International Journal of Information and Computation Technology.
ISSN 0974-2239 Volume 4, Number 2 (2014), pp. 113-118

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Mobile Adaptive Opportunistic Junction for Health Care Networking in Different Geographical Region

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Abstract

Nowadays, the availability of these ubiquitous mobile services has significantly increased due to the different form of connectivity provided by mobile devices, such as GSM, GPRS, Bluetooth and Wi-Fi. The advance of wireless body sensor networks (BSNs), mobile Healthcare (m-Healthcare), which extends the operation of Healthcare provider into a different geographical environment for better health monitoring, has attracted considerable interest recently. One core element is the technical development in this area and the social paradigm that will be used to create cooperation among users for better monitoring of patients in the network and providing a feasible solution for the health issues. The scopes of these applications are very broad, since people can approach various entities to provide solutions at the given state of the Patient Health Information. Essentially, opportunistic computing is characterized by exploiting all available computing resources in an opportunistic environment to provide a platform for the distributed execution of a computing-intensive task. Providing an extensive solution for the patients either as a self monitoring kit or as a kit that will be handled by a medical user to provide a timely and resourceful evaluation of the current state of the patient on any given environment thereby saving the time constraint and providing capable medical aid on the point of that time. In addition, the future of mobile will be in novel technologies such as network coding as well as in combination with social networks in order to boost cooperation among users in as well as connect people over the shared content.

Keywords: opportunistic computing, social paradigm, patient health information.

1. Introduction

E-health system has been used as communication system that enables to deliver medical service over the Internet. With the advancement of wireless technologies, high performance and fault tolerant wireless devices can be employed to eliminate medical errors, to reduce workload, to improve the efficiency of hospital staff as well as to improve the comfort of patients.Wireless sensor networks (WSNs) are massively distributed networks that do not require any external infrastructure and are typically used to monitor a physical phenomenon. Sensor network applications can play a key role in many different areas, such as intrusion detection and surveillance, wildlife monitoring, precision agriculture and building monitoring. It is commonly accepted that, because of the lack of resources, classical strategies for computing and communication cannot be applied to the world of WSNs. This pushed the definition of new paradigms, such as opportunistic networking and computing.Adoption of the opportunistic computing paradigm to maximize the resources available to find the solution at multiple stages. The concept of making interaction between mobile nodes through wireless communication makes this opportunistic computing more efficient and lively by providing different solutions and results for a particular problem for which the medical user uses the specifically developed medical application which gets the input from an kit which consists of sensors that gets the input from the user or patient on whom the sensors are implanted.To enable resource sharing between multiple heterogeneous healthcare enterprises and medical staff securely, this paper uses communication techniques such as SOA approach, UPnP and OPC-UA. To the best of one’s knowledge, this paper is one of the first attempts to tackle key research challenges posed by the opportunistic computing concept. Specifically, developing an android native application to get the input from the sensors through a Bluetooth and this enables the kit to be carried remotely to any location and provide some first aid for the issue that is addressed to the patient. Solutions can be obtained at any given level from the mobile application itself, furthermore the social paradigm that enables the medical staff to interact and share the condition of the patient and provide the solution for the particular problem. If the solution is not being obtained at these levels health care centre can be contacted to provide an ambulance or the doctor for the particular patient. This project enables any user who has this kit to provide first aid for the patient before a doctor or an ambulance approaches to the particular location. Furthermore, adding features like holding the record for the patient and monitoring them from time to time till the patient gets a treatment. The Bluetooth kit from which the value is received and user who attended the patient. This helps in knowing the issues of the patient when brought to the health care centre without making any time delay and provide the necessary medications and treatment to the patient.

2. Models and Design Goal

In this section, we formalize the system model and identify our design goal as well.

2.1 System Model

2.1.1 Smart Mobile device and BSN. Smart mobile devices (smartphones and tablets) and BSN are huge factor for health care emergency. They contribute in a major amount there by bringing mobility and agilely in this field of expertise. Each act individually and combinable as a resource for providing any kind of attention or treatment to a patient in any given scenario and geographical region.

2.1.2 Health Care Center. With an history of all available diseases to a patient in an health care center it is very much important to include in this proposed scheme since it adds similar symptom based results that can be useful for many other patients as well that can be sent to medical staff. It is also relevant to include health care center into the framework, with the inclusion of the health care center medical staff can update the location of the patient with their current status and so that an ambulance or an doctor can be dispatched to that location.

2.2 Design Goals

Our design goal is to develop an application that can be implemented on smart mobile devices that should be carried out everywhere. Making an application that is acceptable over all devices, will make communication easier and there by contributing a factor to add social paradigm into the proposed scheme. Adding social paradigm will bring opportunistic computing into play. That makes a way for numerous numbers for solution to a single problem. Providing certain constraints to monitor battery meter on smart mobile devices and provide alternative solutions on the low level of battery meters. Android includes a number of mechanisms to reduce the scope of potential issues by limiting the capability of Web View to the minimum functionality required by our application.so developing a native application will provide an numerous solution and way to handle data's efficiently.

3. Proposed Framework

In this section, we propose our SPOC framework, which consists of three parts: system initialization, access to health care center and medical staff and role of opportunistic computing in m-Healthcare emergency.

