



DESIGN A HAND HELD ULTRASOUND DEVICE FOR DETECTING BRAIN TUMORS

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ABSTRACT

The healthcare monitoring systems has emerged as one of the most vital system and became technology oriented from the past decade. Humans are facing a problem of unexpected death due to various illness which is because of lack of medical care to the patients at right time. The primary goal was to develop a reliable patient monitoring system with portable blood clot identification. so that the healthcare professionals can monitor their patients, who are either hospitalized or at home using an embedded based integrated healthcare system with the view of ensuring patients are cared for better. A mobile device based healthcare monitoring system was developed which can provide real time online information about physiological conditions of a patient mainly consists of sensors, the data acquisition unit, microcontroller. Hence the proposed architecture collects the sensor data through PIC16F887 microcontroller.

Keywords: Sensors, Microcontroller, Brain Tumors and Patient.

1.INTRODUCTION

Blood is an essential component of the human body; therefore, the loss of this fluid, particularly in large amounts, can be life-threatening. To protect the body against the potentially devastating effects of blood loss events, several vascular mechanisms and biomolecules can be employed to generate a blood clot. Despite the crucial role of blood clots in preventing blood loss, the development of specific blood clots like a thrombus or embolus can have deadly effects. Whereas a thrombus is a blood clot that forms inside the veins or arteries, the detachment of this clot from one location in the body to another is referred to as an embolus. Both thrombi and emboli can prevent the adequate flow of blood through a blood vessel, thus reducing the ability of oxygen to reach these tissues. Some of the most clinically significant blood clots in the heart can lead to conditions including deep vein thrombosis, pulmonary embolisms, mesenteric venous thrombosis, strokes, and heart attacks.

2. PROBLEM DEFINITION

There are many patients, who are in chronic condition and need long-term and ongoing health care [81]. Elderly people also prefer to stay in their own homes where they can have the right to use of public support, shopping, transportation services, social activities, and health care when they needed [75]. They need to have medical treatment at their doors, from the doctors in case of any emergency or abnormality in the working of heart. Therefore, many elderly people wish to remain as independent as possible in their own home for as long as possible [30]. It is not possible for the elderly heart patients to visit their doctor every day for regular checkup or any laboratory test. They are too weak to attend the hospital appointment regularly. On the other hand, patients have behavior to avoid from the visiting to the care provider [38]. Sometimes there is much crowd in clinics and hospital and patient have to

wait for long time of their turn, which is also problem for patients [28, 8]. Heart monitoring system (Holter Monitor) is used for heart patients to get heart electrical activity data for analyzing their previous condition. The heart monitoring system is attached with the patients and after few days, the patients have to go to the hospital and cardiology department, the holter monitor attached with the system to get heart electrical activity data of the patients for analyzing. Although some time heart diseases, e.g. heart attacks become very dangerous and fatal and these should be controlled immediately but through the current Holter Monitor, it takes a time to know about any abnormality in heart. Sometimes even patients can not inform to the doctors during such serious attack. Therefore, the above mentioned challenges and problems have contributed the significant role in our research study and encourage us to do research for IDSS (Intelligent Decision Support System) based heart monitoring system to save the life of elderly heart patients from any emergency. Therefore, medical resources such as budget, life and time as well can be saved and can be utilized for constructive activities. Patients may have a lot of time to spend with their relatives and friend instead of in hospital because human beings are social animal and they want to interact with each other.

3. OBJECTIVES

The tools based on ICT (Information Communication Technology) are being used widely in healthcare domain for communication, exchange, storage and other activities regarding patient health. However, in case of emergency, the problem becomes more critical and dangerous when there have to access the patient's information in time for providing health care. We assume that the elderly citizens, who are heart patients and the doctors as well, will get great benefits by using the proposed IDSS based solution in future. The main goal of the study is to propose that how to monitor the chronic heart disease for elderly heart patients through intelligent support system. To achieve this goal, there are some following steps.

To find out the difficulties facing by elderly people in using current heart monitoring system.

Through literature study, questionnaire and interviews, we will find out the shortcoming in current heart monitoring system and why there is a need of intelligent heart monitoring system for elderly heart patients.

To know, what has been done until now for elderly heart patient people in e-health domain?

To evaluate and validate the effectiveness and consequences of the proposed intelligent heart monitoring system through case study.

