DOI: 10.20396/revpibic.

Environmental Sensors and Internet Of Things: A Proof Of Concept

Eric Nakabashi Ogata, Luis Fernando de Avila

Abstract
This research aims to present a proof of concept at the core of the internet of things, developing an application with toxic gas sensor and integrating a monitoring solution in the industrial environment.

Key words:
Internet of Things, Environmental Sensors, Online Monitoring

Introduction

With the advancement of the urbanization process and the industrial activity, it is noticeable that it is increasingly necessary to understand how environmental parameters influence the health of the planet as a whole. Toxic gases are being disseminated in various types of activities, and in the case of industrial activity, the hazards are greater and require more and more accurate monitoring. In the field of safety of work, the use of sensors to monitor ammonia, carbon dioxide and benzene are even more needed, but with the advent of industry 4.0 (fourth industrial revolution) it is possible to combine enhanced technologies that are increasingly consistent and able to provide a large amount of data for online platforms, triggering alarms instantly and ensuring security in the industrial environment more effectively.

One of these technologies is called Internet of Things, which can be defined as the concept of objects that connect each other over the internet [1], characterizing the next evolution of the web [2]. The main objectives of the research are: the study of parameters that indicate environmental degradation in order to identify the most suitable sensors for each type of monitoring; Develop individual simulations with the sensors, understanding their operation and applying metrics (standard for identification of degradation, classification of degradation, alerts for environmental control) for the parameter studied; Integrate the applications developed in the core of the Internet of Things, which means, to making the sensor send data in real time to an online platform.

Results and Discussion

For the acquisition of environmental data, the MQ-135 toxic gas sensor was used. With the use of the Arduino microcontroller board and an Ethernet or GPRS shield, it is possible to establish data communication and make connection with the Online platform. Ubidots online platform is used to receive the data and later to register alarms and build dashboards. Figure 1 shows the architecture used to develop the application:

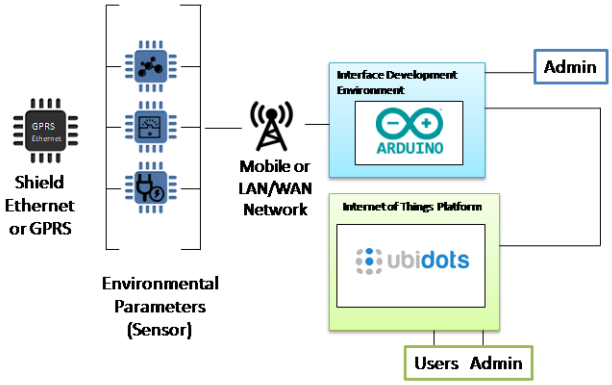

Figure 1: The Architecture of the application.

Once the data is in the platform and the operation of the sensor is validated, specific solutions can be defined for individual use of the measured parameters. For example, it is possible to use the sensor as an ammonia meter, ensuring that the levels of this gas are stipulated in static environments over the Ethernet connection or as equipment used by a technician moving along the monitoring path, over a GPRS connection. Both will ensure data collection in real time and allow monitoring not only individual, but to all users who have access to the online platform.

Conclusions

It was possible to develop an application in the context of the internet of things in order to provide a solution for monitoring toxic gases in an industrial environment. The proof of concept was made and the objectives were achieved.

Acknowledgement

The Authors thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), for the support.

---

[1] Charith P., Arkady Z., Peter C. and Dimitrios Georgakopoulos: Context Aware Computing for The Internet of Things: A Survey. IEEE Communications Surveys & Tutorials (**2014**).
[2] Dimitrios G., Prem P. J.: Internet of things: from internet scale sensing to smart services. Springer-Verlag Wien - Computing (**2016**).