Survey on Mobile Healthcare

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Abstract— There are several factors behind the progress of the mHealth field. The first factor concerns the constraints felt by healthcare systems of developing nations. These constraints includes high growth in population, a high burden of disease prevalence, large numbers of rural inhabitants, low health care cost, and limited financial resources to support healthcare infrastructure and health information services. The second factor is the recent rapid rise in mobile phone usage in developing countries to large portion of the healthcare industry, as well as the population of a country as a whole. With increasing access of mobile phones to all segments of a country, including rural areas, the importance of reducing information and transaction costs in order to deliver healthcare improves.

Wireless body area networks (WBANs) are emerging as important networks, applicable in various fields. In recent years, clinicians are beginning to utilize Mobile Health Systems (mobile devices with clinical applications) when delivering healthcare services to patients at the point-of-care. There are several applications like Healthcare Smart Hospitality, Monitoring System, and Continuous patient monitoring system are under Body Area Network (BAN) technology. mHealth technology helps physicians to remotely monitor patients' health and enables each person to manage their own health more easily. The key factors which help mobile healthcare system infusion are time-criticality, availability of the technology, habit of people, technology, etc. Here we have to consider power efficient protocols, monitoring and sensing, system architectures, security and sensing. Body sensor networks provide a unique platform for the development of pervasive healthcare, physically engaged gaming and well being.

I. INTRODUCTION

The demand for mobile communication technologies is because they enable communication in motion and allow persons to contact each other regardless of time and place. This is mostly beneficial for work in remote regions where the mobile phone, and now ever more wireless infrastructure, is able to arrive at more people even faster. The capacity for better access to information and two-way communication becomes more available at the point of need as an impact of such technological advances.

A. Mobile phones

Currently mobile phones are an integral part of even the low and middle income world, with the global Mobile phone usage rate drastically increasing over the last decade. As per the study conducted in 2013 the total number of subscribers was estimated to be 6.8 billion of an estimated global population of 7.125 billion (95.43%). While compared to other parts of the world there was peak growth is in Asia, the Middle East, and Africa. In most of the countries, the number of fixed-line telephones becomes less than the number of mobile phone subscribers; this is mainly true in developing countries. There were only 4.1 billion mobile phones in use in December 2008 in worldwide.

B. Smartphones

A smartphone (or smart phone)[9] is more advanced in computing capability, processing power and connectivity power than basic featured phones. Smartphones includes the features of a phone with those of other popular consumer device, such as a media player, a digital camera or a GPS navigation unit. The smartphones which came later include all of those previous features plus the features of a touchscreen computer, like web browsing, Wi-Fi, motion sensor, 3rd-party applications, payment transactions and 3G.

C. India

India has no dedicated Privacy law and data protection laws. Even m-health projects and businesses in India are operating without any legal framework and they need to be suitably regulated in India. The electronic health records standards are still to be enforced properly in India. If we keep in mind the lack of mobile security and absence of regular encryption laws in India, m-health seems to be a troublesome notion in India.

II. APPLICATIONS WITHIN THE MHEALTH FIELD

There are mainly five application categories within the mhealth field they are:

A. Education and awareness

Education and awareness programs within this field are basically about the spreading of bunch of information from source to recipient through short message services (SMS)[2]. In education and awareness applications, SMS messages are used to offer information about various subjects like testing and treatment methods, health service availability, and disease management.

B. Helpline

Helpline usually consists of a specific phone number that any individual person can call to gain access to a range of medical services. These services include phone consultations, service complaints, counseling, and information on facilities, equipment, drugs, and available mobile health clinics

C. Treatment support, diagnostic support, communication and training for healthcare workers

mHealth[4] projects involve connecting healthcare workers to sources of information through their mobile phone. This phase involves connecting healthcare workers to other medical institutions, healthcare workers and ministries of health. Such projects also include using of mobile phones to better organize and target in-person training. Improvement in communication process attempt to increase knowledge transfer amongst healthcare workers and improve patient outcomes through such programs as patient referral processes

D. Disease surveillance, collection of remote data, and epidemic outbreak tracking

Health providers at the different levels like national, state, district, and community level need accurate data so that they can measure the effectiveness of existing policies and programs and shape new effective ones[1]. In the developing world, collecting field information is particularly difficult since many segments of the population are not able to visit a hospital regularly, even in the case of severe illness. A lack of patient data creates a difficult environment in which policy makers can't decide where and how to spend their resources effectively. Some software within this area is specific to a particular content or area where as other software can be adapted to any data collection purpose.

