MACHINE-TO-CLOUD MANAGEMENT SYSTEM OF DISTRIBUTED HETEROGENEOUS DEVICES

TECNOLOGÍA PATENTADA

LICENCIADA EN EXCLUSIVA

DATOS DE CONTACTO:

Research Results Transfer Office-OTRI
University of Alicante
Tel.: +34 96 590 99 59
Email: areaempresas@ua.es
http://innoua.ua.es

RESUMEN

The Specialized Processors Architecture Laboratory (SPA-Lab group) research group from University of Alicante has developed a system which improves remote control systems processes of different kind of devices geographically spread, through the Cloud. This suggested system provides independence between application layer and remote-controlled devices.

Its main advantage is the homogeneity of mechanisms and functions for their interaction with the devices no matter their nature and the scope of the application. The supplied technology may be used in sectors needing monitoring and controlling a wide range of devices.

The research team supplies the companies both the “know-how” for the necessary adaptation and implementation of the system and the possibility of licensing this technology.



INTRODUCCIÓN

Many industrial sectors have a stock of devices geographically spread out which form their business processes, such as: Food (vending machine network), Reprography (printer and photocopier network), Lifts, Car rental... These machines usually require maintenance tasks to be carried out regularly for a proper tune up, re-supply, checking and performance monitoring.

Remote control of these machines allows establishing management frameworks of distributed resources which improve quality of service (QoS) and productivity. Both information and communication technologies and the Internet have allowed us to adapt this model to other sectors such as remote healthcare or the management of both traffic and urban furniture in smart cities.

However, the wide range of devices, manufacturers and models available in each sector may hinder the use of one remote management system which would be able to handle a system made of devices of different nature flexibly.

Current solutions in the market may be efficient in its particular field of application; however, they lack enough flexibility to face heterogeneous problems in the architecture and communication protocols. That prevents being able to work, generally speaking, with devices of different nature.

DESCRIPCIÓN TÉCNICA

Specialized Processors Architecture Laboratory (SPA-Lab group) Research Group from University of Alicante has developed a system which improves remote control systems processes of different kind of devices geographically spread. Furthermore, the

group has established a standard method and a common architecture based upon Cloud Computing frameworks on which remote management models are built even for devices related to different sectors. Thus, all the problems caused by the incompatibility between protocols and communication schemes are overcome and their management processes are moved to the Cloud. This means that the communication Machine-to-Cloud (M2Cl) will be easier for remote management, no matter the kind and features of the machines.

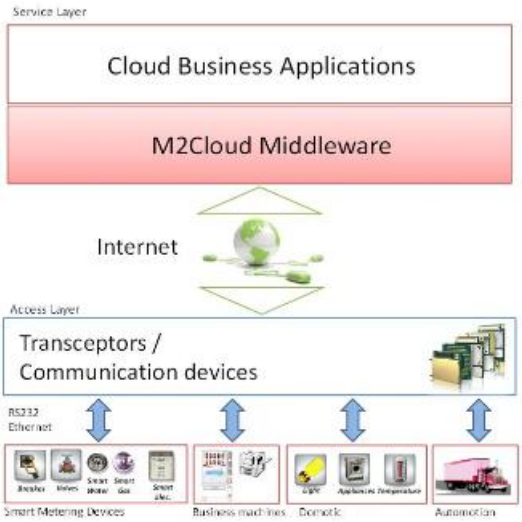

Figure 1. General architecture of the system

In order to fulfill this objective, the team has analysed thoroughly the requirements of the management of advanced applications related to different industrial sectors and has studied an heterogeneous set of connected devices to identify the basic aspects that determine their functioning.

From the information collected it has been developed a remote management system which, as its main characteristic, transforms management requests and communications with the devices by using the M2Cl architecture through a common interface for the user application layer and a common gateway for all the connected devices. The user management applications are configured as a middleware layer; these ones have got a single partner for all the devices they manage and the devices have got a single gateway which connects every application. This middleware layer allows us to establish a homogeneous management system for every device.

To carry out the suggested management system, it has been defined the necessary architecture (see figure 1) which, in broad terms, consists of machines to be controlled remotely, a transceiver, M2Cl architecture and the high-level applications in charge of the tasks of controlling, supervising, monitoring and managing the devices network connected in the middleware layer.

