

A study on the u-Healthcare System in LBS

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Abstract— *This paper is a study on the u-Healthcare System in LBS. LBS is the service which can help to detect the location of patient. Using LBS, we recognize status and information of patient quickly and accurately. It can ready for accurate treatment immediately and quickly when patient arrived to hospital through transferring the patient's condition and real time location.*

I. INTRODUCTION

Human is always desire to their health. In the recent, the interests towards health management and well-being have elevated and the demands for the healthy and plentiful life have also increased for citizens themselves. Therefore, people want to be guaranteed their health in the hospital and also regardless of the time and location with this needs various in a distant place. Systems are developing that can check their health status and treat them in a distance in a real time. We are asking more services that can detect patients location and utilize this information.

In reconstruction for such demands, the concept of u-Health Care that has integrated the computing techniques with medicine has appeared. The essential point is placed on accomplishing more effective measures within emergency situations for elderly or disabled patients in solitude who are in difficult situations to gain medical services at fixed times and this has been spotlighted as the more effective system by integrating with the LBS technology.

LBS is the service which can help to detect the location of people or things through the portable-equipment based on wireless communication network. In this system, patient can move both to the indoors such as their home and their office and to their outdoors such as the roads outside, and they can transfer their data to the remote-place through the sensor and the equipment they are wearing. It is the main objective of this system that transfers the data of patient's location and status in an urgent situation. Through this service, bionics data such as ECG data and pulse data with location information can be transferred to remote places like hospitals and emergency rooms and maintained by such institutions.

We can provide to various service to patient using this u-healthcare system. And we can manage patient's health effectively and systematically. Determination of Patient Location is more important to manage patient's health in emergency situation.

II. LBS

A. The Definition Of Location Based System

Location based system is the service which can help to detect the location of people or things through the portable-equipment based on wireless communication network. In this system, patient can move both to the indoors such as their home and their office and to their outdoors such as the roads outside, and they can transfer their data to the remote-place through the sensor and the equipment they are wearing. It is the main objective of this system that transfers the data of patient's location and status in an urgent situation.

1) It is the standard service that is using network so that it can be possible to offer the application of location foundation. (From TS 22.071 of 3GPP).

2) It is defined as an applied software service, the connection or the offer of location information. (From OGC).

3) It is defined that the users can take the information about their geographical location or well-known existence.(From FCC). [2]

B. Types Of Determination Technology

The essential factor of realizing LBS is the Location Determination Technology. Our system uses GPS for constructing Location Determination Technology system.

There are GPS in US and GALILEO in Europe in the satellite-based determination technology. This system has some advantages. It has the wide signal radius and is able to provide stable service by the fixed satellite and this is mostly being used at the present. However, on the other hand, it has the low accuracy and is affected by the climate easily and also, is unable to reach the GPS signal in the shadow areas or indoors.

GPS is composed of 24 artificial satellites placed on the Earth orbit, the control tower that control the satellite on the Earth, and GPS terminal units able to receive the GPS signal.

Each of 4 artificial Satellite set is placed in the 6 orbits with the 60 degree intervals, GPS receivers can receive the Satellite signal from 5 to 8 at the same time from the every direction on the Earth. GPS is able to recognize the location from the every direction on the Earth.

III. U-HEALTHCARE MODEL IN LBS



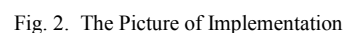
Using LBS, we recognize status and information of patient quickly and accurately. If patient's data over its threshold which is warning of danger, patient's bio data and location data transmitted to emergency center. Then we can know patient's accident location. In Existing service, patient have to put on switch directly for his emergency situation and be reported by the 3rd person.

When using the remote emergency medical terminal unit during the patient transfer, the vital signs, audio, video and medical information of the patient can be transferred both

Although the emergency measures during the appropriate transfer is important for emergency patients, selecting the appropriate and prepared hospital according to the degree of severe illness for the transfer is also important. For this, the emergency medical information possible for provision of each hospital must be grasped and provided to the emergency vehicles in real-time.

Many emergency patients are developing on a daily basis within the emergency rooms, intensive care units and the wards within the hospital and the emergency patients and the situations must be initially recognized to provide the appropriate emergency medical service. However, low quality emergency medical service is being provided due to lack of medical manpower, equipments and facilities, the system insufficiency and the overpopulation of the emergency room. Moreover, as the place of many physicians treating many patients with numerous medical equipments, tools and medicine, such factors cause for gradual complications in 'checking, searching then contacting' that is the basic of hospital work, in spite of putting great amounts of time and efforts, the work efficiency is decreasing and the medical malpractice have gradually increased. For solving such problem, not only the national financial support and superintendence but also the development of the system applying the IT is required. Many systems have been developed and applied in the recent and the recognition for patients of serious illness, recognition of medical information, diagnosis assistant system, emergency situation, physician search management and paging system, medical property monitoring, mobile remote treatment and prescription are being attempted.

IV. IMPLEMENTATION



In the conventional circumstance, a patient lives with a sensor such as (a) in the picture 1 on his/her arm attaching it like (b). PDA like (C) collects the information. Then, the information is transmitted to a local place through wireless LANs, CDMA and cellular modems.

