

A REVIEW ON SMART HEALTH MONITORING SYSTEM

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Abstract— Health monitoring system offers a lot of benefits to people life especially for those who have chronic disease and need daily observation. This health monitoring system will improve quality of life. Information technology (IT) and wireless communication system has the potential to improve safety, quality and efficiency of health care. By this improvement of the technology, doctors and patients can easily access and use health information as needed.

Keywords—Health monitoring system, smart phone

I. INTRODUCTION

There are very few facilities available to keep record and monitor patient's health after patient is discharged from hospital especially for those who have serious illness. Patients that just got released from hospital, normally they need to be under doctor's observation for a certain period of time. This step is needed because we cannot expect what will happen to the patients after they have gone home. There are some cases, after patients went home, the disease returned and patient gets infected with new disease. We have to be alert with these cases because the sudden attack may cause death [1][2].

In the recent years the emergence of wireless sensor networks in the healthcare systems has significantly increased mainly in the areas like remote health monitoring, medical data access, and communication with the caregivers in emergency situations. Using WSN, we can easily design a simple but efficient system to monitor the conditions of patient continuously. Patients can be tracked and monitored in normal or in emergency conditions at

their homes, hospital rooms and also in Intensive Care Units (ICUs) [3]

Cardiovascular disease is the leading cause of mortality in the developed world. Cardiovascular disease refers to various medical conditions that affect the heart and the blood vessels. These conditions include coronary artery disease, heart attack, myocardial infarction (MI), angina, congestive heart failure, hardening of the arteries, stroke and peripheral vascular disease. The risk factors for developing cardiovascular diseases can be medical but also lifestyle related [4].

Major risk factors are:

- High Blood Pressure
- Diabetes Mellitus
- High Blood Cholesterol and other Lipids

Being overweight or obese also contributes to developing cardiovascular diseases. Obesity is becoming a major problem in developed countries

and the World Health Organisation (WHO) estimates that 1 billion adults are overweight and at least 300 million of them are obese [5][6].

II. OVERVIEW OF HEALTH MONITORING SYSTEM

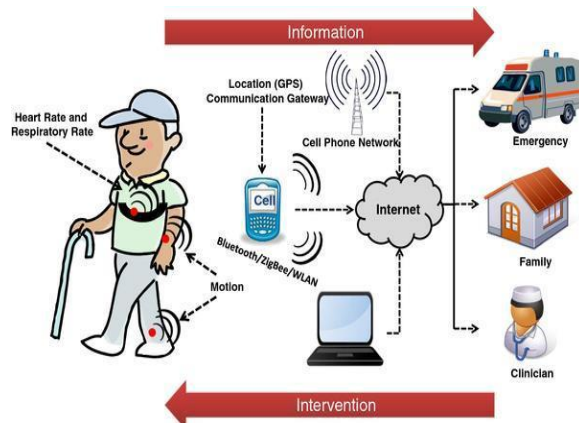


Figure. Remote health monitoring system
Emergency situations (e.g. falls) are detected via data processing implemented throughout the system and an alarm message is sent to an emergency service centre to provide immediate assistance to patients. Family members and caregivers are alerted in case of an emergency but could also be notified in other situations when the patient requires assistance with, for instance, taking his/her medications. Clinical personnel can remotely monitor patient's status and be alerted in case a medical decision has to be made.

III. WIRELESS MONITORING TECHNOLOGY

A wireless monitor displays graphics, video or any other computer-generated data using wireless signals with the help of a bridge that connects computer.

A. Bluetooth Technology

Bluetooth, which co-developed by Ericsson, IBM, Intel, Nokia and Toshiba, and other five co-developed companies, is low-cost, short-range wireless communications technology standards. Its purpose, via Bluetooth wireless module, is to make mobile phones, wireless information devices, handheld computers, personal digital assistants and other devices interconnect with each other, as well as desktop computers and office or home phone. This communication technology has clear

Wearable sensors are used to gather physiological and movement data thus enabling patient's status monitoring. Sensors are deployed according to the clinical application of interest. Sensors to monitor vital signs (e.g. heart rate and respiratory rate) would be deployed, for instance, when monitoring patients with congestive heart failure or patients with chronic obstructive pulmonary disease undergoing clinical intervention.

Sensors for movement data capturing would be deployed, for instance, in applications such as monitoring the effectiveness of home-based rehabilitation interventions in stroke survivors or the use of mobility assistive devices in older adults. Wireless communication is relied upon to transmit patient's data to a mobile phone or an access point and relay the information to a remote centre via the Internet.

differences between the traditional modes of communication, whose original intention is to achieve the same cost and safety of the general function of the cable to make mobile user free from the cable restraints. Compared with other wireless communication technology, Bluetooth technology has many properties, such as voice and data applications without the need to apply for permission to run in the 2.4 to 2.485GHz band, operating range up to 10m or 100m [7].