The communication between the applications and the devices is achieved through the Internet by using a transceiver or communication element similar to that shown in the figure 2:



Figure 2. MTX-65+G transceiver

In figure 3 you can see the system communication flows.



Figure 3. System communication flows

VENTAJAS Y ASPECTOS INNOVADORES

MAIN ADVANTAGES OF THE TECHNOLOGY

• The system facilitates the management of different devices, even from different sectors, using a standard method and a common architecture.

• The system provides more flexibility to basic Machine-to-Machine (M2M) architecture to solve, at lower cost, problems of interaction between devices of different nature and to take advantage of synergies of a distributed environment based on cloud computing.

• By moving the management processes to the cloud, the system enables ubiquitous administration of distributed machines. These processes can be implemented through web applications or other Internet services.

• The system allows to configure distributed resource management structures to improve quality of service and business productivity.

• The system improves operational efficiency and reduces communication costs with devices since it is not necessary that they are permanently connected.

• The system facilitates and accelerates the integration of high level management applications and the interaction with machines using Internet communication protocols.

INNOVATIVE ASPECTS

• The system allows remote management of the heterogeneous machines through a communication protocol which is independent of the communication, machine and business sector types.

• The system overcomes the disadvantages resulting from incompatibility between protocols and communication schemes.

• The system implements a flexible communication protocol that meets the demands of information in both directions. The interactions with devices are restricted to those necessary for the tasks of management and control.

• If need be, the system can adapt the message format to the specifications of each sector or can use a standard format to joint characteristics.

• The system simplifies the coordination of the transaction between devices and applications through a high-level management system in the cloud.

• The system provides a management system of massive transaction schemes.

ESTADO ACTUAL

The Research Group has developed a prototype of the system implemented with all modules showed in Figure 1. The system can be tested and simulated. Also there is a detailed documentation of the specification.

The system can be deployed into the cloud and implemented via software for each business sector.

Specific customer's requirements could be considered to determine the best way of implementing the system.

APLICACIONES DE LA OFERTA

The system can works in several environments and it is especially useful in software companies and industrial sectors characterized by management needs of a machines fleet geographically distributed. For example, the following sectors:

• Food industry (vending machines network)

• Office machine sector (printers and photocopiers network)

• Elevators industry

• Car rental companies

• Traffic Control elements, street lighting and furniture for Smart City contexts providers.

• Health Telecare providers.

• Intelligent metering systems providers.

• Domotic and Smart building sector.

COLABORACIÓN BUSCADA

The group is interested in:

• Patent licensing agreement.

• Research and Development (R&D) project for technical cooperation in order to adapt and implement the technology to company applications.

• Subcontracting project for technical assistance and training in order to adapt or deploy the technology into the company customer environments.

• Transfer project for knowledge cooperation or patent license in order to use, manufacture or marketing the technology.

• Spin-off partners.

DERECHOS DE PROPIEDAD INTELECTUAL

This technology is protected by **patent.**

• Application Number: 201400648

• Application Date: 06/08/2014

PERFIL DEL GRUPO DE INVESTIGACIÓN

This patent is the result of the work developed in the specialized processor architectures laboratory research group:

(SPA-lab, http://www.dtic.ua.es/spa-lab/).

The Specialized Processors Architecture Laboratory (SPA-Lab group) is aimed to adapt the architectural aspects of the processor to the computer specifications of the systems.

The research topics include basic and applied researching that especially consider computer problems of the nearer geographic context. These aims cover the research & development of specialized architectures to address computing applications with specific needs, such as real-time, high security or scientific computation applications.

The members of the research group have Ph. Degree and have experience managing both public and private research projects. They are author of numerous research contributions published in conferences and scientific journals.

SECTORES DE APLICACIÓN (13)

Agri-food and Fisheries
Biodiversity and Landscape
Construction and Architecture
Pollution and Environmental Impact
Marine Studies
Pharmacology, Cosmetics and Ophthalmology
Computer Science, Language and Communication
Engineering, Robotics and Automation
Toys
Wood and Furniture
Medicine and Health
Water Resources
Transport and Automotive