

Internet of things as a solution for production and disaster activities in the province of Los Ríos

Internte de las cosas, como solución para la producción y las actividades de desastres en la provincia de Los Ríos

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Abstract—Teaching strategy presented aims to provide the contextualized learning computational intelligence in correspondence with the needs of the information technology students. This proposal is the output of a theoretical model that structure the process of teaching and learning of computational intelligence, from the dialectical relations between its components and it is manifested as a set of actions structured in three stages, defining their respective goals to transform the work, being done in the traditional way, towards new demands of renewal in the continuous improvement that is required, in correspondence with the needs that the learning of mathematical content has for the College student, social significance, and practical value. Assumes the contextualization as a contextual approach to the teaching of computational intelligence. The application of the teaching strategy in teaching practice confirmed its relevance, feasibility, and effectiveness through the use of empirical methods: evaluation by expert criteria, consultation with users and the pedagogical experiment in its pre-experiment variant, demonstrating favor the contextualized learning of the subject computational intelligence in the information technology students.

Keywords—Contextualized, strategy, process.

Resumen—La estrategia de enseñanza presentada tiene como objetivo proporcionar el aprendizaje contextualizado inteligencia computacional en correspondencia con las necesidades de la información estudiantes de tecnología. Esta propuesta es el resultado de un modelo teórico que estructura el proceso de enseñanza y aprendizaje de la inteligencia computacional, desde la dialéctica relaciones entre sus componentes y se manifiesta como un conjunto de acciones estructuradas en tres etapas, definiendo sus objetivos respectivos para transformar el trabajo, que se realiza en manera tradicional, hacia nuevas demandas de renovación en la mejora continua que es necesario, en correspondencia con las necesidades que el aprendizaje de contenido matemático tiene para el estudiante universitario, importancia social y valor práctico. Asume el contextualización como un enfoque contextual a la enseñanza de computacional inteligencia. La aplicación de la estrategia docente en la práctica docente confirmada su relevancia, viabilidad y efectividad mediante el uso de métodos empíricos: evaluación por criterios expertos, consulta con los usuarios y el experimento pedagógico en su variante pre-experimento, demostrando favorecer el aprendizaje contextualizado del sujeto de inteligencia computacional en los estudiantes de tecnología de la información.

Palabras Clave—Contextualizado, estrategia, proceso.

INTRODUCTION

Ecuador in a great percentage is clearly agricultural and the province of the Rivers is an area where it's greater the heading is of the agriculture, therefore the importance towards these zones is vital. The Coast Region has 4 million hectares of land devoted to crops. Of this area, 21.38 % is used for short cycle crops - corn, cassava, rice, cotton, tropical fruits; 26.99 % for permanent crops - banana, African palm, coffee, cocoa, sugar cane; And 51.62 % for pasture. The zones that are not suitable for agricultural production are the peninsula

of Santa Elena and other sites bordering Peru, which are dry regions with unfavorable climatic conditions.

The production of Ecuadorian rice in 2014 decreased by 4.45 % compared to the year 2013, this behavior is different from the evolution of international production and was due to the presence of diseases and climatic conditions that affected the crop. This decline in domestic production affected exports as they were significantly reduced. In addition, it caused an increase in the prices at the level of producer and wholesaler. In the Los Rios Province, the main source of production in agriculture. In the plains, there are crops of rice, sugar cane, corn, African palm, passion fruit, papaya, etc. And in the higher parts, there are excellent conditions for export crops: coffee, cocoa, bananas, bananas.

The cities of the Ecuadorian coast due to their geographical

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characteristics and their level of location above sea level, tend to flood especially in winter times accentuated much more when the phenomenon of the child occurs, this causes that the existing rain systems in the cities collapse.

Today, there are more than 7 billion people living on the planet, a figure that is expected to reach 9600 million by 2050 (United Nations, 2013). By then, the middle class - which typically has more money available for food, increasing demand - could reach 5000 million by 2030 (OECD, 2012). At the same time, the number of people living in cities will increase from 50 % today, to almost 70 % in 2050. The Colombian case is dramatic. After years of mass displacement, about 74 % of the population lives in urban areas and this trend is increasing. If these numbers are maintained, food production should double in a relatively short period of time, with fewer people directly involved in food production, to meet the demand of the world's population (United Nations, 2009).

The internet of things especially in the agricultural field makes it possible to generate useful information for crops, temperature controls, pest controls in general. Also applying this technology to certain catastrophe situations can prevent disasters floods, landslides, earthquakes, among others.

Technology and agriculture have become so much all that it is possible to collect a large amount of important information at a minimal cost, thus obtaining an agricultural operation more oriented to the process of statistical information and thus potentially use it to improve productivity and become more efficient.

