

Topical Collection on “Smart and Interactive Healthcare Systems”

Yin Zhang¹ · Min Chen² · Victor C. M. Leung³ · Roy “Xiaorong” Lai⁴

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With the progress in wireless sensor, mobile communication technology, stream processing, etc., a significant effort has been placed on advanced information technology for effective healthcare and wellness in both academic and industrial applications. A variety of new healthcare concepts for supporting and assisting users in technology-enhanced environments emerge, such as transforming reactive care to proactive and preventive care, clinic-centric to patient-centered practice, training-based interventions to globally aggregated evidence, and episodic response to continuous well-being monitoring and maintenance. These e-healthcare solutions are characterized by a combined use of information and communication technologies and health monitoring devices.

As healthcare domain knowledge is not familiar to users, e-healthcare technologies substantially depend on the patients' acceptance to use them. Naturally, healthcare systems are expected to provide user-friendly, professional and personalized

assistance, such as the effective interactions between users and the system, user-friendly interpretation about context-specific information concerning the patients and their situated environments, etc. Moreover, the increasing willingness of people to be involved in making decisions about their health or disease, have been paving the way of advances in personalized healthcare. To address these challenges, smart and interactive healthcare systems are expected to provide professional and personalized assistance, and interpret context-specific information concerning the patients and their situated environments.

In response to the call for papers, we were pleased to see many submissions from many countries and areas all over the world, which was far more than we expected. Totally, we have collected 51 papers, and only accepted 16 papers through the serious peer-review process. In this topical collection, we have selected the following high quality papers contributed by academic and industrial researchers to identify and discuss technical challenges and recent results related to smart and interactive healthcare systems.

With the development of IoT (Internet of Thing), big data analysis and cloud computing, cloud-based smart healthcare application attracts a lot attention. In the article “Towards Interactive Medical Content Delivery between Simulated Body Sensor Networks and Practical Data Center”, X. Shi, et al., develop a cloud-based smart healthcare system by semi-physical simulation technology.

In recent years, new technologies, such as body area networks, cloud computing, and smart clothing, have allowed the improvement of the quality of services. X. Xu, et al., in the article “Health Monitoring and Management for Manufacturing Workers in Adverse Working Conditions”, propose a five-layer architecture for health monitoring and management of manufacturing workers, and analyze the system implementation process, including environmental data

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✉ Yin Zhang
yin.zhang.cn@ieee.org

Min Chen
minchen@ieee.org

Victor C. M. Leung
vleung@ece.ubc.ca

Roy “Xiaorong” Lai
roy.lai@ieee.org

- ¹ Zhongnan University of Economics and Law, Wuhan, China
- ² Huazhong University of Science & Technology, Wuhan, China
- ³ The University of British Columbia, Vancouver, BC, Canada
- ⁴ Confederal Networks Inc, USA, Renton, WA, USA

processing, physical condition monitoring and system services and management, and present the corresponding algorithms.

In order to remotely monitor the health and diagnose the diseases for users, the article “A Novel Human Body Area Network for Brain Diseases Analysis” by K. Lin, et al., a novel human body area network for brain diseases analysis, including initial data collection, data correction, data transmission and comprehensive data analysis to ensure the high quality of the analysis result.

Patients are interested in how these drugs can be selected to match their respective conditions, due to the varieties of anti-hypertensive drugs. D. Chen, et al., in the work “Context-Awareness Based Personalized Recommendation of Anti-Hypertension Drugs”, propose a personalized recommendation service system of anti-hypertensive drugs based on context-awareness and designs a context ontology framework of the service.

In the article “Patient State Recognition System for Healthcare Using Speech and Facial Expressions” by M. Hossain, a patient state recognition system for the healthcare framework is proposed to provide good recognition accuracy, provides low-cost modeling, and is scalable. The system takes two main types of input, video and audio, which are captured in a multisensory environment.

