Editorial

Trends in the Internet of Things

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The Internet of Things continues to set the pace of many aspects of the scientific and technological development worldwide. Moreover, it is expected to do so, at least, for the next ten years, according to forecasts that predict trillions of devices connected to the Internet [1]. In addition to influencing different factors of people's daily lives, this new vision of the world poses a series of challenges and opportunities that have an effect on general aspects of the economy and politics.

Market opportunities derived from data acquisition, processing, analysis, and storage open up a space where different social actors, from countries that are not major producers of technology, can participate in the productive chain through innovation and development [2]. This is possible if the academic, productive, and political sectors adequately prepare for such moment of transformation, although the gap - compared to developed countries - will remain.

In relation to other key moments of significant changes in technological development, the current favorable conditions enable more individuals to make the most of the economic dynamics offered by the IoT for two reasons. On the one hand, many device manufacturers have marketed a wide variety of low-cost, low-consumption sensors, actuators, and development systems. On the other hand, providers of cloud computing services have established a solid infrastructure for the development of the IoT in the short term.

Besides these stakeholders in the IoT ecosystem, who already have relatively well-defined markets and projections, there is a more varied group of actors exploring the potential of the IoT in several fields of application, from private life to decision making and policy development in large cities [3].

For example, home automation systems have grown enormously in recent years due to the introduction of hands-free devices such as Google Home or Amazon Echo, which use virtual assistants, real-time natural language processing, and artificial intelligence algorithms. Such electronics extended the market of actuators and sensors compatible with the technology; they enable to control lights, curtains and audio systems, and even "monitor" and water the plants. Together with smart appliances, these advances can result in an efficient home when used appropriately. Nevertheless, the sensible data produced by these devices could also fall into the hands of third parties and, consequently, IoT security is a very important topic.

In turn, in recent years, multiple technologies have been widely used in smart cities, which reduces the price of such electronic devices and allows local governments in developing countries to acquire them. For example, low-cost sensors can be bought and used to design

georeferenced air-pollution measurement systems in order to complement environmental control systems [4]. Thanks to this strategy, the spatial resolution can be improved and, unlike standardized systems based on gravimetry, such devices could send the information in real-time.

Traffic lights systems are a well-consolidated technology in smart cities, integrating cameras and dynamic cycles to improve mobility. In addition, some systems use sensors for pedestrian or bicycle detection and assign different times and priorities in the cycle. Specific intersections without traffic lights use sensors to detect pedestrians crossing the street to automatically show signals to warn drivers. Mobility information is displayed on a map and the metadata produced by users' smartphones is mixed with the traffic system in order to define the situation in the city.

Some smart cities use beacons for tourism, guiding visitors around the metropolis with their smartphones. This technology is also applied to indoor tours at museums, big hospitals, and even in supermarkets where products are highlighted. Other technologies for public on-street parking are being implemented to reduce traffic congestion. Smart cities also face a great challenge when it comes to reducing their energy consumption; therefore, automatic street lighting technologies are now attracting increasing attention. Likewise, the development of smart grids using renewable energy resources and energy efficient resources has been a relevant issue [5].

The industry is not disconnected from the IoT. From agriculture to construction, the Internet of Things is adopted for the purpose of improving productive processes. Smart farming uses the IoT to obtain data about weather conditions, monitor cattle and soil quality, and manage crops. That information allows farmers to control the performance of their staff and equipment, as well as the efficiency of the process. For example, locating heavy equipment and workers is important in construction and, as a result, beacons and other technologies are employed [6].

REFERENCES

[1] I. Yaqoob *et al.*, "Internet of Things Architecture: Recent Advances, Taxonomy, Requirements, and Open Challenges," *IEEE Wirel. Commun.*, vol. 24, no. 3, pp. 10–16, Jun. 2017.

[2] S. Leminen, M. Rajahonka, M. Westerlund, and R. Wendelin, "The future of the Internet of Things: toward heterarchical ecosystems and service business models," *J. Bus. Ind. Mark.*, vol. 33, no. 6, pp. 749–767, Jul. 2018.

[3] S. Kar, B. Chakravorty, S. Sinha, and M. P. Gupta, "Analysis of Stakeholders Within IoT Ecosystem," in Advances in Theory and Practice of Emerging Markets, 2018, pp. 251–276.

[4] J. Botero-Valencia, L. Castano-Londono, D. Marquez-Viloria, and M. Rico-Garcia, "Data reduction in a low-cost environmental monitoring system based on LoRa for WSN," *IEEE Internet Things J.*, pp. 1–1, 2018.

[5] B. N. Silva, M. Khan, and K. Han, "Towards sustainable smart cities: A review of trends, architectures, components, and open challenges in smart cities," *Sustain. Cities Soc.*, vol. 38, pp. 697–713, Apr. 2018.

[6] A. M. Carmona *et al.*, "Instrumentation and Data Collection Methodology to Enhance Productivity in Construction Sites Using Embedded Systems and IoT Technologies," in *Advances in Informatics and Computing in Civil and Construction Engineering*, Cham: Springer International Publishing, 2019, pp. 637–644.