

# Detection of Diabetes In Children Using Internet of Things (IOT)

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**Abstract**—Aroud 400 million people around the world is affected by diabetes. In this paper, we have discussed several techniques for management of glucose level in the patient's body such as using wireless temperature sensor where a PDC sensor is used. For security purposes methodologies like MQTT(Message queuing Telemetry Transport ), AMQP(Advanced Message Queuing Protocol), CoAP(Constrained Application Protocol) and IETF (Internet Engineering Task Force), HGI (Home Gateway Initiative). A protocol called nRF protocol is used for wireless communication. Instead of using blood to detect diabetes we can use non-invasive methods, the methodologies used is Iontophoresis, Thermal Emission, Photo acoustic Detection and Sonophoresis.

## I. INTRODUCTION

Increase in population leads to increase in the number of chronic and heart diseases. Diabetes is the seventh leading cause of death. Few conditions need immediate treatment for which the current healthcare system is inefficient. In this paper, we will be reviewing different techniques which can be used for glucose monitoring and overcoming the security challenges. Instead of using a connected sensors a wireless sensors can be used which is more efficient and portable to use. While using blood for the detection of glucose is widely popular a non-invasive method can be implemented which will be easier to use as it is more convenient to use. Security is one of the issues, this we can overcome by using several protocols like MQTT, AMQP and CoAP. Incorporating these methodologies we can develop a project using IoT which can detect the abnormality in a patient's health and provide immediate medication from the doctor via SMS by using a cloud based platform to store the history of a the patient's health.

## II. RELATED WORK

[1] Development of a Wireless Temperature Sensor using polymer derived ceramics, in this paper author proposes a research on a temperature sensor. Temperature measurements that are accurate are required for many applications. Out of variety of materials studied for these applications a Polymer-derived SiAlCN ceramics (PDCs) is used in this paper as this material demonstrates accurate high

temperature reading, upto 830 degrees. PDC sensors are resistive sensors whose resistance are converted to voltage. While measuring the temperature using PDC sensor voltage must be supplied through the circuit DAC7724 then sample the circuit output and finally converting the output to temperature measurements and show the output data to the reader. This sensor is low cost and compact in size which makes it more efficient. This research is also trying low power consumption methods like MSP430 and develop battery-less sensors.

[2] A Survey of Protocols and Standards for Internet of Things, in this paper the author proposes a survey on the management and security protocols. IoT has various applications healthcare, agriculture, transport and also help in improving the quality of life. The ecosystem of IoT has seven layers, this paper focuses on the interconnection layer which is the third layer which is above the market layer which is the application domain and acquisition layer that contains sensors and smart containers. Routing protocol for low-power and lossy network(RPL), cognitive RPL, CORPL, both uses DODAG technology while channel-aware routing protocol(CARP) is based on distributed networks. Coming to the session layer standards MQTT is mostly used in IoT. There are number of challenges in IoT for which many standards have been proposed. In this paper a survey of protocols is discussed for IoT which is standardized by IETF, IEEE and other organizations.

[3] A roadmap for security challenges in the Internet of Things, in this paper author proposes the highlights of the systematic and cognitive approach which includes their components and their interactions. The overview of the roadmap has been proposed in this work by highlighting the tight interaction of a system dimension of IoT security. The brief discussion about the interactions and solutions related to security are given namely privacy, trust, identification and access control. The main standardization activities and the issues that are open are mainly focused in addition to highlighting scientific and technological hacks. The methodology the have used are IETF, HSIC through which it is shown that this major evolution forms its own security and privacy challenges. Many if these challenges are due to the inherent vulnerabilities of objects in IoT and the tight coupling of the physical world to the virtual world through intelligent objects.

[4] IoT-based continuous glucose monitoring system: In this paper the author proposes a study of a system to know the use of sensor devices with efficient energy combined with an energy harvesting unit, a unit that manages power and nRF wireless communication with ultra low energy in case of any abnormalities the notifications are sent both to the doctor and the patient by using dedicated gateways equipped with advanced services from this we will be proposing a system

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based on IoT which continuously monitors the glucose. A sensor device with efficient energy is designed to extend the battery life of the sensor receivers, the energy harvesting unit has been designed using nRF protocol. From the browser or sms the doctor or care taker can easily monitor their patient at any time by using this system.