E. Treatment support and medication compliance for patients, including management of chronic disease

Remote monitoring and treatment support allows much better involvement in the continued care of patients. Recent studies seem to show also the ability to produce both positive and negative affective states, using smart phones. In environments that have limited resources and beds, remote monitoring of patients allows healthcare workers to efficiently track patient conditions, follow-up scheduling

and medication regimen adherence. Such projects can operate through either one way or two way communications systems. Remote monitoring can be used in an efficient manner in the area of medication adherence for AIDS and diabetes.

III. BODY AREA NETWORK (BAN)

A body area network (BAN)[5], also referred to as a wireless body area network (WBAN) or a body sensor network (BSN), is a wireless network of wearable computing devices.
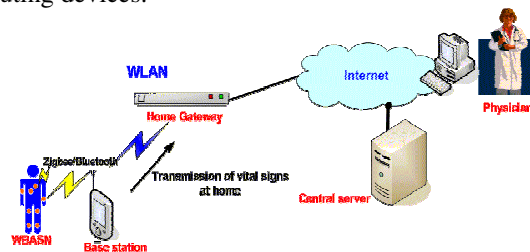

fig. 1 Body Area Network

BAN devices may be contained inside the body, implants, may be wearable technology, may be surface-mounted on the body in a fixed position or may be accompanied devices which humans can carry in different positions, by hand, in clothes pockets or in various bags. To make BSN platforms truly pervasive and suitable for continuous sensing and monitoring, significant effort of our research is focused on ultra-low power design in terms of signal conditioning, on-node processing, and wireless communication links. Applications and practical deployment of BSN include elderly care, managing patients with chronic diseases, rehabilitation, sports, and entertainment.

IV. HEALTH MONITORING SYSTEM

Health Monitoring System (HMS)[8] has created new health and wellness dimensions with a comprehensive approach to life. HMS aims to treat symptoms of illness before they could even surface and hence prevent illness. For an illness to develop the first thing that occurs is a change in cell energy levels. If this cell change is ignored, there will be a change in bio-chemicals, if this also is ignored the blood test would show an abnormality and if this is also ignored, systemic changes occur and the person falls ill.

Portable health systems includes various types of small physiological sensors, which helps to continuously monitor a variety of human vital signs and other physiological parameters such as respiration rate, heart rate, body temperature, blood pressure, oxygen saturation, electrocardiogram (ECG), body posture and activity etc.

Furthermore, due to embedded transmission modules and processing capabilities wearable health monitoring systems can facilitate low-cost wearable unobtrusive solutions for continuous all-day and any-place mental, health and activity status monitoring.

TABLE 1
COMPARISON OF TRADITIONAL HEALTHCARE SYSTEMS VS BAN

Sl no	Feature/System	Traditional Healthcare	BAN
1	Security	Yes	Yes
2	Recovery	Yes	Yes
3	Mobility	No	Yes
4	Efficient Communication	No	Yes
5	Updated Techniques	Partial	Yes
6	Centralized DB	Yes	Yes
7	Co-operation	Partial	Yes
8	Vital Signs Monitoring	No	Yes
9	Failure Backup	No	Yes

V.   CONCLUSION

This survey paper is based on mobile health care systems and techniques like body area networks. Wireless body area networks provide low power consumption, continuous health monitoring and mobility.

Mobile technologies offer the ability to connect patients with their doctors and loved ones and enable timely health monitoring which suggests improved patient engagement and better health outcomes. Mobile health applications and services are becoming an important factor in extending health care resources around the world especially for people in remote areas where there is a scarcity for medical practitioners

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