B. Wi-Fi Technology

Wi-Fi is a low-cost wireless communication technology. A Wi-Fi technology consists of a wireless router which serves communication hub as well as linking portable device with an internet connection. This network facilitates connection of many devices depending on the router configuration. These networks are limited in range due to the low power transmission, allowing the user to connect only in the close proximity. This network facilitates connection of many devices depending on the router configuration. These networks are limited in range due to the low power transmission, allowing the user to connect only in the close proximity.

C. ZigBee Technology

ZigBee is a wireless communication standard designed to address the unique needs of low-power, low-cost wireless sensor, and control networks.

ZigBee can be used almost anywhere, as it is easy to implement and requires little power to operate. Zigbee has been developed looking into the needs of the communication of data with a simple structure like the data from the sensors.

D. Wimax Technology

One of the important wireless technologies another technology is present that is called as Wimax technology. It is defined as a type of the wireless networking technology that is required to transmit the information in the form of microwaves through different type of methods of wireless networking from point to point or multi point access top the devices which are portable in nature. Wimax technology is categorized into two types that are Fixed Wimax and the mobile Wimax.

IV. PATIENT MONITORING ELEMENTS

Sensors are used in electronics-based medical equipment to convert various forms of stimuli into electrical signals for analysis. Sensors boost the intelligence of medical equipment, which provides life-supporting implants, remote monitoring of vital signs and other health factors.

A. Pressure sensors

Pressure sensors are used in anesthesia delivery machines, oxygen concentrators, sleep apnea machines, ventilators, kidney dialysis machines, infusion and insulin pumps, blood analyzers, respiratory monitoring and blood pressure monitoring equipment, hospital beds, surgical fluid management systems, and pressure-operated dental instruments.

B. Temperature sensors

Temperature sensors are used in anesthesia delivery machines, sleep apnea machines, ventilators, kidney dialysis machines, blood analyzers, medical incubators, humidified oxygen heater temperature monitoring and control equipment, neonatal intensive care units to monitor patient temperature, digital thermometers, and for organ transplant system temperature monitoring and control.

C. flow sensors

Applications for flow sensors include anesthesia delivery machines, oxygen concentrators, sleep apnea machines, ventilators, respiratory monitoring, gas mixing, and electro-surgery, in which high-frequency electric current is applied to tissue to cut, cause coagulation, desiccation, or destroy tissue such as tumors.

D. Image sensor

Image sensor applications include radiography, fluoroscopy, cardiology, mammography, dental imaging, endoscopy, external observation, minimally invasive surgery, laboratory equipment, ocular surgery and observation, and artificial retinas.

E. Accelerometers

Accelerometers are used in heart pacemakers and defibrillators, patient monitoring equipment, blood pressure monitors, and other integrated health monitoring equipment.

F. Biosensors

Biosensors find applications in blood glucose and cholesterol testing, as well as for testing for drug abuse, infectious diseases, and pregnancy.

G. MEG and MCG systems

Magneto encephalography (MEG) and magnetocardiography (MCG) systems use superconducting quantum interference devices or SQUIDS. These highly sensitive magnetometers measure extremely weak magnetic fields and are used to analyze neural activity inside the brain.

H. X-ray machines

Encoders can be found in X-ray machines, magnetic resonance imaging (MRI) machines, computer-assisted tomography equipment, medical imaging systems, blood analyzers, surgical robotics, laboratory sample-handling equipment, sports and healthcare equipment, and other noncritical medical devices.[8][1][3][6].

V. SMART PHONE

Smart phone has open operating systems, such as Plam OS, Windows Mobile, Symbian, and Linux and scalable hardware- software multi-function , its operating system can support third-party software installation. Smart phone system architecture mainly consists of three components: the hardware layer, mainly by the accessories, network connections, wireless modules, I / O port, memory and CPU peripheral devices worldwide.

On the hardware layer, there is software platform, in addition to an open operating system, but also has some applications, such as communications software, simulator software, browser software, software development, etc. It should also have the appropriate hardware drivers. About software layer, there is a client layer, which can manage documents and data and control a variety of applications, aiming to optimize and coordinate the various parts of the whole system. With the continuous progress of science and technology, and now smart phones apart from phone calls, send text messages, Internet and other basic functions, it can also be used to control other devices, with a strong intelligence, and began to move closer to the PDA Pocket PC and to achieve a combination of both to further expand its applications. Smart phones for wireless medical monitoring, has a strong application prospects [7].

VI.CONCLUSION

Recent advances in micro-electro-mechanical systems (MEMS) technology, wireless communications, and digital electronics have enabled the development of low-cost, low-power, multifunctional wireless sensor nodes that are small in size and communicate untethered in short distances. These tiny wireless sensor nodes, which consist of sensing, data processing, and communicating components, leverage the idea of

sensor networks based on the collaborative effort of a large number of nodes. The efficiency of hospital staff is increased by using some of these newly available applications and tools. In the healthcare field, issues such as long-term patient care in hospitals, support for elderly people at home and in an ambulatory environment are being discussed in the realm of wireless sensor networks.

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