Healthcare Monitoring System Based On Pulse Sensor

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Abstract: Currently, several solutions are available for monitoring patient health using body sensors. In hospitals, healthcare wireless sensor networks (HWSNs) offer support to access these sensors to allow for continuous patient monitoring. Healthcare wireless sensor networks (HWSNs) are a specific field of wireless sensor networks when applied to healthcare solutions. In HWSNs it is important to have continuous access to the patients' sensors. This feature allows for close control over the patients' health. Then, if an abnormal behavior occurs in the monitored human parameters, the system can detect it and alert the medical staff immediately. In healthcare wireless sensor network, the sensors are attached to the patient for periodically monitoring of patient. In healthcare scenarios it is important that technology may be focused on the patients' quality-of-life. The use of HWSNs improves patients health monitoring. These technologies can be used for patient monitoring in both a real-time and continuous manner. The health monitoring is simplified by using MATLAB software. Patient uses MATLAB software to diagnosis the disease and giving the precaution to the patient instantly without any effort or any other torcher to the patient. This is very important to the patient like, who cannot walk or stand for long time and mostly for the critical condition patient who can't wait for a second.

Keywords: HWSNs, Healthcare Wireless Sensor Networks, Quality-Of-Life, MATLAB

1. Introduction

WIRELESS sensor networks (WSNs) technologies have risen to the top of research topics over the past few years. Currently, these networks are one of the most promising technologies for the future, including the Internet of Things vision. Several small sensors collecting data and sharing it wirelessly over the Internet are the fundamentals of the WSNs. These technologies are applied to solve several challenges in different areas like military surveillance, building structure monitoring, tracking animals, fire detection in forests, traffic monitoring, environmental monitoring, and healthcare solutions. Healthcare wireless sensor networks (HWSNs) are a specific field of wireless sensor networks when applied to healthcare solutions. This field is one of the most promising WSN applications. Nowadays, in hospital wards, the medical staff perform most of the monitoring tasks near the patients at periodic intervals. This behavior does not allow for real-time control over the monitored parameters and in some cases a tight control may fail in some parameters that need more attention. The use of small sensors (with bio feedback capabilities) attached to hospitalized patients could be the ideal solution to perform the regular daily monitoring tasks in real-time. HWSNs promote health control of human beings. The accuracy of this control may be the difference between life and death. Starting with this principle there are several variations between traditional and healthcare WSNs.

1.1 Principles of HWSN

Real-time monitoring. In HWSNs it is important to have continuous access to the patient's sensors. This feature allows for close control over the patient's health. Then, if an abnormal behavior occurs in the monitored human parameters, the system can detect it and alert the medical staff immediately. Random and continuous motion of sensor nodes. Due to the fact that sensor nodes are attached to

people with random and constant motion, the HWSNs should support fast and seamless mobility mechanisms. These mechanisms are the key point for real-time and continuous access to sensor nodes. Desirable long life of node's batteries. The sensor nodes depend on their batteries to stay alive. Reducing the waste of energy in sensor nodes' operations is crucial to increase their lifetime. So, the design of optimized algorithms and procedures to operate these devices is extremely important. The use of HWSNs can contribute to better life support system. As described above if these technologies can ensure a close monitoring of the patient's general health, they can reduce the time required to detect an abnormal situation when compared with traditional methods. Therefore, it can guarantee a more efficient service at healthcare facilities and help medical staff to anticipate timely abnormal health conditions that patients might suffer. The remote access to patients' data can also improve the collaborative work between physicians.

2. Overview

In the hospital, patient's have to wait long time to meet with doctor. In the case of critical condition patient can not wait. In any condition of patient's, they have to wait for appointment to the doctor then the patient can meet to the doctor. And then the patient getting the treatment and medicine through the doctor's prescriptions. Another problem in the existing system is patient want to me meet with the doctor he or she must go to the hospital.There is only one to one communication with the doctor only. For example like, first the patient's detect symptoms then they was gone to the hospital then taken appointment to meet the doctor for diagnosis then they was call by appointment number one by one. After this the patient had been given treatment by doctor.

Hence for this kind inconvenience to the patient there is need

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to develop a software that get a input via sensor like temperature, Blood pressure, pulse rate or any other sensor's. This provide predicted precaution to the user. The predicted precaution is in the text format so that user can read it whenever he want. For the critical condition patient who can't wait for a second. In this, patient is a user and we develop a software that get input from sensor's and provide precaution to the user or patient.

3. Discription

The environment in which we build our simulation model was MATLAB. The name MATLAB stands for matrix laboratory. MATLAB, developed by Math Works Inc., is a software package for high performance numerical computation and visualization. The combination of analysis capabilities, flexibility, reliability, and powerful graphics makes MATLAB the premier software package for scientific researchers. The most important feature of MATLAB is its programming capability, which is very easy to learn and to use, and which allows user-developed functions.

In this we simulate the environment in that user sent its symptoms like temperature, blood pressure reading, ECG, heart bit and etc., via sensor. We store the lot of database with the related symptom and form the association rule by using apriori algorithm. And get the prediction by giving the symptom of the user.