4. LITERATURE REVIEW

DEVELOPMENT AND CLINICAL EVALUATION OF A HOME HEALTHCARE SYSTEM MEASURING IN TOILET, BATHTUB AND BED WITHOUT ATTACHMENT OF ANY BIOLOGICAL SENSORS

Daily monitoring of health condition at home is important for an effective scheme for early diagnosis, treatment, and prevention of lifestyle-related diseases such as adiposities, diabetes and cardiovascular diseases. While many commercially available devices for home health care monitoring are widely used, those are cumbersome in terms of self-attachment of biological sensors and self-operation of them. From this viewpoint, we have been developing a non-conscious physiological monitoring system without attachment of any sensors to the human body as well as any operations for the measurement. We developed some devices installed in a toilet, a bath, and a bed and showed their high measurement precision by comparison with simultaneous recordings of ordinary biological sensors directly attached to the body. To investigate that applicability to the health condition monitoring, we developed a monitoring system in combination with all the monitoring devices at hospital rooms and previously carried out the measurements of patients' health condition. Further, in this study, the health conditions were measured in 10 patients with cardiovascular disease or sleep disorder. From these results, the patients' health conditions such as the body and excretion weight in the toilet, the ECG during taking the bath and the pulse and respiration rate during sleeping were successfully monitored in the hospital room, demonstrating its usefulness for monitoring the health condition of the subjects with cardiovascular disease or sleep disorder.

INTELLIGENT WIRELESS MOBILE PATIENT MONITORING SYSTEM

Nowadays, Heart-related diseases are on the rise. Cardiac arrest is quoted as the major contributor to the sudden and unexpected death rate in the modern stress filled lifestyle around the globe. A system that warns the person about the onset of the disease earlier automatically will be a boon to the society. This is achievable by deploying advances in wireless technology to the existing patient monitoring system. This paper proposes the development of a module that provides mobility to the doctor and the patient, by adopting a simple and popular

technique, detecting the abnormalities in the bio signal of the patient in advance and sending an SMS alert to the doctor through Global System for Mobile(GSM) thereby taking suitable precautionary measures thus reducing the critical level of the patient. Worldwide surveys conducted by World Health Organization (WHO) have confirmed that the heart-related diseases are on the rise. Many of the cardiac-related problems are attributed to the modern lifestyles, food habits, obesity, smoking, tobacco chewing and lack of physical exercises etc. The post-operative patients can develop complications once they are discharged from the hospital. In some patients, the cardiac problems may reoccur, when they start doing their routine work. Hence the ECG of such patients needs to be monitored for some time after their treatment. This helps in diagnosing the improper functioning of the heart and take precautions. Some of these lives can often be saved if acute care and cardiac surgery is provided within the so-called golden hour. So, the need for advice on first-hand medical attention and promotion of good health by patient monitoring and follow-up becomes inevitable. Hence, patients who are at risk require that their cardiac health to be monitored frequently whether they are indoors or outdoors so that emergency treatment is possible. Telemedicine is widely considered to be part of the inevitable future of the modern practice of medicine.

THE REAL-TIME MONITORING SYSTEM FOR IN-PATIENT BASED ON ZIGBEE

The system is made up of two sub-systems: patient physical states data acquisition and communication system based on ZigBee technology, and hospital monitoring and control center. The patient physical states data acquisition and communication system monitors the main physical parameters and movement status continuously. The information from data acquisition system is sent to hospital monitoring center by ZigBee wireless communication module. The monitoring center receives the information from each patient and save them to the database, and then judges the states of the patient by fuzzy reasoning. The data from the patient can be displayed as a graph or numeric on the monitor if it is necessary, and then the doctor can diagnose the patient according to the recorded continuous data. Wireless sensor network is made up of a lot of wireless sensors based on ZigBee technology. The ZigBee technology provides a resolution for transmitting sensors' data by wireless communication. ZigBee technology can transmit data with a rate of 250kbps, and then it is enough for the physical parameters of the patient. The communication distance of ZigBee node can be over 200 meters and can be spread by add route node, and then ZigBee technology is suited to a short distance wireless sensors network. ZigBee technology owns many virtues, such as low power consumption, low cost, small size, free frequency, etc. To know the physical states of in-patient, the physical parameters need to be monitored real-time. The traditional medical test instrument is a large size and connected by wire often, and the patient is required to be quiet during the test. In most of the hospital, the medical instruments need to be read by doctor or nurse, and the physical parameters are tested and recorded one or two times each day, the real-time monitoring is expensive for most of the patients, and can be only acquirable for ICU by a nurse. For this reason, the worsening of patient can't be found in time, and then the patient can't be helped in time. For most of the patients can be monitored real-time in hospital, we should find a new method. Consider that the movement of the patient is limited in hospital, we adopted the ZigBee and wireless sensors network to acquire the physical parameters of the patient.

