Chapter 2
Applications of Wireless Sensor Networks in Healthcare

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ABSTRACT

Health is the key capability humans require to perceive, feel, and act effectively, and as such, it represents a primary element in the development of the individual and the environment humans belong to. It is necessary to provide adequate ways and means to ensure the appropriate healthcare delivery based on parameter monitoring and directly providing medical assistance. Wireless sensor networks (WSNs), commonly known as the internet of things (IoT), enable a global approach to the healthcare system infrastructure development. This leads to an e-health system that, in real time, supplies a valuable set of information relevant to all of the stakeholders regardless of their current location. Economic systems in this area usually do not meet the general patient needs, and those that do are usually economically unacceptable due to the high operational and development costs. This chapter shows how recent advances in wireless networks and electronics have led to the emergence of WSNs in healthcare.

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INTRODUCTION

WSNs consist of spatially distributed autonomous devices to cooperatively monitor real-world physical or environmental conditions, such as temperature, sound, vibration, pressure, motion, pollution and location. This technology is also widely used by military applications, such as battlefield surveillance, transportation monitoring, and sensing of nuclear, biological and chemical agents. Recently, this technology has developed and been widely used in daily life as WSNs are low cost, low power, rapid deployment, have self-organizing capability and cooperative data processing, including applications for habitat monitoring, intelligent agriculture and home automation. The major components of a normal WSN sensor node are a microcontroller, memory, transceiver, power source and one or more sensors to detect the physical phenomena. The structure of the sensor node is generally divided into four major parts: sensing unit, processing unit, communication unit and power unit (Hejlová & Voženílek, 2013). A sensor node sends the measurement of the physical phenomenon to the sink which has bigger memory and processing power. Depending on the application scenario, sometimes extra hardware is added in the sensor nodes and a deployment strategy is devised. Normally, in applications for WSNs the environment is unpredictable such as hostile, with remote harsh fields or disaster areas, sometimes called toxic environments. Hence, no standard deployment strategy existed the deployment usually involves scattering or by possibly carrying out the application scenario (Brinis & Saidane, 2016). Despite their quick deployment and significant advantages over traditional methods, WSNs have to face various security problems because of their nature and the possibility of the presence of one or more faulty or malicious nodes in the existing network. There are many technically interesting research discussions involving WSNs, such as development of models and tools for the design of better WSNs architecture and elaboration of standard protocols in WSN adapted to work robustly on certain scenarios. However, one of the most important issues that remain subject to debate is security. The emphasis in this chapter focuses on security in WSNs. More precisely, the work focuses on investigating models preventing internal attacks on WSNs.

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