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Portable ECG Kit

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***Abstract*— Measuring the Electrocardiogram (ECG) signal is an important method for the identification of heart diseases. The ECG signal has the knowledge of the degree of how much heart perform its function. In this paper, using Internet-of-things (IoT) we propose a new methodology for ECG recording and monitoring. A wearable monitoring node gathers the ECG information and using Wi-Fi technology is transmitted directly to IoT cloud and user can see the pulses on Things speak.**

Keywords— ECG, IOT cloud (Things Speak), Health monitoring, Wearable Sensors.

I. INTRODUCTION

IOT is the most widely used technology to design interactive circuits since last decade. The heart diseases are one of the foremost reasons for unexpected deaths. Many factors such as Age, fitness activity, cholesterol level, diabetes, cardio vascular diseases, body size, body position etc. may influence the heart rate of an individual. In this project, how to identify the heart rate of the individual has been attempted in this project.

The Electrocardiogram is physiological signal ensuing from thebody surface. Electrocardiograph is a device used to evaluate and monitor the ECG signal. In most of the medical institutions, Electrocardiogram is observed using bulky and fixed instruments. This sort of hardware normally utilizes 12 electrodes to collect Electrocardiogram Records because of their great execution and accuracy in less time. As these devices are costly and cumbersome for home utilization, patient need to visit the hospital on regular basis, which will increase the load on clinics and hospitals. In this method, a minimal effort convenient ECG detecting framework is exceptionally required.

In this study, using Internet-of-things (IoT) cloud, the architecture of ECG monitoring system is put forward. In perspective of this design, we plan and execute an adaptable ECG checking framework. The ECG data, which is gathered from the human body will be sent directly to the Internet-of- Things Cloud storage, utilizing Wi-Fi convention and this cloud server will also acts as an online data storage. For graphical display in the Thing speak site itself there are many tools which allow us to display the data and also observe each reading one by one.

II. REVIEW OF LITERATURE

1. IoT based ECG System for Rural Health Care:

The rural population lacks adequate medical care. In this perspective, modern technology can be facilitated to alleviate your health problems. The ECG meters are connected to the human chest and the necessary cardiovascular data is collected through an IoT device. This data is stored in the cloud, which is integrated with the MQTT and HTTP servers. This study proposed an innovative IoT-based method for ECG monitoring systems in cardiovascular or cardiac patients. ECG signal parameters P, Q, R, S, T are collected, pre-processed and predicted in order to monitor cardiovascular conditions for further health management. The machine learning algorithm is used to determine the importance of the ECG signal parameters and the error rate. The logistic regression model corresponded to the best agreement between the train and the test data. The prediction was made to determine the variation in the quality of the PQRST and its suitability in the ECG monitoring system. Satisfactory results are obtained when the values of the quality parameters are taken into account. The proposed ECG system based on IoT will reduce healthcare costs and the complexity of the process.

2. **An IoT-cloud Based Wearable ECG Monitoring System for Smart Healthcare**
Electrocardiogram monitoring is widely studied and used to diagnose heart disease. However, almost all existing portable ECG monitoring systems cannot function without a mobile app that is responsible for data acquisition and visualization. This article proposes a new ECG monitoring method based on Internet of Things (IoT) techniques. ECG data is recorded with a portable monitoring node and transferred directly to the IoT cloud via WLAN. The HTTP and MQTT protocols are used in the IoT cloud to provide timely and visual ECG data to users. Almost all smart terminals with a web browser can conveniently record ECG data, greatly alleviating the cross-platform problem. Experiments are carried out on healthy volunteers to check the reliability of the overall system. The experimental results show that the proposed system is reliable in collecting and displaying ECG data in real time, which can aid in the primary diagnosis of certain heart conditions.

