INTELLIGENT HEALTH CARE SERVICES BASED ON IoT

R.Revathi, S.Vijani ,S.Vijanu

AVS Engineering College, Salem

ABSTRACT

Now-a-days global ageing and the prevalence of chronic diseases have become a common concern. Many countries are undergoing hospital restructuring by reducing the number of hospital beds and increasing the proportion of home healthcare. A promising trend in healthcare is to move routine medical checks and other healthcare services from hospital (Hospital-Centric) to the home environment (Home-Centric). By doing so, firstly, the patients can get seamless healthcare at anytime in a comfortable home environment; secondly, society's financial burden could be greatly reduced by remote treatment; thirdly, limited hospital resources can be released for people in need of emergency care.

In-home healthcare services can drastically reduce the total expenditure on medical care or treatment. In addition to physical needs, aged people have many psychological and social difficulties that they will be dependent to the family or the nurse who may cause stress and depression which in turn decrease their confidence. So designing devices and equipments to increase their independency is very important .Therefore, it is urgent in the near future for the healthcare industry to develop advanced and practical health-related technologies and services by leveraging information and communication technology (ICT) and apply them directly in the home environment. Therefore, it is urgent in the near future for the healthcare industry to develop advanced and practical health-related technologies. Drug management system that is considered in this work, make it possible to deliver drugs to the patient on time and without the presence of the nurse. This kind of system is safe and more effective.

INTRODUCTION

The world's population is growing old. So programmers, municipals and socialists pay more attention to secure these peoples' needs. By leveraging information and communication technology (ICT), and apply them directly in the home environment.

In order to track the physical status of the elderly and in the meanwhile keep them healthy, the following two daily tasks are essential: 1) real-time monitoring and analyzing vital signs to early-detect or predict life-threatening adverse events, 2) checking whether they are following their prescribed treatment, including taking their prescribed medicine on time. However, with rapidly aging populations, these daily tasks have brought great pressure and challenges to global healthcare systems. One review estimates that about 25% of the adult populations do not adhere to their prescribed medication, which may lead to poor health outcomes and increased mortality. Poor medication adherence is a major problem for both individuals and healthcare providers. Technology improvements in healthcare facilities and services are highly desirable to meet the requirements of this giant group. In the meantime, Internet-of-Things (IoT) has been recognized as a revolution in ICT since it started at the beginning of the 21st century.

The provision of personalized services in healthcare is also being considered significant with the advent of ubiquitous computing environment, a variety of mobile devices that come along with many sensors, such as smart phones or tablets, has become now popular. Mobile devices enable us to obtain with ease contextual information about the surrounding environment of individuals, such as sensor data, location, call and text history, and application usages statistics. So various applications were built that provide personalized healthcare services by gathering sufficient data to be processed about each individual from mobile lifelog collectors such as smart phones or tablets that users always have in hand and by analyzing the personal data to improve the medical services. Personalization in various medical applications has a crucial drawback, however, since it highly relies on information collected from smart phones. It is difficult to analyze and utilize lifelog data in a smart phone because smart phones are still lagging behind desktops in computing power and have much lower storage space. Moreover, since a smart phone itself can be easily changed or lost, the enormous loss of lifelog data or the disclosure of sensitive private information can frequently happen. Therefore it is natural to suggest a system and protocol of sending sensitive lifelog data collected from smart phones to a safe, stable, and powerful server in a very secure and reliable way in order to

enable us to make use of lifelog data and to prevent the leak of personal information.

The term Internet of Things has recently become popular to emphasize the vision of a global infrastructure of networked physical objects. Although this vision is compelling, no consensus exists about how to realize it. The Internet of Things is partly inspired by the success of RFID technology, which is now widely used for tracking objects, people, and animals. RFID system architecture is marked by a sharp dichotomy of simple RFID tags and an extensive infrastructure of networked RFID readers. This approach optimally supports tracking physical objects within well-defined confines (such as warehouses) but limits the sensing capabilities and deployment flexibility that more challenging application scenarios require.

We're working toward an alternative architectural model for the Internet of Things as a loosely coupled, decentralized system of smart objects — that is, autonomous physical/digital objects augmented with sensing, processing, and network capabilities. In contrast to RFID tags, smart objects carry chunks of application logic that let them make sense of their local situation and interact with human users. They sense, log, and interpret what's occurring within themselves and the world, act on their own, intercommunicate with each other, and exchange information with people.

