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Elder Health Care Android Application

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Abstract - In this paper, an elder care system is introduced according to the present situation of the countryside. In this system, smart mobile phone and pad with LBS service enabled are used for personal and family data collection which is used for care system configuration and setup; ZigBee technology with IEEE 802.15.4 standard is used for timely communication of the care node and care center with economic advantages. It can collect the specified physiological data of the elders and environment information of their living places, provide health advises and alert according to the specified configuration, report the situation to the family members and community management organization, start emergency processing with certain settings.

Key Words*: *health care system, wearable devices, care notification system

I. INTRODUCTION

According to the WHO report, the world average lifespan was 68. In several cities of China, average life expectancy has exceeds 80. More than two thirds of elders over 65 years old will need long term care and the term averagely lasts more than three years [1]. To keep the pace with the average lifespan increase, convenient and high quality long term care has been more and more important. In the countryside, medical treatment facilities and institutions are not popularly available, even the internet access are very limited which make the basic data collection difficult. On the other side, due to the one-family-one-child policy, less family members can take care of the elders, elders are easy to get lost and forget to take the necessary medicines, and they also have some psychological problems because of being lonely at home for long time. Telecommunication, information, wireless network and sensor technologies has made it feasible to collect data through radio communication, monitor and care the elders remotely and timely, report the care statue and send alert the carers. This System considers from the plan phase of the care system which will collect the elders' family and personal data mainly with thehelp of LBS services to better setup and configure the care system; in the running phase, the system collect the data from ZigBee network, monitor the care nodes, report the health and care status to the careers, handle the emergency problem [2].

II . SYSTEM ARCHITECTURE

The system architecture is shown in the Figure 1.It includes three parts: Care Nodes; Care Centers; Carers[3].

A. Care Nodes

Care Nodes include the elders and their living and activity places. The data collection from the care nodes are made up oftwo phases: plan phase and Implement phase.

They will use different technologies.

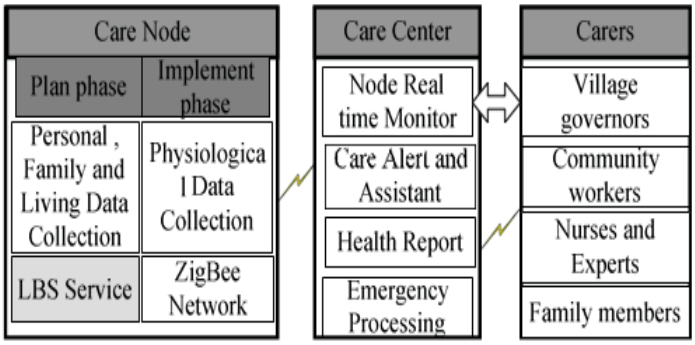

Figure 1. Architecture of the Countryside Care System

1)Plan phase:

In this phase the system will collect the elders' family and personal data. Though the countryside elders live, play and sports in a much closed area, the elders from different family have different care status. Some of them have the children living nearby, some of them live alone. The availability of the children's assistant is an important factor to the care system. The locations of the elders can help the governors and community works well construct and build the elders' room, arrangement the on door care visit, and volunteer life assistant activities [4] .These kinds of data is respectively fixed, once it is collected, it will not change frequently, so the work can be implemented by the planners, usually the community workers door by door. The data will be collect through the application of the smart mobile phone with LBS services enabled. The data to collect in However, most wearable devices passively receive data now, users must use the corresponding software or APP to view the collected data report. To those dementia users who cannot use the app conveniently, once the emergency happens,their caregiver cannot grasp the situation immediately. In orderto satisfy the appeal, the health care system in this study not only develops passive care system to notify the caregiver, but also add care notification system as proactively system to helpthe other users to manage their health status[5].

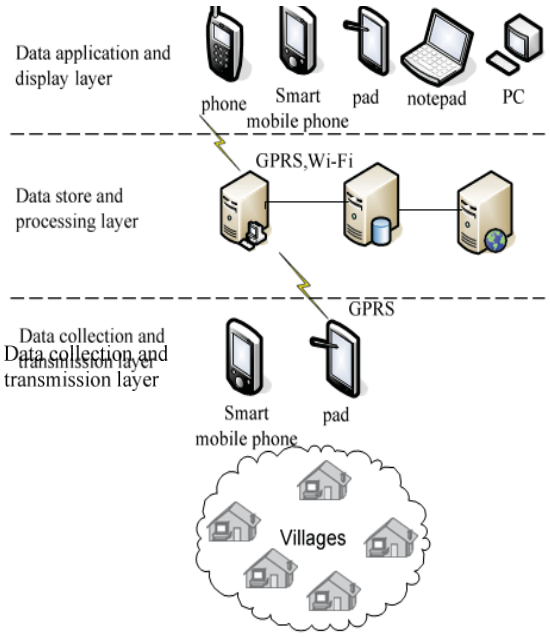

Figure 2. Network of the Countryside Care System

With the data input analysis from this phase, some elders' room will be built in the village, where all the elders of the village can make activities and get the physiological data like blood pressure and blood sugar through the shared specific machines and sensors[6].

