# Chapter 3
# Fog Computing and Edge Computing for the Strengthening of Structural Monitoring Systems in Health and Early Warning Score Based on Internet of Things

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## ABSTRACT

*Currently, with the implementation of IoT, it is expected that medicine and health obtain a great benefit derived from the development of portable devices and connected sensors, which allow acquiring and communicating data on symptoms, vital signs, medicines, and activities of daily life that can affect health. Despite the possible benefits of health services assisted by IoT, there are barriers such as the storage of data in the cloud for analysis by physicians, the security and privacy of the data that are communicated, the cost of communication of the data that is collected, and the manipulation and maintenance of the sensors. This chapter intends to deploy and develop the context of the IoT platforms in the field of health and medicine by means of the transformation of edge and fog computing, as intermediate layers that provide interfaces between heterogeneous networks, networks inherited infrastructure, and servers in the cloud for the ease of data analysis and connectivity in order to implement a structural health monitoring based on IoT for application of early warning score.*

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## INTRODUCTION

The new platforms, being a great collaborator and promoter of the new tools, models, instruments and appearances of the health sector (Marolla, 2018). The most implemented applications through IoT is the monitoring, monitoring and management of sector contents (Hsieh, Lee, & Chen, 2018). These applications show great problems according to the sensitive characteristic of the information that is managed. Some of the most representative issues of IoT implementation, in the e-health electronic health management systems, are due to the need for information privacy, secure communication in the media, authentication, protocols control, transport and service orchestration (Aghili, Mala, Shojafar, & Peris-Lopez, 2019). In addition to this the growth of these applications and users, can cause the growth of large volumes of data, which will require great resources or for their transport and analysis (Annamalai, Bapat, & Das, 2019).

IoT can define as a global infrastructure for the information society, which through available services enables the interconnection of physical and virtual objects based on interoperable business-to-business communication technologies (Networks, 2012).The IETF defines IoT as the Internet that considers simultaneous TCP / IP and non-TCP / IP sets and devices or items as objects "created" by single directives (Valdivieso, Peral, Barona & García, 2014). IEEE IoT in its Special Report on "Internet of Things" as defined: A device that connects devices with detection storage (Minerva, Biru, & Rotondi, 2015). Now redefine as a red that connects uniquely identifiable virtual and physical devices using new or existing communication protocols. Verify that dynamically configured devices or devices and user interfaces are accessible from a distance from the Internet (Mirón Rubio et al., 2018).

## INTERNET OF THINGS

Currently, science debates about the Internet of Things (IoT) paradig, given the technological advance and the increase of application fields (Lee & Lee, 2015). Even more so when technological trends and innovation at the global level, the results for the diversification of services for society and industry in general (Vögler Matrikelnummer, 2016a). Thus, applications based on the use of content, the possibilities in the services of smart and connected homes, industries 4.0, the orange economy, specialized medical care, health self-care, environmental monitoring, adaptive logistics, the national defense, the automatic transport and the cybersecurity (O. Salman, Elhajj, Chehab, & Kayssi, 2018) .

For the implementation of IoT there are different platforms, hardware and architectures, they are used for different providers, they are given the opportunity to have heterogeneous networks of inherited technology and a variety of them, or the means of communication, the formats of the data and the means of transmission (Cha et al., 2016; S. Lee, Bae, & Kim, 2017). On the other hand, interoperability becomes the priority of the integration of communication systems, the interconnected media, not only at a physical level, but at the level of applications and services (Jabbar, Ullah, Khalid, Khan, & Han, 2017; Bhattarai & Wang, 2018). As an alternative, IoT technology designers use protocols such as: ZigBee, Z-wave, LTE, Wi-Fi, Ethernet, X10, Bluetooth, among others; However, in the standard IoT application network (Minerva et al., 2015) it can be used as an intermediate manager between the legacy data networks and the final sensors.

The International Telecommunications Union (ITU), expected before 2020, the IoT platforms are around 50,000 million network devices (ITU Corporation, 2015). Forbes publishes that the prediction of the IoT markets for the year 2021 will be approximately 521 billion dollars, more than double the