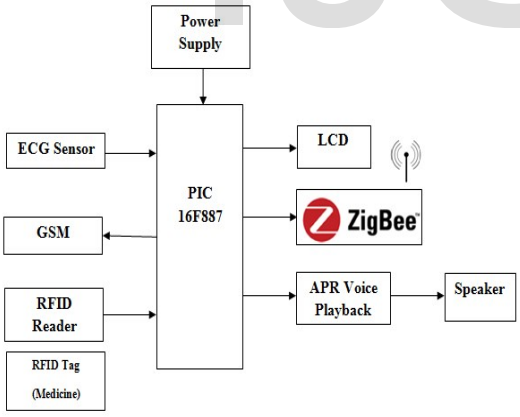

Figure iMedBox

WORKING PRINCIPLE

With the use of PIC microcontroller, the system has been designed that can deliver drugs to the patient on time and to check patient's bio-parameters without the presence of the Nurse. PIC microcontroller has 200 ns instruction execution, 256 bytes of EEPROM data memory. It has been already programmed to take the correct medicine on time in order to avoid the abnormalities in the patient. The proposed system consists of two sections which are iMedBox and care section.

The iMedBox is the central platform of the iHome Health-IoT system. The inspiration for the iMedBox comes from the traditional in-home medicine container. The difference lies in the fact it is equipped with a high performance and open platform-based tablet PC and wireless transmission units, so the

iMedBox is fully function as a medication inspector, and an on-site examiner for daily monitoring . An ultra-high frequency (UHF) RFID reader, a high frequency (HF) RFID reader, a Wi-Fi unit, a Zigbee receiver, and a tablet PC with extension ports are embedded into the lid. A high resolution weight bridge sensor is integrated in the bottom of the iMedBox to track the weight variation of the medicine stored in the box, and based on which the dose of medication taken by the patient can be calculated. Wearable medical sensors (e.g., Bio-Patch), intelligent medicine packages, as well as the sensors/devices from third

parties can be connected to the iMedBox via various wireless technologies. The iMedBox can serve as an in-home healthcare gateway to gather patients' physiological information, and it can deliver a variety of services such as on-site analysis, health social network, telemedicine, emergency and medication management services.

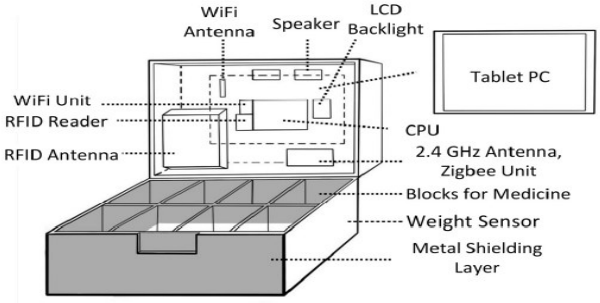

Figure Hardware Architecture and Interfaces of the iMedBox

The iMedBox contains separate blocks such as Wi-Fi antenna, RFID Reader, RFID Antenna, Speaker, LCD. It consists of separate blocks for storing the medicines. To access the iMedBox the patient need to show the unique identity card. Once the patient card verified they can take the medical process. In the iMedBox array of sensor interfaced with microcontroller to monitor the patient ECG. In this heart rate of the patient is continuously monitored. When there is any abnormality in the ECG it will be indicated to the patient's relative's

mobile with the help of GSM. The sensed values continuously updated in monitoring section through the Zigbee.

To take a exact medicine RFID technology is used here. It automatically identify and track tags attached to objects. The tags contain electronically stored information. It operates at hundreds of meters from the reader. Unlike a barcode, the tag does not necessarily need to be within line of sight of the reader, and may be embedded in the tracked object. Radio frequency identification (RFID) is one method for Automatic Identification and Data Capture (AIDC). Each medicine sticks with RFID tag. Once the patient takes the wrong medicine the reader detects it and inform through the speaker. When the patient does not take the medicine it will be indicated through the speaker..

The ECG value of the patient is continuously displayed on the LCD.So that the details of the patient can be seen by any one.The status of the system displayed on LCD. The Care section is used to monitor the patient details in the hospital by using the Computer. The information of the patient is transmitted through Zigbee. The information of the patient is monitored continuously. So the details of the patient can be updated at any time.

CONCLUSION

In recent decades, the rapid growing of ageing population has been a challenge to global healthcare systems. Many countries have been active in undergoing hospital restructuring through optimizing medical resources and increasing the use of home healthcare. This work presents an IoT-based intelligent home-centric healthcare platform (iHome system), which seamlessly connects smart sensors attached to human body for physiological monitoring and intelligent pharmaceutical packaging for daily medication management.

It also offers multiple opportunities to adapt a wide variety of e-health applications with minimum changes. Examples include the scenario of assisted living for people with disabilities, where users can interact with smart objects, such as home appliances, and environmental sensors etc., deployed in a home environment to ensure their health and well-being. An ultra-low power, tiny-size, application-specific integrated circuit has been developed to measure ECG. By connecting the iMedPack, Bio-Patch, and the back-end services through a wireless link, the iMedBox can deliver various services, including real-time bio-signal monitoring,local analysis and alarm, remote diagnosis and prescription, as well as medication non-compliance control.When the health condition of patient is abnormal then it is automatically indicated to the relation by using GSM.

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