The platform is composed of anti-contact temperature sensor (ZTP-115 of GE) for measuring the body temperature and pulse measuring sensor, and IEEE 802.15.4. [10]

Also, PDA uses HP's iPAQ5450 model that is using PocketPC2003 as an operation system. The previous system might be helpful to detect the status of users, however it will not let us know the place where the user is located in an emergency condition. It will cause the failure to catch the right time for the patient. Therefore, we need the system that can rescue the people faster.

The patients can move freely with the sensor on his body and he can send the data measured by the CDMA or WLAN network through the portable terminal unit like PDA. On this system, we add the GPS module in order to get the location data and we send the data regularly with the bio-data. We still have difficulty in indoors measurement with the only GPS system, so we can build up the sensor network with Zigbee in the indoors to determine the location. For this we use Zigbee from Hanback Elec. and add GPS module. We can send the measured data with the GPS outdoors and determine the location by formatting Ad-hoc network indoors.

The incoming data goes to the hospital from the server, the doctor is able to examine and manage the patient's status and from the distant place in ant time. Also, if the measured bio data goes over the dangerous figure, this system is connected with the emergency center right away and detects the location of the sick. Since we already get the bio-data and location data, we can manage to deliver the serious sick as soon as possible.

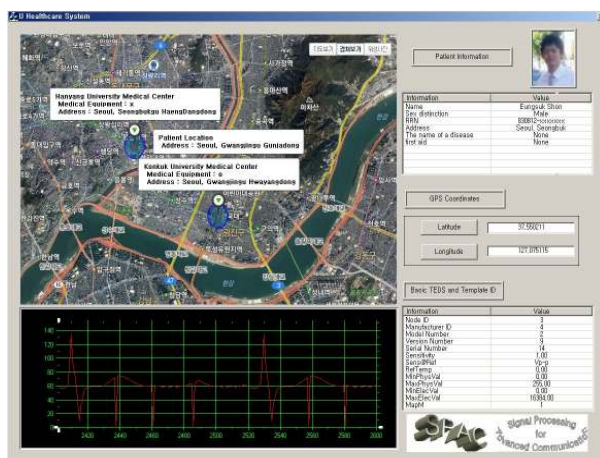


Fig. 3. Application of u-Healthcare system based on LBS

Figure 3 is implemented healthcare system. That shows satellite picture with map using open API program provided by NAVER corp. It can recognize patient's location in the map with GPS signal. And we can monitor patient's information and sensor data in right side.

It shows patient is in Sejong Univ, Gwangjingu in Seoul now. And He has ECG sensor with medical device.

The following are what this application shows.

1) Patient's location and closest hospital's location near patient. And it also simply provides medical equipments information which need patient. (Figure 4)

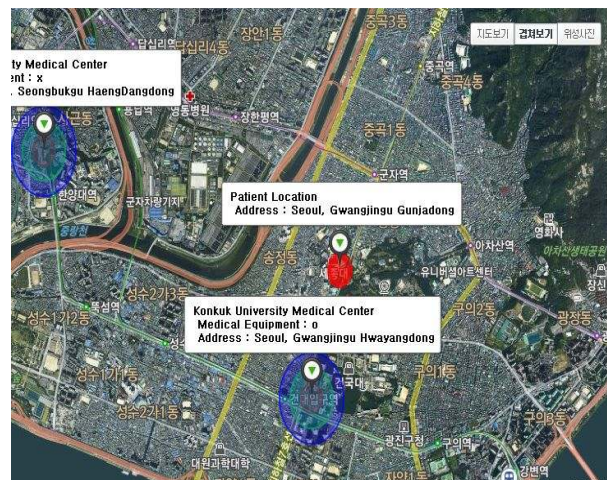


Fig. 4. Patient location information

2) Patient's medical information like as name, sex, RRN, Address, disease information.

3) Latitude and longitude of GPS sensor. And it also shows other sensor data such as ECG data. (Figure 5)

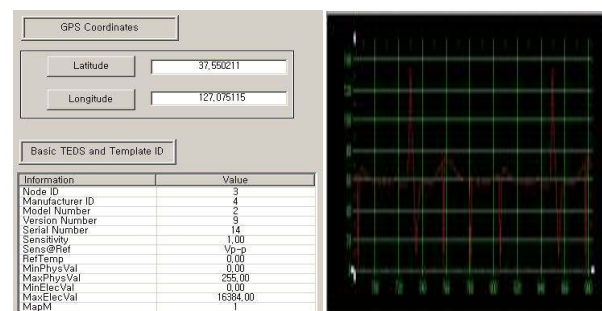


Fig. 5. GPS, TEDS data and ECG data

V. CONCLUSION

Even though an unexpected accident takes place to this person who does not have his identity card with him, we know who he is as far as the person wears this equipment. We can have the information of this person's identity and the cause of the disease in the hospital in advance. Also, we can get the information of the arrival time at the hospital and we can give him the treatment in the right time.

We can provide custom-made Healthcare service to the patients using LBS. This system is necessary service for the patients in the Ubiquitous age. In this paper, we suggest the solution for managing data based on the location information service along with the patient's bio-data from the distant place. With this, we can manage to deliver patients who have heart disease symptom more easily and quickly in an urgent situation. In the near future, we can serve the patients with the custom-made emergency treatment in an Ubiquitous area. Although we still have difficulty in an accuracy in location determination of

indoors and outdoors at the present, by developing and introducing the accurate measurement system that can far beyond the existing location detecting program's tolerance limit, we can provide the sick with the better service.

ACKNOWLEDGMENT

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