PORTABLE ECG MONITORING DEVICE WITH WEB INTERFACE

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ABSTRACT:

According to the problem of the rising sub-health people and the potential undetectable chronic diseases, in this project we develop a kind of portable ECG health monitoring system. Heart diseases have caused millions of death worldwide in the past years because of the increase in the population and rising of health care costs. The main causes of heart attacks are a lack of prerequisite care and un-availability of medical care in emergency situations. Treatment and prevention of heart attack is very important. Periodic checkup is important in health maintenance. Electrocardiography (ECG), can be monitor anytime, anywhere and send the report of Electrocardiography (ECG), to the medical expert with this portable device and can effectively communicate with them. In case of any abnormality, doctor will effectively communicate with the patient. For regular checkup and home based checkup, there is need of low cost, portable, low power and time-saving ECG monitoring device. The main requirement of any portable device is low power supply and in this project, there is no need of external power supply.

Keywords: ECG, smart Health, ECG with Wifi, Portable ECG, Web ECG, IOT.

[1] INTRODUCTION

1.1 What is ECG?

Electrocardiography is a medical diagnostic procedure used to record the electrical activity of the heart and display it as a waveform. An electrocardiogram (ECG) is obtained by measuring electrical potential between various points of the body using an instrumentation amplifier linked to the body via leads attached to electrodes (electrical contacts). Electrodes are placed on different
sides of the heart to measure the activity of various parts of the heart muscle and the voltage between pairs of these electrodes is what is returned as ECG in the form of a graph.

In our system, portable ECG Monitoring device is coupled to receive patient ECG data from the ECG monitor and transmit the patient ECG data to a health care provider over internet. The invention relates generally to electrocardiograms (ECGs) and the use thereof, and more particularly to, a method and apparatus to remotely monitor patients using a portable ECG device with a wireless communication interface. It would be advantageous if a physician, or health care provider, could supply a device to this type of patient that could expedite diagnosis and treatment by alleviating the embarrassment and time expense of showing up in an emergency department when in fact, no cardiac problem exists. This could eliminate not only the time involved in a patient going to the emergency room for indigestion, but also saves hospital resources and health insurance costs. This is useful for the patients who are suffering from the cardiac diseases. Portable ECG machine offers various benefits for detection and monitoring of heart condition. There is a growing demand for affordable, portable ECG machine. The remote monitoring of the patients proposes to tackle this problem, by using portable monitoring systems.

1.2 Objective:

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1.3 Motivation:
Our motive to implement this system is to save the patient's life by providing him the affordable and portable ECG which will be used by family doctor to monitor health of the patient remotely and real time.

RELATED WORK

2.1 Literature Survey:

The cardiovascular disease does harms to person's health, and most of them are concerned with arrhythmia which is the leading cause of death. The chances of suffering a myocardial infarction are great and increase up to fifteen times after the first occurrence. During a heart attack, heart muscle is deprived of oxygen and will literally die if the artery remains blocked. The first few hours are critical in saving much of the dying heart muscle and preventing permanent heart damage. Unfortunately, the symptoms vary and the most common reason for critical delays in medical treatment is lack of early warning and patient unawareness. It is possible to detect the onset of a heart attack and eliminate patient error. In this paper, we present a portable miniature wireless device for ECG measurements. The patient will only be required to carry a cell phone equipped with Bluetooth. When the device detects a heart attack, it will alert the cell phone which in turn will automatically call for help and provide the patient's location. The goal is to provide early heart attack detection so that the patient will be given medical attention within the first few critical hours, thus greatly improving his or her chances of survival.


Measuring the Electrocardiogram (ECG) signal is an essential process for the diagnosis of the heart diseases. The ECG signal has the information of the degree of how much the heart performs its functions. In medical diagnosis and treatment systems, Decision Support Systems processing the ECG signal are being developed for the use of clinicians while medical examination. In this study, a modular wireless ECG (WECG) measuring and recording system using a single board computer and e-Health sensor platform is developed. In this designed modular system, after the ECG signal is taken from the body surface by the electrodes first, it is filtered and converted to digital form. Then, it is recorded to the health database using Wi-Fi communication technology. The real time access of the ECG data is provided through the internet utilizing the developed web interface.