2)Implement phase:

In implement phase, care system will collect frequently from the living place, elders' room, elders and other activity places. ZigBee technologies based on IEEE 802.15.4 can be used for the data collection as replacement, as shown in Figure

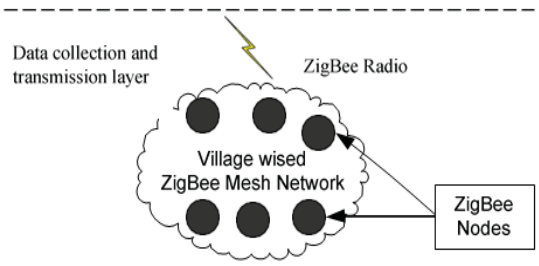

Figure 3. Data collection and transmission layer in implement phase

ZigBee network is lower power; the nodes can setup the network freely and flexibly. According to IEEE 802.15.4 standard, ZigBee network has five topologies:

- Star
- Tree
- Mesh
- Tree-mesh Combination
- Cluster Tree

The mesh network has several advantages as follows: Robust, multi-hop communication that exploits multiple path; Network diameter not necessarily fixed; Per-hop latency is minimal. The care center need to deal with the home automation remote control from the living places, collect and transmit data from elders' room and elders wearing ZigBee node, so it selects mesh topology [7].

There're FFD and RFD nodes in the network respectively. Some FFD nodes play the role of the coordinator and routers inthe network, to communicate with other nodes or network [2]. It can also be extended to other village if the distance and nodes number meet the requirement.

The data to collect in this phase are shown in Table II. The data are come from the ZigBee network with the support of various sensors. Videos will also be used limitedly for special elders.

TABLE II. DATA DESCRIPTION

Data Type	Data Items	Data Description
Personal Data	Career ID	Personal Data
	Medicine Track	
	Position	
	Blood Pulse	
	Blood Pressure	
	Blood Sugar	
	Family connection	Family Data
	Social connection	
Living Data	Temperature	Health environment assistant
	Moisture	
	Airiness	
	Door and Windows control	Security environment assistant
	Electric and Gas control	

***A.** Care Centre:*

Care center can be setup for several villages according the nodes distribution. It receives the data from the collectors and sensors; store it into the data processing and database server; format it according to industrial standards; convert it into the human words for daily monitor; send control and alert the care nodes, provide care assistant to the care nodes; send the report to the careers. As shown in Figure 2, it belongs to the data storeand processing layer of the care system[8].

***B.** Careers*

The careers include village governors, community workers, nurses and experts, family members. According to different role rights, they can monitor the daily status of the elders, watch the health report, and take part in the assistant and emergency processing. As shown in Figure 2, it belongs to the data application and display layer of the care system.

III.CALL CENTER USER INTERFACE

After the data are the collected, the care center will format and process them, then provide the user interface to the careers to care the elders. The user interface frame is shown in the Figure 4. The careers can access the user interface through web, wrap pages, short message and multimedia messages. The care notification system contains three main functions. First, abnormal physiological measurement. The user can update their vital signs such as pressure, heartbeat by wearabledevices or input blood sugar, uric acid by themselves. The health care system can immediately transmit abnormal physiological values to the care notification system through thedefined API format[9].

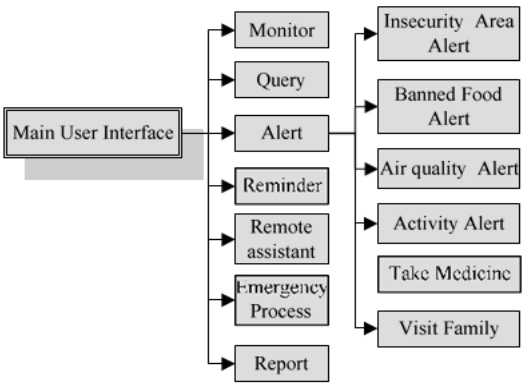

Figure 4. Care Centre User Interface

A. Monitor

Every elder's living status and health status can be viewed according the different security level of the user. It also provides the remote monitor for the family members.

B. Query

Users can query the information by ages, sexes, illness and time.

C. Alert:

There are several kinds of alert can be setup according to different care requirement.

Insecurity Area Alert: Elder people have the possibility to enter the insecurity areas. According the position data, the care center can configure the insecurity areas, while the elders go close to these areas, the center send out the alert.

Banned Food Alert: Many elder people have some chronic, they need take care of the foods which are not good for their health. The user interface provides the alert if banned food is detected[10].

Air quality Alert*:* The center will monitor the air qualityof the care nodes, including temperatures and moistures of the room, if the date of the node is abnormal, the center will send alert to the cares.

D. Reminder

1.Take Medicine:

Elders often forget to eat the medicine. The center can remind the elder to take the medicine according to career's configuration.

2.Visit Family

The family members sometimes will be too busy to pay a visit to the elders. The center will send out alert to the elders' children or friends in the cares to visit their family frequently.

E. Remote assistant

According to the monitor status, the center can send the remote control command to help the elders to open or close the door or windows, switch off the electric and gas for security consideration.

Some elders will lose the way sometimes, if they met such problems, they can press the specified key on the wearing ZigBee system, and then the call center will know the location of the elder to help them back.

F. Emergency Process

The elder can send emergency request from the nodes with feature specified key to ask help, the center will start the pre- set emergency processing according the request.

G. Report

The center will provide the statically distribution report on elders' location, age, sex, illness respectively. Daily monitor report to the cares.

IV.CONCLUSION

The authors of this paper propose and design elders data collection in such a way that overcomes the difficulties of the information technology in the medical field of countryside. Our goal is to help elder people get Medicaid as quickly and effectively as possible. In two phases of the elder care system, LBS services and ZigBee based network are used respectively. The advantage is that the system can collect the data in real time, can extend the care nodes and care data without construction rebuilt. It can work reliable and economically. A model of this system has been implemented in the urban villages of Ningbo china. The data collection layer improves the community work efficiency verywell, it relieves the workers from a lot of paper work and on spot visit. It also connects the family member closer.

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