Diabetic Healthcare Monitoring system: Detection of Levels of Blood Sugar Using IoT Based Breath Analysis

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I. SUMMARY

In recent years, the world has witnessed rampant growth in science and technology. Internet has been through a lot of revolutions to assume its present form. Being a key player in the field of network and connectivity, it has become a part and parcel of the human society. It is now the time to connect with the objects that humans depend on the most, to broaden the functionality it has to offer by what is popularly known as Internet of Things (IoT). Healthcare, being one of its major areas of application is turning out to be a boon for people. The statistical analysis on diabetes based on the current Indian population is expected to double by 2025.

The objective of this paper is to design a device based on IoT which provides a consistent technique to measure blood sugar level. It has been established that the level of ketone in the breath is directly linked to the sugar level of a person. For this purpose, the device collects the sample of the breath when the patient blows into the mouthpiece and senses the level of ketone in addition to the temperature and humidity levels of the breath that minimizes the need for any human interference.

Overall system adopts the concept of IoT to build the proposed device to simplify the diagnosis and personal monitoring of the patients related to diabetes. Objectives of the proposed work:

- In this designed system, an Arduino UNO has been used to analyze and compute the patient health.

- Use of smart devices to collect sugar level, temperature and humidity that will aid in evaluation of the health condition of the patient.

- The diagnosed results are displayed on the android device used.

- The results generated are stored onto the database for future references and are accessible from any location in case of emergency without minimal delay.

II. SHORTCOMINGS OF THE SOLUTION

The present technology is very much accurate in determining the blood sugar levels using various statistical means. But the challenge which is faced here is the remote health monitoring. This doesn't include support through internet based on wireless networks.

This method deals with blood sugar monitoring through sophisticated hardware and each of these have their own overheads of switching to a new system model.

III. SOLUTION TO THE EXISTING SHORTCOMINGS

To deal with this existing shortcoming in a hospital or medical assistance center, we could proposes an alternative vision that includes support through internet based on wireless networks and also compatible with existing infrastructure. We could make use of the enhanced Constrained Application Protocol (CoAP) using multi hop flat topology, which makes the patients being monitored by a central system. It also provides secure communication among the patient nodes by using the public key algorithm. We aim to minimize as well improve implementation method more domestically and secure communication between client and server.

The goal of CoAP is to:

• Create a wireless topology with one client and multiple servers.

• Establish link between each server with client.

• Servers can be accessed via Copper Web Browser plugin through which sensor data can be monitored.

• Each server is provided with separate URL; Client should be able to log onto the URL of particular server and enter his/her patient number and acquire necessary details from his platform.

• Sensors attached to the patient's body provides the information about the parameters in healthcare.

• As per the request from the client end, information is displayed.

• When implemented, the request by doctor, then information can also be displayed in his/her mobile devices, thus reducing the time spent for manual diagnosis.

Overview of CoAP

It is a software protocol intended to be used in very simple electronics devices that allows them to communicate interactively over the Internet.

Attributes:

• GET: The GET method helps in retrieving information from that of server.

• POST: The POST method requests the server to provide data for the user.

• PUT: The PUT method helps in updating or creating the information in the corresponding URI.

• DELETE: The DELETE method helps in erasing the information stored.

There is no perfect technology, each technology has specific features that work well in certain situations As a part

of future work, artificial intelligence and machine learning can be embedded to the system to help in classification and prediction of data to get more accurate results. Additionally, RFID tag could be used for unique identification of the breath-check.

IV. References

[1]   Dr. Khalid Nazim Abdul Sattar, Dr. Mohammad Mahmood Otoom, Dr. Mutasim Al Sadig, Dr. Nandini." N. Detection of Levels of Blood Sugar Using Simple IoT Based Breath Analysis". IJCSNS International Journal of Computer Science and Network Security, VOL.20 No.8, August 2020.

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