3. **IoT: Electrocardiogram (ECG) Monitoring System**

This study aimed to develop a small electrocardiogram (ECG) monitor that measures heart rate and waveforms and sends the data to a database and web server. An ECG recording device was designed using a single wire heart rate sensor and an Arduino microcontroller. A program that processes, analyzes, and loads ECG data is encoded using MATLAB and C # programs. The collected information is displayed in a graphical user interface (GUI), encoded with C #, and displayed on a web page. Rapid Application Technology (RAD) was used in the methodology that began with rapid system design. Hardware and software systems went through a prototyping cycle for development. Once the system integration is complete, a complete IoT-based ECG monitoring system will be configured. A sample size of 18 and a = 0.05 is used to test with ttest. The tests returned test values that are in the non-critical range for all ECG parameters, which means that there is no significant difference between the collected data. The percent reliability of the device for detecting ECG conditions such as normal sinus rhythm, sinus tachycardia, sinus bradycardia, and flat line is 83.33%. The percentage difference in heart rate is 0.35%, which is within the acceptable medical standard of 99 precision. The device was classified as functional and fully running.

III. PROPOSED METHODOLOGY

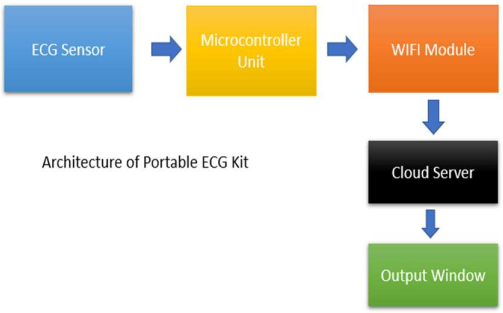

Fig1. Proposed Methodology

- In the proposed methodology as shown in the above figure the components that will be used in this project are the following:
    1. ECG Sensor
    2. A Microcontroller Unit
    3. WIFI Module
    4. Cloud-Based Server
    5. An output device/system

- ECG Sensor:
The **ECG tracking** node is responsible for collecting information from the human skin ECG and then sending that information through an unguided medium**.** For the most part, as shown in Figure 2, the ECG tracking node includes: 1) ECG sensor module 2) Microcontroller module; 3) Communication module;

1)ECG Sensor Module:
The sensor module is the basic component of the system that collects ECG information from the human body. With the AD 8232 ECG sensor guide and certain peripheral circuits, sensitive signals can be linked with sufficient precision. Because the frequency of the ECG signal ranges from 0.5 Hz to 100 Hz, the AD 8232 uses a bandpass channel to eliminate excitation outside the frequency band.

2)Microcontroller Module:
We use Arduino Uno for the microcontroller module. The Arduino Uno is an ATmega328 compatible microcontroller board. It includes 20 powered data / power pins (six of which can be used as PWM power and six as simple sources of information), a 16 MHz resonator, a USB port, an ICSP header, and a reset button. First, the analog signal is converted to digital

with the help of sampling and ADC. ECG information is buffered before being packed.

3)Communication Module:
The Wi- Fi device can get theECG medical information through the web server. The Wi-Fi device provides quick and efficient web access that can send and receive consistent electrocardiogram information to the IoT cloud.

- Cloud-Based Server: The cloud server that this project focuses on is the Things Speak server which is an open platform. There are two types of windows on the Thing speak platform one is the private window and the public window; the public window gives access to all user to view the data.
- An output device: To view the ECG the user will require a device on which user will view the ECG and the readings.

IV. RESULT

The expected output is that when the connections are done with ECG Sensor module, microcontroller and the communication module the data from the module will be read and passed through the WIFI module into the cloud server. The cloud server will show the readings the ECG,

V. CONCLUSION

The IOT industry is already transforming many lives each day and this project aims to help and prosper the lives of those under privileged people who don't have the facility to go to hospitals every time just to check their ECG. As heart diseases are one of the leading reasons for unexpected deaths. The factors being age, fitness activity, cholesterol level, diabetes, cardio vascular diseases, body size, body position etc. may influence the heart rate of an individual and cause death of the individual. Thus, this project will keep the ECG in check by checking it and normally these devices are clumsy and unwieldy the patient will have to do regular visits to the hospital, this project can ease the process and lessen the burden of the medical facilities.

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