5. Existing System

In the existing system, we use active network technology to network various sensors to a single PMS. Patients' various critical parameters are continuously monitored via single PMS and reported to the Doctors or Nurses in attendance for timely response in case of critical situations. The sensors are attached to the body of the patients without causing any discomfort to them. In this PMS we monitor the important physical parameters like body temperature, ECG, heart beat rate and blood pressure using the sensors which are readily available. Thus, the analog values that are sensed by the different sensors are then given to a microcontroller attached to it. The microcontroller processes these analog signal values of health parameters separately and converts it to digital values using ADC converter. Now, the digitalized values from more than one microcontroller are sent to the Central PMS. Each of the sensors attached microcontroller with a transceiver will act as a module which has its own unique ID. Each module transmits the data wirelessly to the gateway attached to the PC of the Central PMS. The gateway is attached to the PC i.e. Central PMS which is situated in the medical center, is capable for selecting different patient IDs and allowing the gateway to receive different physical parameter values the patient specified by the ID. The software designed using Graphical User Interface (GUI) can operate on different physical parameters of each patient, consecutively with a specified time interval for each patient. At any time, any of the doctors or nurses can log on the

Central PMS and check the history of the observed critical parameters of any of the patient attached to the network.

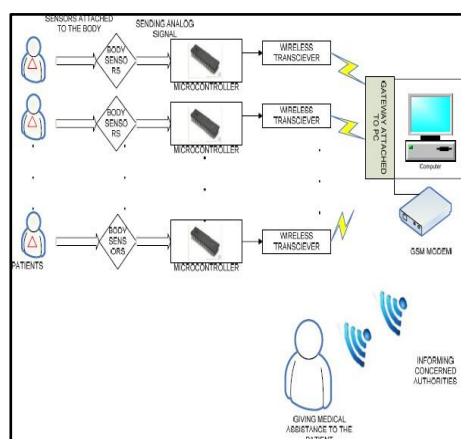


Figure 1: Existing System

In case of a critical situation which requires the immediate attention of the doctors or nurses for any of the patients, the custom software will instruct the Central PMS to enable the GSM modem to send an SMS with the patient ID. A voice call is also made to the doctors and the staffs of the hospital. The SMS also consists of a status of the patient's physical condition. With the help of the patient ID, the doctor can easily identify and attend to the patient situation.

6. PROPOSED SYSTEM

All the sensors details are read by Microcontroller and displayed in LCD display. Power supply is given to all the components. Sensors values are shared with IOT module. Through the internet connection all the details are update in thing speak website. Social distancing is done using ultrasonic sensor. Medicine remembrance is Implemented.

Requirement Analysis is the first and important phase of the software developing activity in developing any kind of project effectively.

SOFTWARE SPECIFICATIONS

Operating System: Windows 7 or higher
 Platform: IoT Cloud
 IDE: CCS compiler, Arduino
 Technologies used: Embedded C

HARDWARE SPECIFICATIONS

Microcontroller: PIC controller, Node MCU
 Sensors: Temperature, Heartbeat, Ultrasonic Sensor
 Processor: Pentium IV or higher
 Processor speed: 1.6GHz
 RAM: 512 MB
 Disk Space: 250 MB or higher

7. CONCLUSION

The remote patient monitoring system was researched, designed and presented the concept of the Internet of things. Personal physiological data from the patient is collected that simulates blood clot identification, heartbeat, respiration level and pressure. The readings are collected in a simple cloud database and can be viewed remotely by a doctor or Healthcare giver. The data can also be used in research on medical issues affecting the covid. The main objective of the experiment was successfully achieved. All the individual modules like Heartbeat detection module, pressure and respiration level etc. and remote viewing module gave out the intended results. The designed system

modules can further be optimized and produced to a final single circuit. More important fact that came up during project design is that all the circuit components used in the remote portable blood clot identification and health detection system are available easily.

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