3. ECG-Enhanced Multi-sensor Solution for Wearable Sports Devices, Wei Xia; Yu Zhou; Yin Feng Fang; Honghai Liu, 2018 IEEE International Conference on Systems, Man, and Cybernetics (SMC), Electrocardiogram (ECG) plays a crucial role in the prevention of cardiovascular diseases in humans and various types of ECG monitoring equipment are continuously being developed. Most monitoring methods place the electrodes near the heart or on both arms, based on standard ECG leads. Although accurate monitoring effect has been achieved by these conventional approaches,
the wearable performance still need to be improved. This paper proposed a novel ECG-enhanced multi-sensor solution for wearable sports devices. A wireless and wearable ECG detection system based on signal acquisition from left upper-arm was designed to verify this solution method. The system has been evaluated with solid experiments proving that the system has outperformed existing similar system. Moreover, the inertial measurement unit (IMU) and electromyography (EMG) data were detected and fused by the system to determine the validity of the ECG signal. It indicated that the system can achieve a good performance of heart rate detection under different body states.

PROBLEM STATEMENT

1.4 Problem Statement:
In wired an ECG monitor connected to a plurality of lead wires and a plurality of transducers, capable of receiving a plurality of ECG signals from the patient. In existing system there was need for an extra device to plug into wall outlet which may be the time consuming and difficult for some patients when experiencing ischemic symptoms. Even it is tedious job for doctors. To overcome such above problem we introduce new system that is portable ECG Monitoring device with web interface.

1.5 Existing System:
Currently, there are two different types of ECG systems that are used. The first one is the standard ECG which generally involves twelve or fifteen leads that are connected to the patient’s chest, arms and right legs through electrodes. The device records the ECG signal for almost thirty seconds. Possible ailments can be discovered from reading the ECG signal. However, due to the short time for sampling, sporadic abnormalities which mostly occur in the intensive care unit (ICU) patients may not be discovered. In order to address the problem mentioned above, continuous electrocardiogram telemetry is used by many hospitals to monitor patients in the ICU. This device has three electrodes that acquire ECG signal for an extended period and then the signal is displayed on a screen or printed on an ECG graph paper. The Wireless ECG Monitoring System proposed here falls in this second category of ECG devices as it will be used to monitor the cardiac activity of subjects. Many ECG machines, both standard and continuous, are marketed as “portable”, but are not necessarily small and lightweight. In addition, most such appliances receive power from an electrical outlet and are sufficiently heavy that they must be mounted on a cart and wheeled from one location to the next. The both ways are time consuming as well as costly.

PROPOSEDSYSTEM

The purpose of our system “Portable ECG with web interface” is to design a working prototype of an ECG that acquires the electrocardiograph patients and sends it on cloud to a receiver unit such as computers and hospital monitors. This device will save time and effort for the doctors as well as nurses who are constantly following the patient’s condition and help them to operate more efficiently. At the same time, the goal of our system is to minimize the cost of the device so hospitals can afford one for every patient, especially the ones that are in the ICU. Wireless devices have the potential to significantly improve this situation by reducing the weight and size of such devices and eliminating the need for power or lead cables. The
invention relates generally to electrocardiograms (ECGs) and the use thereof, and more particularly to, a method and apparatus to remotely monitor patients using a portable ECG device with a wireless communication interface. It would therefore be advantageous if a physician, or health care provider, could supply a device to this type of patient that could expedite diagnosis and treatment by alleviating the embarrassment and time expense of showing up in an emergency department when in fact, no cardiac problem exists. This could eliminate not only the time involved in a patient going to the emergency room for indigestion, but also saves hospital resources and health insurance costs.

5. OTHER SPECIFICATIONS
5.1 Advantages:
As the proposed system is based on the IOT approach i.e Internet of Things so that it has many advantages over conventional or existing system.
1. Real time ECG tracking
2. Remotely patient health checkup is possible
3. Web based application makes transparent and easy.
4. Best web GUI.
5. Doctor can view the patient ECG report remotely.
6. Portable so that can be carried easily anywhere.
7. Affordable so any one can use.
5.2 Applications:
Our proposed system can be used for
1. Home users (Personal use)
2. Offices
3. Organization’s
4. Hospitals
5. Mobile hospital van

7. CONCLUSION

There is a growing demand for affordable, portable ECG machine. The remote monitoring of the patients proposes to tackle this problem, by using portable monitoring systems. So by choosing the appropriate components suitable for portable applications, portable ECG machine can be developed. It is especially required that these systems can perform reliable measurements, they have extended power autonomy, and also they are generic enough for reducing the costs.

REFERENCES

[11] [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4987424/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4987424/)