Chapter 25
An Intelligent Multi-Objective Framework of Pervasive Information Computing

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ABSTRACT

This article describes how electronic healthcare has been the key application of pervasive computing innovations to enhance healthcare quality and protect human lives. Specific patients of constant sicknesses and elderly individuals, by and large, may oblige continuous observing of their wellbeing status wherever they are. In this regard, remote patient monitoring technology plays the various important role through wearable devices to monitor patient's physiological figures. But, this must ensure some broad issues like, wearability, adaptability, interoperability, integration, security, and network efficiency. This article proposes a data-driven multi-layer architecture for pervasively remote patient monitoring that incorporates aforesaid issues. It enables the patient's care at the real time and supports anywhere and anytime requirement with using network infrastructure efficiently.

1. INTRODUCTION

Nowadays, the population of aging people who have incessant illnesses such as diabetes, heart disease and much more is increasing. In addition, youngsters are also experiencing diseases like asthma and obesity due to a lavish lifestyle (Jensen, Jensen, and Brunak, 2012). With all such issues, there is an increase in healthcare costs that demand cost-effective, reliable and pervasive patient healthcare systems. If a patient's health could regularly be observed over an extended amount of time, the doctor could diagnose serious health problems at an early stage and may also provide more accurate treatment.

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The Republic of India; a young nation, with the world's most populous community, has battled for making emergency medical care safe and economical (Srinivisan, 2012). Nowadays, Government is thinking about its socioeconomic expansion through Digital India and Skilled India, but it also plagues many challenges (Srinivisan, 2012; Fernald, Capriotti, Daneshjou, Karczewski, and Altman, 2011). The private medical sector of India is holding more or less 81% medical services and 88% medical professionals (Srinivisan, 2012). Health Workforce in India remains inadequate and underutilized, and India started its health reforms journey in the most recent decade. This mission now needs to pick up momentum. Home-based self-monitoring devices are required to become self-reliant for non-invasive and periodic self-monitoring of chronic diseases (Gudwani, Puri, and Vaidya, 2012; Anshari, Alas, and Guan, 2016).

Pervasive healthcare frameworks utilize ubiquitous computing technologies, for example, wearable biomedical sensors with the remote system, to build the modalities and spatiotemporal measurements in which medicinal services administrations can be accommodated enhancing the patient well-being. The most accurate information about the patient at the right time is essential to obtain the best possible service for the patient (Shumer, Tang, Shrivastava, Lombrozo, and Druker, 2008). The goal of Pervasive Healthcare (PH) is to utilize ubiquitous computing technologies to provide continuous health care services from anywhere and outside the scope of traditional medical places, such as hospitals and medical clinics (Kuhn and Prettner, 2016). Pervasive healthcare is aiming to change this conventional way (Visiting a physician /specialist) into pervasive patient monitoring from anywhere and at any time. It exploits the sensing and communication technologies to monitor patient round the clock.

Pervasive healthcare encourages patient-doctor collaboration and can give exact, precise, and upright care to all (Mukherjee, Kolui, and Datta, 2014; Wu et al., 2017; Hart, 2013). This is especially helpful nowadays, since the population is expanding quickly, medical institutions are confronting deficiencies of medical staff, and the cost of healthcare is soaring (Fernald et al., 2011; Hajheydari, Khakbaz, and Farhadi, 2013). The electronic healthcare framework has been the primary application of pervasive computing to enhance healthcare quality and preserve human lives. A number of frameworks consisting of many devices have been invented for remote observation to gain the patient well-being (He, Zeadally, Kumar, and Lee, 2016; Yu and Tseng, 2007; Yuan and Herbert, 2011; Andreu-Perez, Poon,Merrifeld, Wong, and Yang, 2015).

Due to technological advancements in different fields like a wireless network, microchip, integration, and tininess of devices, sensors, and the internet, it is easy to modernize the way of healthcare services and focus on early diagnosis of chronic diseases (Chondrogiannis, Andronikou, Tagaris, Karanastasis, and Varvarigou, 2017).

These systems are structured in such a way that it can react to crisis and manage illness rather than wellness (Banaee, Ahmed, and Loutfi, 2013). In this view, Body Sensor Network (BSN) is a feasible solution, because it is an appropriate blend of modest wearable gadgets connected to the patient's body for observing the patient's physiological information. Sensors continuously screen and gather the patient's information and send it to a remote server through a network that is referred as Database Server (DBS) (Tiwari and Kumar, 2012).

2. ISSUES AND CHALLENGES

A noteworthy challenge is to give continuous and persevering medical services via wearable human services gadgets. Furthermore, numerous patients are more concern about privacy especially, when