By means of processes it is possible to get the tasks automated and with this, a precision and intelligent agriculture is achieved, based on sensor and actuator technologies, the use of which is well established in other industries and applied in agriculture in other countries.

The solution provided by the internet of things with agriculture is that you can instantly capture, store and analyze the real data and display them so that you can give an optimal response for the user to automate the processes.

The process of developing technologies that make decisions can provide multiple benefits in situations that affect the population in a catastrophic way, which can also monitor inconveniences in winter times, due to the fact that the investigation in the province of the Rivers was able to analyze that it has A high rate of recorded flood cases. The research aims at analyzing the internet implementation of things in agriculture and catastrophic situations that can be prevented and controlled in the Los Rios province.

For this analysis is used the observation and direct methods, to apply a prototype of technology and the influence on it.

The study can recommend the application of internet technology of things to improve the life status of a population, since its main source of income is agriculture, in this case, the province of Los Ríos which has a high percentage of Agricultural production and has a high rate of flood problems in winter times.

RELATED WORK

Automation has always been a fundamental part of the progress of many processes today, these processes improve the

quality of service and immediate care for a population or crop.

Monitoring the soil is no longer a myth rather it is something common today, knowing its conditions help researchers to look for new ways to deal with employee negligence and manual systems.

The internet of things is not only limited to buildings, homes or smart devices many companies have adopted this technology to their businesses businesses or tasks a sample is Michelin tire company incorporating sensors in the tires of trucks that could send information via SMS or email about the condition of the tires, this led to better service.

Companies like these understood that it was not only hardware or software, this also has to do with services Esther Murrow, CEO of the consultancy Alineum, specialized in coaching and creation of growth strategies for companies.

The average consumer in a developed country has more than a dozen devices in their environment, including appliances, computers, cars and communication devices, but less than 1 percent of devices in the world are currently connected.

By 2020 there will be 500 million devices connected to the Net, of which only 17 % will be computers or telephones, the remaining 83 % will be part of the so-called Internet of Things (IoT).

Among work related to research there are many places where the cultivation is automated, Students of the mechatronics career at the Instituto Tecnológico de Querétaro (ITQ), which is part of the National Technological Institute of Mexico, developed an automated scale hydroponic greenhouse system with control of temperature, humidity, substrates (proteins and minerals) and irrigation Recreates environments and climates ideal for producing vegetables or fruits.

It consists of TH sensors, which are for temperature and relative humidity. It is very economical because we save approximately 50 percent of the water that is spent in other irrigation systems.

The irrigation located by drip is one of the most used for the great variety of crops in the province is based on applying small flows of water under pressure by dripping (emitters) on a reduced soil volume and generating a very interior water consumption to any Another kind of irrigation (Moreno, 2015).

In order to create efficient pipeline schemes in the affected areas, a flood early warning system is necessary. The system must be able to measure and predict water behavior in order to generate flood warnings in communities, giving them enough time to act. In addition, flood warning systems can be used to improve and develop water management in the region.

Countries such as Italy have an alert hydro-meteorological system and real-time flood forecasting in the Piedmont region The Po River Authority, a governmental inter-agency group, established a strategic plan to operate a SAT for flash floods / landslides for Piedmont. Authorities created a map of relative risk of flooding within the plain that incorporates topography and land use. The idea was to identify those hydrological basins that were vulnerable to floods, flash floods and landslides and assign them a relative risk category. The Piedmont alert system evaluates and issues alerts.

The system of cultivation under an automated greenhouse provides a micro-climate suitable for the production of fruit,

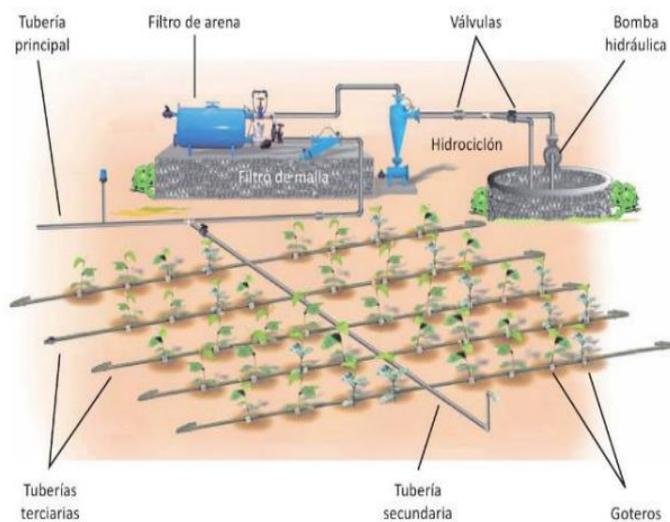


Figure 1. Système d'irrigation au goutte à goutte.

