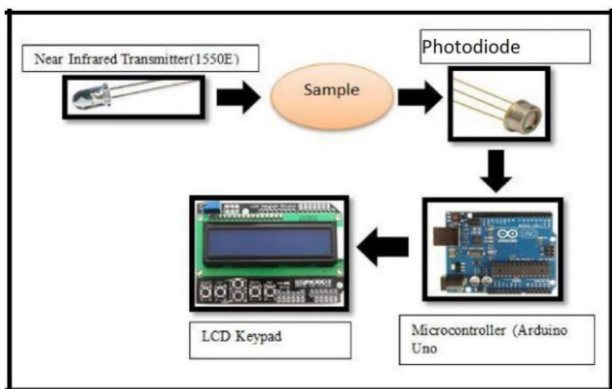
for every BMI category within the go with the flow chart each values of measured. Glycogen awareness also because the required adrenalin dose are going to be displayed at the lcd screen.

4.1. Accu - Check vs. NIR Sensor Reliability Test

The usage of any intrusive technique using the finger-prick procedure (Accu- Check) and the non-obtrusive technique using the portable tool was more and more reliant on four (4) topics. Measurements of blood glucose were contrasted from each procedure in Table 4.2. For through calculation the difference proportion was determined in Equation between these two techniques[7].

The findings of the trustworthiness check have shown that both of the two methods are fair and have a small percentage gap (4% -18%). The differences may be attributed to the fact that glucose solutions that may not contain certain compounds including blood have been derived from the present calculation in the above table.
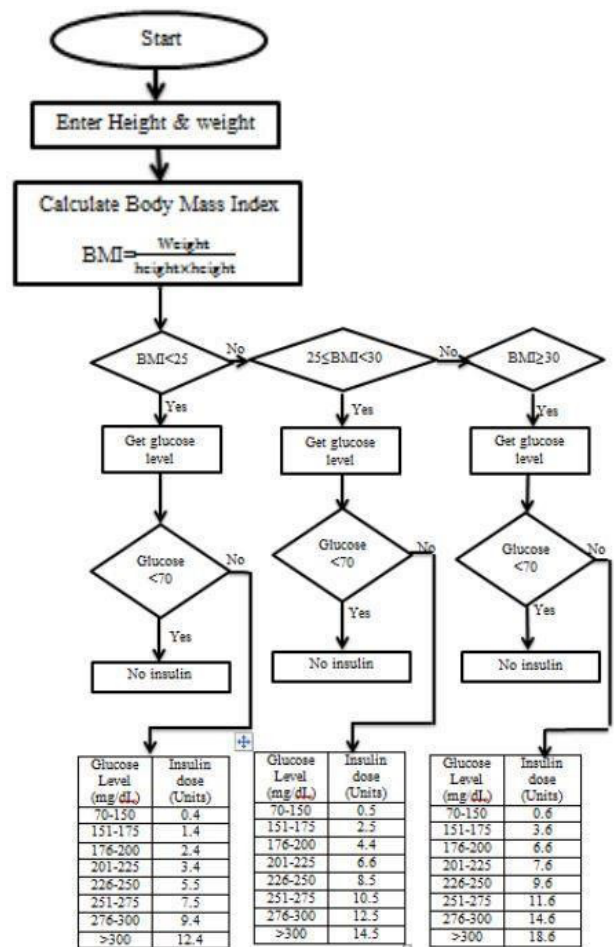

Figure 1: Block diagram

Figure 2 Algorithm of the glucose and insulin calculations for three (3) body mass index (BMI) groups

Table: The table below shows the comparison between the two different techniques.

Subjects	Glucose Concentration Measurements (mg/dL)		Percentage Difference (%)
	Accu Check	*NIR Sensor*	
1	107	112.15	4.70
2	97	114.32	16.64
3	97	114.25	15.46
4	104	115.75	13.3

The anatomical characteristics of an individual or a woman alone will also influence the dimensions as each consumer has unique pores and body fatness that limits the infrared signal penetration. Another concern may also be the dispersion of the infrarouge symbol into the atmosphere and the usage of the IR-receiver would do even less[8].

5. CONCLUSION

The Model was established such that specific sugar attentiveness were defined and the adrenalin dosage needed for various BMIs were calculated. To monitor the operation of the machine the Arduino Uno microcontroller was used. The relation between glucose concentration and voltage was investigated in-vitro experiments. Studies have shown that these two elements have a clear linear relationship; as sugar production declines, voltage arises. The share discrepancy reached by the reliability check may be less than 20%, which has proven to be a accurate indicator of blood glycogen utilizing non-obtrusive techniques within the system. Finally, it is not only helpful for diabetes patients to provide a compact intrusive blood sugar monitor but also for average users to preserve their blood glucose level stable within a healthier lifestyle.

6. FUTURE SCOPE

The future plans for this model is to scale this project to nanoscale such that it will be a band kind of a structure on the finder tip which will monitor the human body 24*7 ,also to reduce the error percentage of the this technique to bring in equivalence of the glucometer implemented using invasive technique. The idea is also to connect this device with mobile phone, the widely used device through either Bluetooth or Wi-Fi so the graphical display is provided to the user and notifies the user on daily basis and also the doctor in case of emergencies.

8. REFERENCES

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