[5] Non-Invasive Glucose Monitoring: A Review of Challenges and Recent Advances, is a paper in which author enriches the information regarding non-invasive expertise and apparatus by showcasing vital confronts. They have forged the headway of antenatal glucose surveillance which assist mankind wretched by diagnosis for refine living. The bionic glucose monitoring assists in dealing with diabetes Miletus. The main aspiration of diabetes controlling is nurturing schedule which includes authentic properties of aseptic glucose monitoring amenities. The convolutions and collateral characters of the computation process are the vital hurdles for the successful progress of non-invasive applied science. Persistent attempts has to be done to surpass performance and user embrace.

[6] Glucose Sensing for Diabetes Monitoring: Recent Developments, in this paper wordsmith propounds to know the latter developments towards bionic and continuous glucose surveillance devices, containing Phenomenon of focusing on controlling glucose concentrations in revolutionary physiological fluids to blood. From this we will be prevailing to biological fluids rather than blood let's say gastro enteric fluid, dampness, breath, sputum and ophthalmic fluids and concentrating especially on aseptic approaches which empowers unremitting glucose supervision of diabetes. The vital strategy used here is reverse iontophoresis, thermal emission and quantum surveillance. The crucial step is to generate explicit conception of the relationship among the diagnostically admissible concentrations of key disease markers in vital fluid collated to supplementary pathogenic fluids

### III. METHODOLOGY

In this paper is an e-Health platform with remote accessibility and manageability of diabetes, possible detection of fever and heart rate. The architecture of the platform contains three main components as shown in Figure 1: 1) Glucose meter 2) Temperature sensor 3) Heart rate sensor, these three components are connected to a Raspberry Pi board.

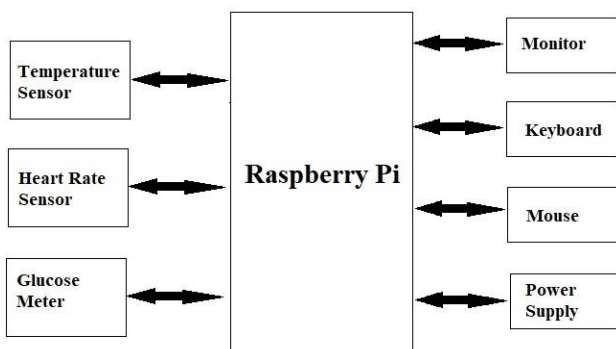


Figure 1. Block diagram.

All the sensors are connected to Raspberry Pi which is used to check the patient's health. The sensors are set to their threshold point, if the sensor detects any kind of abnormalities the doctor is immediately alerted through a message immediately to take precautions. The Raspberry Pi acts as a personal server as it stores all the data in it. Some patients new to medications may need reminders to take medicines on time so an SMS reminder will be sent.

The advantages with this system is that parents will be able to keep check on the health of their children. It is easier for them to get access to a doctor in case of an emergency, as immediate medications will be provided via SMS as soon as abnormal health conditions are detected. Few limitations with this methodology is that it includes use of invasive technique for detecting the glucose level, since we are using a needle to get blood for the check-up children may find it frightening. We can overcome these limitations in the future with a higher production cost and advancement in technology.

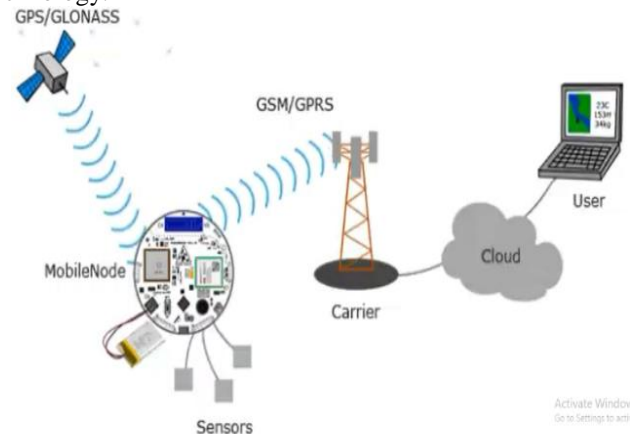


Figure 2. Web based connection using cloud

This system provides a portable device to the users which helps them to keep their health conditions updated to their doctor. Since medications vary according to the test results it is easier for the doctor to higher or lower the dosage of the medicine. The results are stored in the database for further reference of the doctor

### IV. CONCLUSION

Health care is something which has to be taken seriously, in this busy world humans tend to neglect it until something serious happens. So automating these services will help people to keep their health in check and provide a time saving system which efficiently communicates with both the parties. This is an easily installable system which can be installed in hospitals or houses. Since the data is stored in a cloud doctors and patients can easily keep check on their previous records.

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