Source: <https://fr.wikipedia.org/wiki/Micro-irrigation>.

flowers and vegetables among others. The advantages of the system of automated greenhouses are the higher productivity per square meter, the guarantee of quality production, efficient control of pests and diseases of the crop, greater control of environmental factors, to be able to produce out of season, to have Environmental conditions to produce wicked crops, have more opportunity to market high quality crops in a competitive market (Oliveira et al., 2017).

Something as simple as using technology connected to help farmers to irrigate effectively could reduce water used for agriculture, save farmers and help protect one or more resources from around the world. It appears, then, that Internet technologies of things are doing much more than connecting our dolls and cars to the Internet. And this is just the beginning (Chris Neiger, 2014).

METHODOLOGY

For flood control, the early alarm method was used and a prototype design of a SCADA System (Supervision, Control, and Data Acquisition) was installed, and different wireless devices were installed. Wireless cards were installed in pumping stations, electronic boards with humidity sensors, electric pumps, among other devices.

This design works with three sensors introduced in the swimming pools, when the liquid level reaches the second sensor lights the submersible pump of the pool that controls the storage of rainwater in winter stages, thus allowing its emptying, this could Measuring engine start times with automated processes compared to manual starting routines.

Analysis of the time taken by the automated processes of the different pumping stations.

For the use of automation of agricultural sites in the province of Los Ríos, a prototype of a wirelessly controlled humidity sensor system was developed to monitor the level of soil moisture since the crops depend on it. Radio links were installed on the prototype. Humidity sensors and electronic

Table 1. Manual From

Nº	Muestra 1 Forma manual X1 (minutos empleados)
1	20
2	21
3	22
4	23
5	24
6	5
7	240
8	45
9	47
10	69
11	60
12	120
13	180
14	70
15	120
16	67
17	80
18	70
19	170
SX1	1473
TOTAL	77,52632

Source: Prepared by the authors.

Table 2. Automated form

Nº	Muestra 2 Aplicación automática X1 (minutos)
1	1
2	1.5
3	2
4	2
5	1
6	1
7	1
8	0.5
9	1
10	1
11	2
12	3
13	1
14	2
15	1.5
16	2
17	1
18	0.3
19	2
SX1	26,8
TOTAL	1,41053

Source: Prepared by the authors.

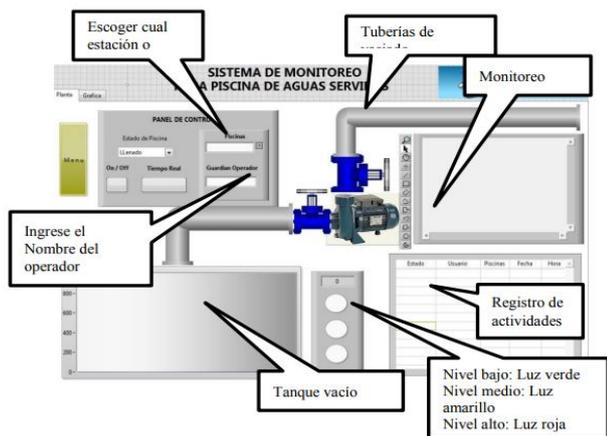
devices, which depends on the humidity of the soil to execute the ignition of the irrigation pumps before installation of pipes.

With this, you can have information to measure the effectiveness of the sensors and to be able to regulate that so much of water must be placed in the ground for the plantation that is planted. By optimizing irrigation, a better use of nutrients and water is made so that, in the end, it has a more productive crop.

The rice plant is very sensitive to drought from the stage of initiation of the panicle to the spike; Reduces yield by increasing sterility of the spikelet.

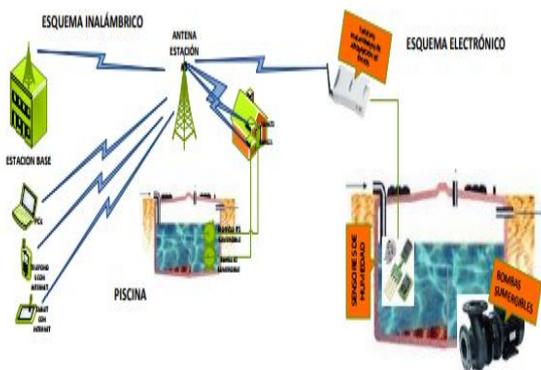
There are concerns about two issues related to rice and the environment. First, environmental changes such as global warming, high infrared radiation, and others were suggested

Figure 2. Menu screen to control the different stations



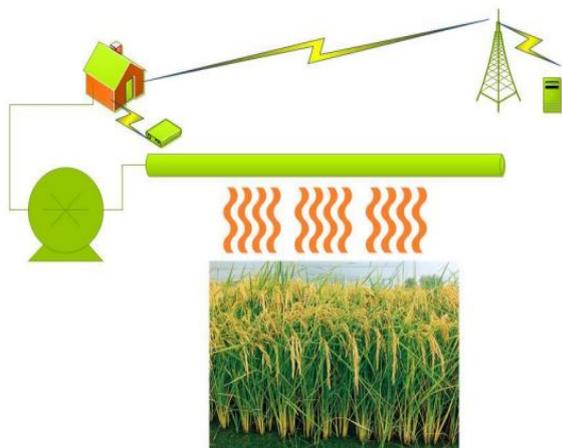
Source: Prepared by the authors.

