# Guest Editorial Special Issue on Internet of Things for Smart and Connected Health

SMART and connected health (SCH) comprises various technologies aimed to achieve remote monitoring and enable clinical interventions by relying upon digital health information tools such as body sensor networks and smart data analysis techniques. SCH has the potential for enabling preventive care and patient-centered clinical practice by means of various Internet of Things (IoT) technologies including sensors, computing tools, and networking and communication hardware. Besides, SCH has the potential for empowering individuals to manage their own health. Future SCH technologies are expected to provide individuals with rich medical information that would replace sporadic, clinic-based measurements with unobtrusive, continuous monitoring, and assessments via wearable sensors.

The development of SCH tools is expected to enable new connected health-based solutions to facilitate the clinical management of subjects with a variety of long-term and sub-acute conditions. However, significant challenges still remain to be addressed. For example, the lack of medical baseline data for each particular individual prevents the implementation of patient-specific solutions that would allow clinicians to detect deviations from the "physiological normal" as defined for each individual rather than deviations from population-based normative values of physiological parameters. IoT technologies such as sensing and mobile communication could be employed to collect individualized baseline data.

This JOURNAL's Special Issue (SI) is focused on two major aspects of IoT technologies for SCH: 1) monitoring and assisting individuals by means of smart systems including sensors, devices, and robotics; and 2) creating interoperable digital health information infrastructures to increase medical/health information availability and use. The papers published in this SI provide evidence that SCH tools that rely upon IoT technologies could significantly improve clinical outcomes and the quality of life of individuals undergoing monitoring.

This SI includes theoretical, practical, and experimental studies, from both academia and industry, related to all aspects of IoT for SCH. Eight papers are part of this SI on new IoT technologies for SCH.

The first paper is entitled "A Motion-Powered Piezoelectric Pulse Generator for Wireless Sensing via FM Transmission." In this paper, the authors examine the feasibility of implementing a motion-powered wireless sensing prototype based on a piezoelectric pulse generator.

In the second paper entitled "PWDGR: Pair-Wise Directional Geographical Routing Based on Wireless Sensor Network," the authors propose a pair-wise directional geographical routing (PWDGR) technique to reduce energy consumption on the sensor network nodes. The proposed data transmission technique could be used in new medical applications.

The third paper entitled "Towards Automatic Activity Classification and Movement Assessment During a Sports Training Session" presents an ambulatory motion analysis system that relies upon wearable inertial sensors. The system is designed to allow one to assess activities performed by athletes. The system can be utilized for accurate and automatic sports activity classification and for the evaluation of movement characteristics.

The fourth paper is entitled "Transfer Learning in Body Sensor Networks Using Ensembles of Randomized Trees." In this paper, the authors examine the process of implementing activity recognition models on the nodes of a body sensor network. The authors discuss activity recognition classifiers that can be implemented on the nodes of the network.

The fifth paper is entitled "Assigning UPDRS Scores in the Leg Agility Task of Parkinsonians: Can It Be Done Through BSN-Based Kinematic Variables?" In this paper, the authors investigate the possibility of deriving unified Parkinson's disease rating scale (UPDRS) scores from data collected using a few body-worn wireless inertial nodes.

The sixth paper of this SI is entitled "MASK-BAN: Movement-Aided Authenticated Secret Key Extraction Utilizing Channel Characteristics in Body Area Networks." The authors present a solution to simultaneously achieve device authentication and fast secret-key extraction merely using wireless physical layer characteristics. A collaborative secret-key generation algorithm is introduced to maximize key generation rate.

The seventh paper is entitled "The Rebirth of One-Time Pads—Secure Data Transmission from BAN to Sink." In this paper, the authors present a novel framework to achieve secure data transmission in body area networks (BANs) by utilizing one-time pads (OTPs). The authors present a system for the generation, distribution, and utilization of OTPs in wireless sensor network (WSN) and BAN scenarios.

The eighth paper is entitled "An Analysis of RFID Authentication Schemes for Internet of Things in Healthcare Environment Using Elliptic Curve Cryptography." The authors present future opportunities of use of IoT technologies in the healthcare sector. In addition, the authors discuss security requirements of radio-frequency identification (RFID) authentication schemes and present a review of elliptic curve

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cryptography (ECC)-based RFID authentication schemes in terms of performance and security.

We hope that this SI will serve as good reference for engineers, scientists, researches, and academicians in the field of IoT for SCH. We would like to thank all the authors for their contributions and the reviewers for their great efforts in providing the authors of the papers that are part of this SI with competent and constructive comments.

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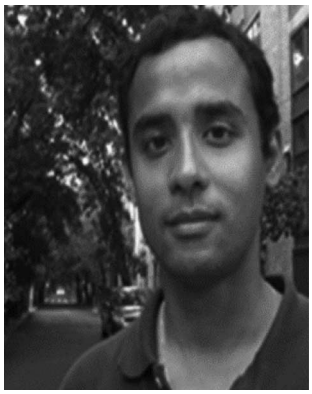

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