Internet of Things (IoT) for Healthcare: Trends, Opportunities and Challenges

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The convergence of sensors, smart objects, wearable/embedded devices, communications (Internet, wireless, mobile), intelligent information processing (filtering, feature extraction, feature selection), and information fusion/monitoring/detection/control technologies, has given birth to a new field of study and applications, called Smart Sensing, Internet of Things (*IoT*), Cyber Physical Systems (*CPS*) or 物联网 (in Chinese). The new paradigm or technology has been widely adapted and used in our daily life, such as healthcare, smart grid, energy & environment, manufacturing process, transportation, supply chain, and home/building, etc. In this talk, we will focus on healthcare.

Healthcare IoT (HIoT), also known as Internet of Healthcare Things (IoHT), or Internet of Medical Things (IoMT), concerns the development and use of IoT in healthcare. We will first review the fundamentals of HIoT, especially on the key sensors embedded in smartphones, wearable devices and body area sensor networks and discuss the increasing trends in HIoT, such as patient-centric healthcare, evidence–based healthcare, unobtrusive and continuous monitoring for home-based care, pervasive healthcare, smart hospitals, tele-medicine, smart and connected health, and precision medicine etc.

We will then summarize its potential applications/opportunities and examine selected applications (some are deeper, some are brief, depending on the time we have), including real-time falls detection, early Atrial Fibrillation (AF) detection, sleep stage detection, diabetic detection and depression detection etc. We will also present the use and selection of analytics models used including deep learning. Finally, we will examine the major issues and challenges you may encounter in the development or implementation of HIoT, such as interoperability; energy consumption; usability-interfaces, display, inputs; real-time monitoring and detection; early detection; personalization; data quality/data preprocessing-noise filtering, data cleaning, earth coordinates transformation; data imbalanced; feature extraction and selection; selection of data analytics methods; systems integration; scenario appropriateness; security and privacy; and business model. We will also share our alternatives/solutions to address these issues.