3.1 Modules

We will working on the hardware part of this system and we are only use pulse sensor for identification of the disease of the patient. Normally signals from the human body are weak hence in this the amplifier is used to amplify the signal and remove noise from signal. Then ADC is used to convert the analog signal to digital signal. Then perfect pulse rate is recorded. Module sequence:

- Attach the pulse sensor to the human body.
- Then pulse sensor senses the pulse rate.
- Pulse rate show which kind of diseases can be occurred in patients.

3.2 Workflow

From above workflow the patient is user which attaché the pulse sensor then pulse sensor sense the pulse rate and recorded it and then from association rules it check the other symptoms with the high or low pulse rate then for example if patient have high pulse rate then it check for symptom like dryness, hair loss, weight gain or weight loss then by using this system we get directly prediction like chances of hyperthyroidism, heart disease, lung disease, stress or any other disease.



Figure 1: Flow chart

3.2 Snapshots

The system for healthcare monitoring now works on part of hardware then now we have only software part. There are some snapshots which show the GUI of image upload option instead of real human body till up to when hardware part is in process this is for only visualization. After this pulse rate recorded in the pulse rate GUI by using interfacing with hardware part. Now, below snapshots show the output of the MATLAB coding which shows the first, second and third module. In this we use only pulse sensor because in medical science the doctors are proved the pulse rate is very important to monitor or detect the patient health condition. Your pulse rate is a measure of how fast your heart is beating. Most people measure this in terms of beats per minute. The average rate is usually between 60 and 100 beats per minute for adults. High pulse rate is also known as tachycardia.

The average resting human heart rate is about 70 bpm for adult males and 75 bpm for adult females. Heart rate varies significantly between individuals based on fitness, age and genetics. In other words, the pulse is an important measure of health and well-being. How hard the heart has to work during various activities can tell a lot about a person's overall physical condition.



Figure 1.2: snapshot of module

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worry about. A sustained high pulse rate might be a different story, however.When your pulse is high, sometimes you can feel your heart beating at a rapid rate. You might have the feeling of a pounding, forceful or racing heartbeat. Medically, these are known as palpitations. If the fast heartbeat continues or gets even faster, that can lead to problems. A high pulse rate can caught shortness of breath, dizziness, lightheadedness, fainting and chest pain.

3.3 Causes of High Pulse Rate

- Excessive Activity
- Medication Side Effects
- Caffeine
- Alcohol Consumption
- Electrolyte Imbalance
- Hyperthyroidism
- Thyroid
- Stress
- Depression

When your pulse is high, sometimes you can feel your heart beating at a rapid rate. You might have the feeling of a pounding, forceful or racing heartbeat. Medically, these are known as palpitations. If the fast heartbeat continues or gets even faster, that can lead to problems. A high pulse rate can caught shortness of breath, dizziness, lightheadedness, fainting and chest pain. Sometimes the reason for a high pulse rate is very simple: you had too much caffeine, or you ate something that didn't agree with you

3.4 Causes of Low Pulse Rate

A slow heart rate can be normal and healthy or it could be a sign of a problem with the heart's electrical system Changes in the heart that are the result of aging. Diseases that damage the heart's electrical system. These include coronary artery disease, heart attack, and infections such as endocarditis and myocarditis. Conditions that can slow electrical impulses through the heart. Examples include having a low. Thyroid level (hypothyroidism) or an electrolyte imbalance, such as too much potassium in the blood. Some medicines for treating heart problems or high blood pressure, such as betablockers, antiarrhythmics, and digoxin. Like this all the above or any diseases is detected in this proposed system by using only pulse sensor and by attaching it on wrist pulse. Hence we can use this system easily without any torcher given to the patient.



Figure 1.3: snapshot of module

4. Working

In this we run the coding matlab and use mysql for connectivity. From figure 1.1,1.2,1.3 & 1.3 it shows the snapshot of the first module which is the result of matlab coding and it is the gui of the image and pulse rate.then from figure it shows the sensor on the body and alert to patient that the sensor's are selected but it is an image and sensor on it because now the hardware part is in process hence instead of real human body we take image and sensor on it only for visualization. Now, after this from figure the snapshot shows the pulse rate value 92 and then by using our system firstly it cheak for wheather the pulse rate is high or low, then it alerts the pulse rate is high or low, then it alerts to patient that the patient may have Excessive Activity, Medication Side Effects.

Some heart ailments can cause your pulse rate to go up. High blood pressure, congenital heart disease, and aortic regurgitation are just a few of the problems with your heart that can lead to a high pulse rate. Lung problems such as pneumonia or emphysema can mean your lungs and heart have to work harder to get your blood to where it needs to be. This hard work of your heart meant that your pulse rate goes up.



Figure 1.4: snapshot of module

Then by using this system we can easily detect the other symptom like dryness, weight gain or loss, dizziness or any other then based on both like pulse rate and related symptom the exact result will be given to the patient.

5. Conclusion

In our simulation, we easily use MATLAB software with sensor interfacing for health monitoring system. And our proposed simulation provides textual information to the patient so that patient can read it whenever he wants. In this we get input from sensor's and provide precaution to the user or patient

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