Poster Abstract: Integrating Weather Information with Body Sensor Networks for Health Monitoring

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ABSTRACT

People normally suffer many different kind of diseases that are strongly affected by the changing of weather. In this poster, we present a novel research work that integrating online weather information with body sensor information to monitor the health condition of patients, and providing real-time suggestion to patients to avoid sudden unexpected weather changing. The scientific impacts about the storing of weather information along with patient's body sensor readings in the remote data center is also discussed.

Categories and Subject Descriptors

H.4 [**Information Systems Applications**]: Miscellaneous; D.2.8 [**Software Engineering**]: Metrics—*complexity measures, performance measures*

General Terms

Theory

Keywords

Weather Information, Body Sensor Networks

1. THE RESEARCH PROBLEM

The emerging of Body Sensor Networks (BodyNets) provides a method for continuous monitoring various body information [1], e.g., blood pressure, heart rate, and body temperature. Normally, health information gathered from body sensors will be locally stored in a smart phone first, which can then be further sent to remote data center through Internet to allow doctors to conduct various researches [2], as shown in Fig. 1[1]. The smart phone is also equipped with GPS function. In case any urgent situation happens, the doctors can be informed about the location of the patient, and try to send out the ambulance at the earliest time.

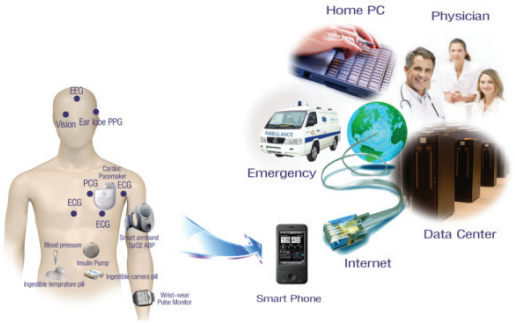

Figure 1: The system model of body sensor networks proposed by the Integrated Microsystems Enterprise (IME) in College of Engineering at Michigan Technological University, USA.

Many diseases of patients can be strongly affected by the changing of local weather, e.g., diabetes, asthma, and heart attacks[2]. Generally, normal people can adapt the slow changing of temperature by adding or reducing clothes, which will not cause serious problem for these kinds of diseases. However, when the temperature suddenly reduces more than 7 degrees or increases more than 5 degrees within a few hours, human body normally cannot adapt the sudden changing. Especially for old patients with diabetes, it is very easy for them to suddenly increase their blood-pressure in this kind of weather changing, consequently cause heart attacks or cerebral infarction. Thus, efficiently getting the predictable changing weather and actively warning patients about the sudden changing of local weather can help to prohibit a lot

[1]http://www.enterprise.mtu.edu/im/projects.html
[2]http://www.smart-heart-living.com/cold-weather-and-heart.html

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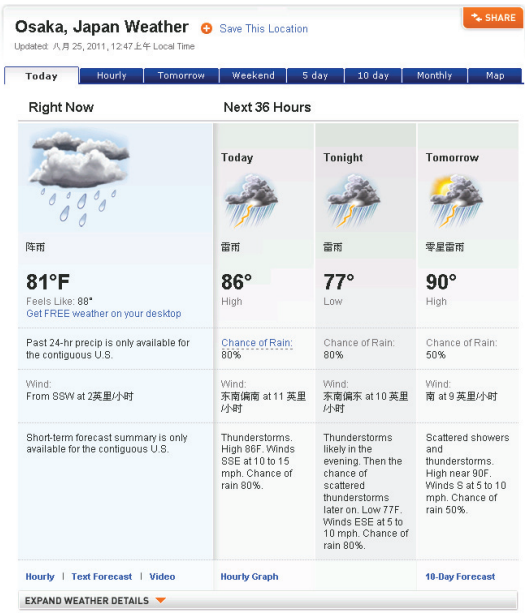

Figure 2: The weather information of Osaka city in Japan provided by Weather Channel in terms of the coming 36 hours.

of unexpected happening of sudden diseases.

2. ONLINE WEATHER INFORMATION

Many public websites provide various weather forecasting services online, e.g., Yahoo Weather, Google Weather, and Weather Channel. We take one example from the website of Weather Channel about the local weather of Osaka city in Japan, as shown in Fig. 2. Readers can easily see that the temperature in Osaka city can dramatically change within 36 hours, from 86 to 77 then back to 90 degrees.

Weather information is not only published in these websites by using figures and symbols, but actually is also available in the from of RSS feeds[3]. This convenient service allows Java programmers to easily implement simple applications in smart phone based on the ROME[4] open source library to extract weather information from published RSS feeds. For example, we use the software RssReader[5] to extract the weather information of Osaka, Japan from the URL: http://www.weather.com/weather/rss/subscription/JAXX0071, as shown in Fig. 3.

3. AN EXAMPLE APPLICATION

Patients after surgery normally need continuous monitoring and logging of vital medial signs and physiological parameters for a period of time both in hospital and at home. And, in many cases, after surgery the patients are advised to take various outdoor recovery programs, e.g., jogging, to maintain the body functions. In many areas in the world, storm can suddenly arrive while these patients may jog with their dogs on beach or in public garden. It can be extremely

[3]http://en.wikipedia.org/wiki/RSS
[4]http://java.net/projects/rome/
[5]http://www.rssreader.com/

Figure 3: The extracted weather information from the URL, which is shown in RssReader.

dangerous if the postoperative wound is exposed to the rain, which may cause serious infection. However, with a smart phone that can automatically check the weather information online, these patients can be informed about the coming storm at least 15-20 minutes in advance, which allows them to have enough time to find the right places to avoid the exposing to the rain.

4. IMPACTS FOR SCIENTIFIC STUDY

The changing of weather can strongly affect various diseases, which is commonsense. Scientists had already tried to study and predict diseases caused by the changing of weather[6]. In this poster, the presented method for gathering the local weather information from RSS feeds to the patient's smart phone allows the storing of the weather information along with patient's body sensor readings in the remote data center. The integrating of weather information with body sensor readings can allow scientists to further study how the changing weather can exactly affect various diseases. Consequently, scientists can build up artificial indoor environment in hospital based on the recorded statistic studies as well as design better outdoor recovery programs.

5. ACKNOWLEDGMENTS

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6. REFERENCES

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[2] O. Pereira, J. Caldeira, L. Shu, and J. Rodrigues. A mobile core-body temperature monitoring system on android. In *Proc. of International Conf. on Body Area Networks (BodyNets'10)*, Corfu, Greece, September 2010.

[6]http://dsc.discovery.com/news/2007/01/23/weather_hea.html?category=health&guid=20070...