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A Review on Health Assistant: Android Application for Fitness Support using Body Sensor Network.

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ABSTRACT: **Body area network (BAN) is a promising technology for real-time monitoring of physiological parameters of the patients. Particularly when the wireless technologies integrated with body area network provides complete telemedical infrastructure. The wireless BAN combined with an Android based smart phone offers a large functionality. Different medical parameters can be analyzed, store and visualized using the graphical user interface of an android Smartphone designed for the end user. The data is transferred to an android based Smartphone via Bluetooth. The system will continuously monitors the physiological parameter of the patient and if any variation occurred then send alert messages to the medical professional. An ever- growing range of wireless sensors for medical monitoring has shown that there is significant interest in monitoring patients in their everyday surroundings. We use wireless sensors and smart phones to monitor the wellbeing of high risk cardiac patients. Real-time ECG data is analyzed on smart phone and whether the patient needs external help or not is determined. Pre assigned caregivers and doctors are automatically alerted in case of emergency situation through the alert SMS. It is also used to give advice (e.g. exercise more).**

Keywords- **Body area network, Electrocardiogram(ECG).**

I. INTRODUCTION

In this busy lifestyle, fast moving, hectic times we live in bring along different health risks to the people's lives. Particularly, people are suffering from problems of stress, which includes severe disease such as impaired immune system, cardiovascular disease, asthma, peptic ulcer disease, indigestion, headaches, migraines and depression are some of the problems faced by today's people. Sometimes current state level is harmful to health is not understood by many people. Therefore it is necessary to have the stress issue under control and manage it somehow.[5]. In addition to this, the World Health Organization predicts that chronic diseases will become the most expensive problem faced by current health care system and sees the integration of prevention into health care as the main solution for this problem.[2].

In most hospitals system the problem is that the physician has to frequently visit the patient and determine his/her condition by measuring the parameters such as blood pressure, drip level, temperature etc.[4]. In case of emergencies, the nurse intimates the doctor through some means of communication like mobile phone. A innovative electronic monitoring devices selection is available, but meaningful communication and decision supports are also needed for both patients and clinicians. Medical monitoring, memory enhancement, Me- dical data access and communication with the clinicians in case of emergency situations through the SMS or GPRS can be provided by health care monitoring systems to help people. In United States Cardiovascular disease is the leading cause of death and is responsible for 17% of national health expenditure. In the year 2010, the total costs of cardiovascular diseases in the United States were estimated to be $444 billion.

An increasingly aging population, combined with decreasing hospitals capacities and rising costs of health care suggest that the current level of hospital care maintenance is becoming an increasing challenge. Adopting of mHealth technology (the technology in which mobile devices are used for delivering health services) is expected to improve the efficiency of healthcare service delivery, thus reducing the cost of healthcare. It describes the homecare environments as being dynamic and customized to a patient's particular situation. A homecare system sends monitoring reports, and state changes to health care providers and triggers alarms in case of emergencies.[6].

The essential component of mHealth is Body Area Network (BANs). BANs are miniaturized sensor networks, consisting of lightweight, ultra low power and wireless nodes, able to provide long term monitoring of physical and vital parameters. BANs monitoring systems would allow home monitoring of the patients, reducing the stays of patient in hospitals.[11].

Fig 1: BAN Architecture.

BAN is also called as Body Sensor Network (BSN). BSN is becoming very important aspect of human life and technologies based on BSN are increasing day by day. BSN technologies are mainly used in healthcare system. It is used as patient monitoring system. For medical monitoring system it requires some kind of hardware resources, sensors etc. also the network will be formed of sensors and hardware for solving the problems in healthcare system. BAN is built from sensor, battery and processor.[8]. For BAN various IEEE standards are available. IEEE 802.15.6 standard is for BAN. IEEE 802.15 standard is for low cost, low complexity, short range and also very low power consumption. Three aspects are presented by IEEE 802.15.6 standard which are physical layer(PHY), medium access layer(MAC), and security aspects.BAN is used for sensing the values from the body of patient. The sensors are attached on the body of patient. Those can be ECG sensor, motion sensor, heart rate sensor, pressure sensor, positioning sensor etc. To make the connection between the sensors and hardware device the wireless sensors are used.

II. LITERATURE SURVEY

Body sensor network based projects in healthcare focus on monitoring of set of physiological or particular disease. It benefits from stationary in-hospital observations, which allows patients to freely move and live their daily life while monitoring over longer times and under more realistic conditions.[2].

