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"IoT FOR ENVIRONMENTAL VARIABLES IN URBAN AREAS"

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Abstract

The purpose of the Internet of Things (IoT), is to make permanent and inclusive the access and interaction with a great variety of devices connected to Internet: the network of networks. The Internet of Things has a lot of applications as for example those for household, vigilance, sensor monitoring, actuators, intelligent displays, vehicles, among others. This in turn allows for the potential development of a large number of applications consuming information coming from these connected objects, which in turn are capable to provide new services to the citizens, enterprises and the public administration. The purpose of this research work is the development of an architecture based on the internet of things (IoT) that allows the use of sensors with the capacity to collect information related to environmental variables and additionally permitting the easy integration with any other types of sensors associated with measurements for a smart city environment, with the aim of providing data on which the conditions of the different environments of a smart city can be determined. Using this information as a tool we intend to improve the process in decision making, starting with the improvements in city design to the increase and improvement of commodities for the city inhabitants.

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1. Introduction

The Internet of Things (IoT) makes it possible the permanent and inclusive access and interaction with a great variety of devices connected to Internet. The Internet of Things has a lot of applications for the home, vigilance, sensor monitoring, actuators, smart displays, vehicles, among others. This in turn allows for the potential development of a large number of applications with the possibility to take the information consuming from these connected objects, which can in turn provide new services to the citizens, companies and the public administration^{1,2}. Today there exists in many cities a lot of problems related to the routinary process of management. These problems are generally related to the different ways the processes are conducted as for example the vehicular chaos, the little information supplied to the citizens or the effectivity on the peremptory changes of facts without previous notice to the citizens. The permanent search for more and better ways to improve the previously mentioned aspects. Within the search it is included the development and implementation of the smart cities. This new approach, make processes faster to convert cities into conscious entities. According to³ "the smart cities are critical for the sustainable urban development." This will reduce many critical problems concerning the difficult problems of urbanizing as for example, traffic jams, environmental contamination, natural resources limitation. A smart city is characterized by the appropriate and efficient use of information and the technological infrastructure for communications, human resources, social as well as industrial resources for the economic development, social/environmental sustainability and a high quality of life of the inhabitants of the cities.

On this point of view, the flow of information to keep the population actualized would be the ideal of an organized society, to have knowledge and some type of forecast of our environment, that would it easier, more efficient and objective the process of decision making. It is this way that the smart city application could be pointed out as the compulsory way towards the evolution of the cities^{4, 5}. The management of the parameters coming from the data under this approach makes this process real. One of these parameters is the environmental, today very remarked in our cities. Pollution, in this case the quality of the air and the acoustic waves, results in the deterioration in our urban centers. Development produces some inconveniences, which if not treated properly could make the life unsustainable in big cities. In large cities like Pittsburgh in the United States, Windsor in Canada, Mexico City, Norilsk in Russia, and Linfen in China⁶ have high pollution levels. All this coming from the industrial development, the buildings and motor vehicles. The environmental contamination makes breathing a major problem, thus reducing the life expectancy of the inhabitants in these cities, due to the proliferation of lung diseases generated by the low quality of the air. The control of air quality and acoustic waves, helps the improvement of natural environment and obviously the life quality. That is why the developing cities are creating mechanisms to monitor these parameters and let their analyzes be known by the citizens, with the purpose to generate understanding on the impact of environmental contamination.

The concept of Smart Cities⁷ is bound to the physical objects integrating it, configured so that they can receive and send information through time, information that will bring options to the citizens for decision making on a particular topic. An example of this would be the page of the daily level of contamination, which would be permanently updated by means of contamination sensors, depending on the particular moment of the day⁸. Another example following this line would be the control of the meteorological information, which generate updated information for the citizen, on the atmospheric conditions. This way the generation of information produced by sensors in the different environments of the cities such as traffic and planning can be maintained.

Taking into account what has been said, what we are looking for in this investigation work is the development of an architecture based in the concept of the internet of things (IoT) which allows the management of sensors with the capacity to collect information related to environmental variables allowing for the easy integration of any type of sensors associated with the measurements for a smart city environment. With the purpose of providing data to determine the different environments if a smart city. By using this information as a tool, it is expected to improve in decision making, ranging from improvements in city design to the increase and improvements in the well being of the city's inhabitants. The main contribution of this article is the development of a multipurpose architecture based

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