How to present body postures through skeleton system equations, and achieve a long-term physical rehabilitation, according to the different limb characteristics of each person, is a challenging research issue. C.F. Lai, et al., in the work “An Intelligent Body Posture Analysis Model Using Multi-Sensors for Long-Term Physical Rehabilitation”, propose a novel scheme named as “Intelligent Body Posture Analysis Model”, which uses multiple acceleration sensors and gyroscopes to detect body motion patterns.

Neonatal jaundice is a common condition that occurs in newborn infants in the first week of life. In the article “Neonatal Jaundice Detection System”, M. Aydın, et al., develop a non-invasive system to control and to detect the jaundice periodically and helping doctors for early diagnosis.

The Wechsler Adult Intelligence Scale-Revised is a widely used test designed and applied for the classification of the adults cognitive skills in a comprehensive manner. In the work “Rank Determination of Mental Functions by 1D Wavelets and Partial Correlation” by Y. Karaca, et al., a method based on wavelets and correlation analysis is proposed for classifying mental functioning.

As a vital approach to diagnose heart diseases, ECG monitoring is widely studied and applied. The article “An IoT-cloud Based Wearable ECG Monitoring System for Smart Healthcare” by Z. Yang, et al., proposes a new method for ECG monitoring based on IoT techniques, in which ECG data are gathered using a wearable monitoring node and are transmitted directly to the IoT cloud using Wi-Fi.

In order to determine an intra and inter-group difference between a numbers of given movements performed by young people with respect to the movements of therapists, I. Lopez-Nava, et al., in the article “Variability Analysis of Therapeutic Movements using Wearable Inertial Sensors”, present an analysis of five upper arm therapeutic movements made by young persons without mobility problems with respect to reference data of therapists.

In the work “Preventable Medical Errors Driven Modeling of Medical Best Practice Guidance Systems”, A. Ou, et al., investigate five categories of generic intellectual tasks of humans, and propose an integrated modeling framework to model a medical I Cyber-Physical-Human Systems (CPHSystem) and use UPPAAL as the foundation to integrate.

Many authentication protocols have been proposed to ensure the secure authenticated access to the Telecare Medical Information System. The article “A Survey of Authentication Schemes in Telecare Medicine Information Systems” by M. Aslam, et al., reviews these proposed authentication protocols and discusses their strengths and weaknesses in terms of ensured security and privacy properties, and computation cost.

In order to have the real-time display of ureter position during the surgical operation, E. Song, et al. in the article “A Novel Endoscope System for Position Detection and Depth Estimation of the Ureter”, propose a novel endoscope system, consisting of a modified endoscope light and a new lumiontron tube with the LED light, to detect the position of ureter by proposed dim target detection algorithm (DTDA).

In the article “A Multilayer Perceptron Based Smart Pathological Brain Detection System by Fractional Fourier Entropy” by Y. Zhang, et al., a novel pathological brain detection system (PBDS) is developed to assist neuroradiologists to interpret magnetic resonance (MR) brain images, which is simplified as recognizing pathological brains from healthy brains.

The emergence of mobile healthcare systems is an important outcome of application of pervasive computing concepts for medical care purposes. The article “Behavioral Reference Model for Pervasive Healthcare Systems” by A. Tahmasbi, et al., presents a general structure for a pervasive healthcare system and a system architecture focused on availability, interoperability, and performance, wherein components, their relationships and the necessary constraints are defined to contribute to easier implementation of these systems.

Healthcare data are a valuable source of healthcare intelligence. In the article “Healthcare Data Gateways: Found Healthcare Intelligence on Blockchain with Novel Privacy Risk Control”, X. Yue, et al., propose an App, called Healthcare Data Gateway (HGD), based on blockchain to enable patient to own, control and share their own data easily and securely without violating privacy, which provides a new

potential way to improve the intelligence of healthcare systems while keeping patient data privacy.

In the end, we would like to thank all the authors who submitted their research work to this topical collection. We also appreciate the contribution of many experts in the field who have participated in the review process and provided

constructive suggestions to the authors to improve the contents and presentations of the articles. We would in particular like to thank Professor Jesse Ehrenfeld, the Editor-in-Chief, and Staff Members, for their support and helpful suggestions during the very delicate stages of concluding the topical collection.