Figure 3. Flood control system with automation of rainwater pool pools



Source: Prepared by the authors.

Figure 4. Automation control system for the ignition of water pumps in rice fields



Source: Prepared by the authors.

as factors that adversely affect rice growth and yield.

Secondly, rice paddies, especially those flooded, were accused of releasing large quantities of methane and nitrous oxide, among others.

As with other crops and based on the knowledge that each crop requires sufficient moisture to achieve higher productivity, rice also requires a minimum of soil moisture, to obtain an acceptable yield. When water deficiencies occur during the development of the crop, the yields decrease significantly. Therefore, in areas where rainfall is not sufficient to remove the crop and water is not available for irrigation, it is advised that the best producer does not plant rice because the risks are significantly increased. It is considered that a precipitation of about 1,200 millimeters well distributed during the crop the cycle is enough to obtain good yields.

Table 3. Análisis de la profundidad de agua máxima para los diferentes cultivos de arroz

TIPOS DE CULTIVOS DE ARROZ	PROFUNDIDAD MÁXIMA DEL AGUA (cm)
Arroz de temporal de tierras bajas	0-50
Arroz de temporal superficial de tierras bajas	5-15
Arroz de temporal de profundidad media de tierras bajas	16-50
Arroz de aguas profundas	51-100
Arroz flotante	101-600
Arroz de tierras altas	Sin agua estancada

Source: Barker y Herdt.

RESULTS

In the two prototypes of automation for both alarms and for region, it was possible to verify with the obtained information, that improves the performance of the tasks, therefore they are applicable to these services, what allows that the Internet of the things can be of great Help in the population of the province of the Rivers to develop researchers that contribute to solving the inconveniences that were presented that are very common in the province, such as lack of technology in agriculture, and automatic flood control.

DISCUSSIONS

We describe the first prototype as a SCADA system (Supervision, Control, and Data Acquisition), designed in LabVIEW in a computer with minimal characteristics and that previously receives the signals of the installed sensors and the output of the corresponding signals all this connected by an antenna Wireless that allows communication of the entire system.

The second prototype uses a SCADA (Monitoring, Control, and Data Acquisition) system, designed in LabVIEW, which also connects to wireless cards to control the signals of the humidity sensors that, through the software, allows the irrigation pump to be turned on. The corresponding sowings. The input of the data sent by the sensors are evaluated according to the program and subsequently, the orders of the same will be the output data for the respective activity of the electronic cards that emit the signal to ignite the pumps.

The Internet of Things refers to a system that relates devices such as computer systems, digital or mechanical machines,

objects, animals or people which have something unique that identifies it in the world of the internet and the ability to transfer information in the Internet. Network without requiring personnel. Cars, kitchen appliances, medical devices and environmental sensors can be connected to the Internet of Things. As the Internet of Things grows in the next few years more devices are added and each activity is oriented to connectivity.

Control applications are a fundamental part, such as smart houses, connected vehicles. However, it is the industrial applications of the Internet of Things that can, in the end, overshadow consumer applications with potential business and socio-economic impact. Given its relative importance, this study focuses on the Internet that connects devices to automate agricultural tasks and specifically in their application

CONCLUSIONS

The research applies the internet of things automates agricultural processes, implemented through wireless communication, which is a fundamental part of progress to improve the production and control of tasks that are vital for a population.

The prototype perfectly demonstrates the good performance of the Internet technology of things, automating the tasks of ignition of the pumps that control the level of the pools and the region. The prototype demonstrated that the 802.11 standards can be used without any inconvenience for voice and video data communication and remote control. The use of the SCADA system with intelligent technology decreases the response time of early alarms for the rainwater pools of the cities that have this flood control.

It is recommended to design systems for the control of the pumping systems and to implement sensors that detect the early filling of the swimming pools that the city possesses for the control of flood, to design the software of control and registry of information, to carry a statistic of activities in The different stations and above all implement the wireless network based on the studies of the geographic area that covers the city.

At present, it is necessary to couple many systems of automation in agriculture, especially the productive sectors that are an important part of the economy of a population, such as short-cycle rice crops.

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