3.1 System Initialization

A native Application built for Android using java is used Validate the effectiveness of the proposed SPOC framework in m-healthcare emergency. This application interacts between the sensor kit implanted in patient body and health care center as well as other medical users. Social paradigm is introduced to provide multiple solutions for a particular issue of a patient. Multiple entities can contact each other for multiple solutions before contacting the server. Battery meters are monitored and handed over

to nearby entity in case of emergency since smart mobile device energy could be insufficient when an emergency takes place. Representation of the system of the proposed framework is shown in the Fig. 1. Relatively medical applications are more sensitive and it has to be handled appropriately with every field name and value so that there won't be any misassumption of data's since any bad data can ruin someone's life. This dedicated application for this scheme provides a reliable and transparent data transfer between medical staffs and health care center which are easy to understand and trustworthy. In addition to providing data isolation, supporting full-file system encryption, and providing secure communications channels, Android provides a wide array of algorithms for protecting data using cryptography.

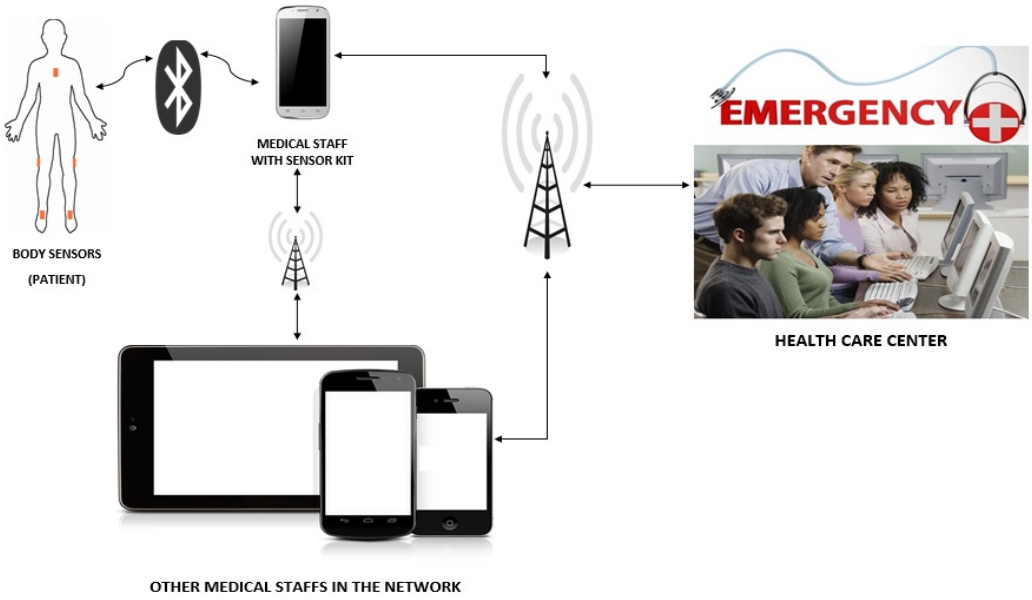

Fig. 1: Proposed framework with social paradigm providing way for opportunistic computing.

3.2 Role of Opportunistic Computing with Access to Health Care Center and Medical Staffs

Medical staff who carry the smart mobile device and BSN are allowed to interact with health care center and other medical staffs there by saving more time and getting more resources that can be applicable to patient. Saving the time by updating the patient health information to health care center instantaneously thereby reducing the time taken for initial treatment at the hospital since all the necessary records are being acquired by the medical staff and sent to the health care center. Once the patient arrives at the scene he can be taken directly to treatment with the necessary information that is being obtained from the medical staff from the scene.

4. Related Works

4.1 Opportunistic Computing a New Paradigm

When two devices come into contact, albeit opportunistically, it provides a great opportunity to match services to resources, exchange information, cyber forage, execute tasks remotely, and forward messages. This is mainly a high level talk. Three billion – that is the estimated number of cell phones in the world by the end of 2010. That number excludes other types of access technologies and deployed sensors. The average performance of a cell phone processor is 100 MIPS and communication is at 200 kbps. However one calculates it, three billion cell phones pack in an enormous amount of computing power, memory space, and energy that can be shared in a collaborative way; in a manner that is representative of distributed computing, albeit in a different paradigm. Often referred to as opportunistic computing, this concept actually meshes well with the phenomenon of social networking that has taken the Internet world by storm.

4.2 Android Security Overview

Android has security features built into the operating system that significantly reduce the frequency and impact of application security issues. The system is designed so you can typically build your apps with default system and file permissions and avoid difficult decisions about security. Some of the core security features that help you build secure apps include:

- The Android Application Sandbox, which isolates your app data and code execution from other apps.
- An application framework with robust implementations of common security functionality such as cryptography, permissions, and secure IPC.
- An encrypted file system that can be enabled to protect data on lost or stolen devices.
- User-granted permissions to restrict access to system features and user data.
- Application-defined permissions to control application data on a per-app basis.

4.3 Using external storage

Files created on external storage, such as SD Cards, are globally readable and writable. Because external storage can be removed by the user and also modified by any application, you should not store sensitive information using external storage.

5. Conclusion

In this paper, we have proposed a technique for overcoming the hurdle that is being faced in day to day life by every person around this global environment. Saving the precious time as well as the life of dear ones by implementing this ideology. We hope that this paper will inspire lot of people to take over and update with lot of emerging technologies and bring more resources to this health care emergency. In our future work we tend to reduce the size of the sensor kit and make it more portable like a wrist

watch which has most of the sensors. Moreover adding voice inputs and message in the application will result in less time consuming and sophisticate medical staff across the network and we intend to increase the battery life by adding solar charging modules to the current battery meters of the sensor kit.

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