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Wireless Sensor Network and Web Application Hybrid Scheme for Healthcare Monitoring

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Abstract

Problems on healthcare delivery have become the current concern in most studies in the academe and industries. These studies have been conducted by using evolving technical solutions. These solutions are driven by technological advancements both in medical sensors and low-power networked systems. Wireless Sensor Networks (WSNs) prompted the emergence of most healthcare systems in recent years. This work proposes a system architecture for a remote healthcare monitoring system using pulse sensor and temperature sensor to measure the physiological parameters including Heart Pulse (HP) and temperature of patients. The presented system is evaluated using several persons with different ages, gender, and situations. The conducted technique is achieved respecting to the cost of service, signal quality, and quality of service. Finally, the current system is effective given that all reported results are standard values.

Keywords: Healthcare monitoring, Body sensor networks, Sensor, Heart pulse, Body temperature

1. Introduction

The global elderly population is growing, and the general population is aging (Gray et al., 2007; Viswanathan et al., 2012; Hao et al., 2008). An increasing number of individuals suffer from chronic diseases such as diabetes, cardiovascular diseases, Alzheimer's disease, and other forms of dementia (Bonato, 2005; Bonato, 2003; Bloom et al., 2012). These diseases provide an additional burden to healthcare systems (Baig et al., 2013; Baig et al., 2013; World Health Organization, 2014). Nearly one billion people worldwide currently suffer from chronic diseases and most of these individuals require healthcare technologies (Minaie et al., 2013; Dorr et al., 2007; Wac, 2013). Several chronic diseases can be determined by observing the changes of a patient may encounter but other types of diseases such as heart attacks can occur suddenly and may cause death even before the patient arrives at the hospital (Pantelopoulos and Nikolaos, 2010; Harrington et al., 2011; Magrabi et al., 2013). Recent developments in technical solutions in industrial and technological fields led to increasing the interest of researchers and experts in discovering suitable solutions to problems in healthcare delivery (Lmberis and Dittmar, 2007; Varshney, 2007; Mitra et al., 2012).

Despite the growing interest in healthcare systems, many challenges exist in the provision of healthcare solutions in the forefront are costs and adaptability of the elderly to healthcare techniques (Minaie et al., 2014; Kluge, 2011; Stanberry, 2001). One of the most important technologies that have been emerged recently and that could change the future of the healthcare is Wireless Sensor Networks (WSNs) (Li and Yang, 2015; Wang and Wang, 2014). WSN technology has significantly improved the healthcare services offered to different populations (Virone et al., 2006; Callen et al., 2013; Jovanov and Milenkovic, 2011).

Researchers have increasingly become interested in improving technical solutions that address problems in healthcare delivery. However, accurately predicting the future of any healthcare domain is a complicated task. Hence, delivery of healthcare services to members of the global aging population poses major challenges. Moreover, delivery of these services is affected by different situations that require cost cutting for healthcare services. Akshay and Krishna (2016) designed and presented a healthcare improvement system which can be used to providing higher quality healthcare services in the population of Rural India. The proposed system can be easily carried and rapidly measurements with implemented algorithms. Whilst, the system required helping a doctor to detect abnormal activity and to keep tracking of those particular person/ patient (Akshay and Krishna, 2016). Almadani et al. (2015) conducted an E-Ambulance framework of smart health monitoring system of patients for the remote professional medical model. The presented system provided a paramedic