AMON[13] is a wrist-worn medical monitoring and alert system which is particularly used for high-risk cardiac respiratory patients. The system is connected to a medical center and it includes continuous collection and evaluation of several vital signs and smart medical emergency detection. The system is technically limited for heart monitoring, by the fact the device is worn on the wrist and therefore the ECG signal is very noisy and it is not suitable for diagnosing the cardiac abnormalities.

Choi et al. [15] Proposed a system for ubiquitous health monitoring in the bedroom using Wireless LAN and Bluetooth Network. The information gathered from sensors connected to the patient's bed is transmitted to a monitoring station outside of the room where the data is processed and analyzed.

Holter[14] monitoring device is used for capturing rhythm disturbances and it is most widely used technique for providing ambulatory cardiac monitoring. Holter device records the patient's ECG for 24 to 48 hours and then is subsequently retrieved and analyzed by a clinician [13]. The main drawback of this device is when a major incident occurs during the monitoring phase. It is recorded but no immediate action is taken to help the users.

MOLEC[12] monitor provides a solution that is capable of not only storing the ECG signal, but also it is an embedded real-time system that captures, processes, detects, analyzes and informs dangerous abnormalities to an alarm center in the hospital in case of high risk arrhythmias through the network from anywhere and at anytime. MOLEC analyzes the ECG locally on a PDA. MOLEC centre updates the centre's database with the information received from each of them. The alarm center receives all the risk alarms detected into the PDA, and reacts and immediately provide medical assistance.

Epi-medics[13] project is an intelligent ECG monitor that can record and analyze ECG signals, other sensor information and generate alarms. It can also be made personalized but this device cannot monitor the patient for 24/7. As directed by the heart specialist the patient connects the device 12 lead monitor periodically.

Our objective is to develop an application whereby using a various types of sensor a heart patient is monitored. Using a Bluetooth, sensor information is collected and transferred wirelessly to a smart phone. The solution analyses the ECG and other sensor data on the local device. The monitoring of a patient is personalized and patient's location can be detected in case of emergency.

III. PROPOSED SYSTEM

Fig 2. Shows an overview of an overview of fitness support system.

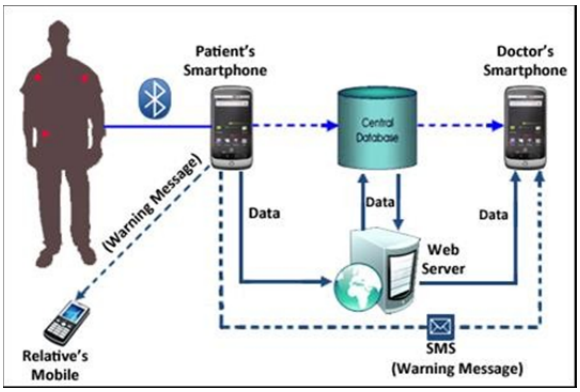

Fig 2: Basic Architecture of the system.

One or more sensors (e.g ECG, blood pressure) are attached to the patient's body. External devices are used such as a weight scale are used to collect periodically additional health data.

The sensors are Bluetooth enabled. The sensor data are processed on the smart phone and patient's wellbeing is monitored. And in case of emergency, automatically warning SMS is sent to the patient's caregivers or family members and to the doctor. The location of the patient is shown to the doctor to provide immediate healthcare solution to the patient.

Using the internet the data collected by the smart phone can be transmitted to the health care data server. To remotely monitor the patient, specialist can access the Data Server via a secure internet connection and if necessary update the threshold levels of the sensors. Relevant sensor data is stored in the patient's health record and can be used for further analysis.

A. Alert SMS System:

In order to handle the emergency situation of the patient alert SMS system is introduced. In the settings of user mobile phone a particular threshold value is set. Whenever the sensor readings are above the threshold value,

automatically the system will initiate the alert SMS to the patient's doctor and caregivers or family members. So that the proper medical care can be provided to the patient as soon as possible. Before sending the alert a countdown timer is initiated.

IV. CONCLUSION

In supporting wide range of application Body Area Network (BAN) will play important role. Combining WBAN and Android Smartphone offers a large functionality. Using this system it will be possible to monitor the patient remotely and to detect the heart problem locally on the Smartphone and if the patient is in danger situation doctor and family member will be contact automatically. In normal situation patient health record will be stored, which can be used for further analysis by a specialist.

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