PACTECH

Applications for Building/Home Automation, WISE/PMC, ZigBee & More

Vol. EC01_2016

Specific Applications

Generator Management System in Taipei 101 Building

FCU (Fan-Coil Unit) Control System Solutions

Lighting & Air Conditioning Service in KTV

UniDAQ - Development Software of ICP DAS PC-based I/O boards

WISE Controllers Play a Key Role in the Hydraulic Control

WISE Application in Fire Alarm Linked System

WISE in the Application of Aquaculture

PMC-5151 used in Power & Air Conditioning Monitoring System Application in Campus

New ISaGRAF Application: Air Pollution Monitoring and Alarm System

PDS-700 Applications - Remote Access to Multiple Distributed RS-485 Devices

HMI and Device Control on a Large Screen using a Small PAC

ICP DAS ZigBee Application for Wireless Monitoring in a Conventional Factory

ICP DAS ZigBee I/O Pair-Connection Products and Applications

Introduction of tSH-700 Function & Application

PROFIBUS Gateway Product and Application

ICP DAS Solution for Monitoring and Controlling Groundwater Pumping Systems

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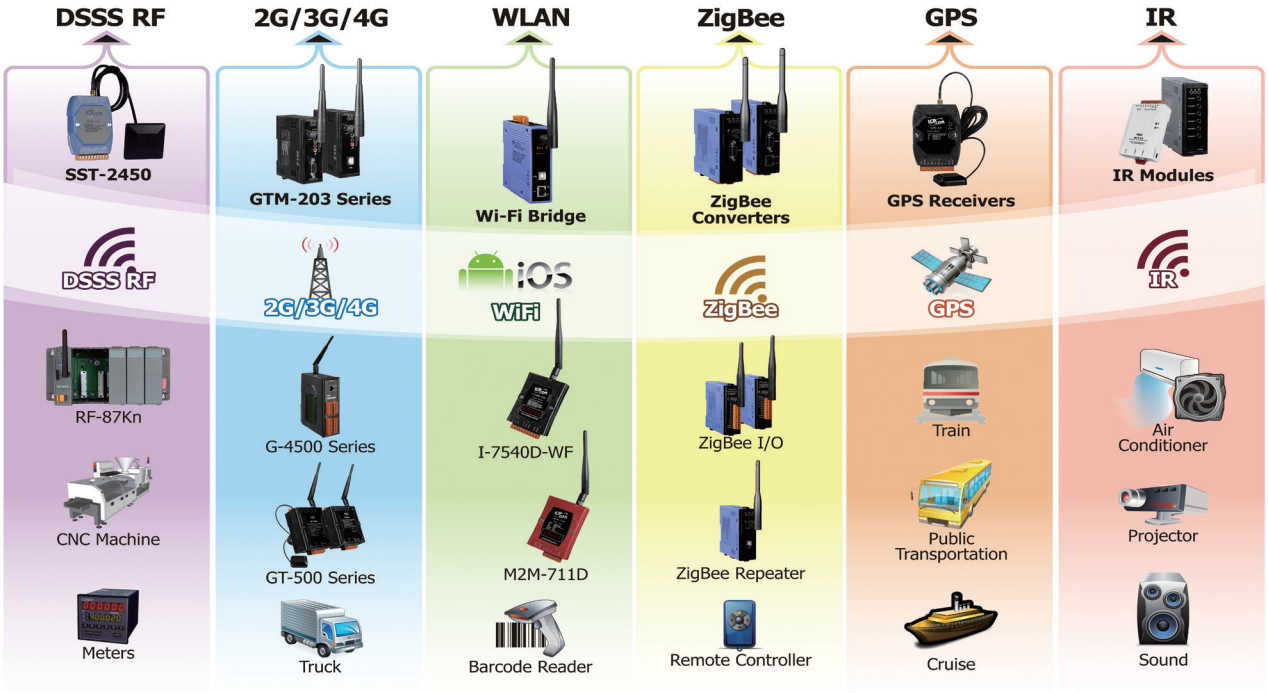
Industrial Internet of Things

WIRELESS



Fieldbus Solutions

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Application for Generator Management System in Taipei 101 Building

By JE Wang. Cony Yu

The generator management system provides full range of control and management of the generators; the SCADA system with user-friendly interface is designed for easy operations. The system architecture adopted coherent communication, therefore when new features is added in the future, as long as the module or hardware uses the same communication, the new features can be seamlessly added without affecting the existing architecture. The distributed modules can function independently to acquire hardware status information, and can be replaced without shutting down the system.

System Architecture

Hardware

WinPAC programmable controller

The generator management system is designed to receive data from the front-end modules through Modbus protocol (protocol commonly used in industrial applications) via RS-485, and then actively transfer the data to the back-end graphic control via Ethernet for data gathering. The following shows the general specifications of WinPAC:

◆ Software and Develop
- Windows CE 5.0
- .Net Framework 2.0
- SDK Provided

◆ Hardware
- CPU: PXA270
- SDRAM: 128 MB
- Flash: 96 MB
- Slots for I/O Modules
- Operating Temperature: -25℃ to +75℃
- Built-in VGA Port (Resolution: 1024 x 768)

◆ Communication
- RS-232/485
- Ethernet (Could be expanded)

◆ Backup
- Dual Watchdog
- Dual Ethernet
- Dual Power Input
- Dual SRAM (512 Kbytes)

M-7051D - 16-channel Isolated Digital Input Module with Display

M-7051D is a module for front-end data acquisition. In this case, it will receive the digital signals of the sensors from the generator devices or the peripherals devices of the generator, and send back these data such as: the error status and operation status of the generator, and the high/low voltage of the battery, etc. via RS-485 to the Win-PAC controller.

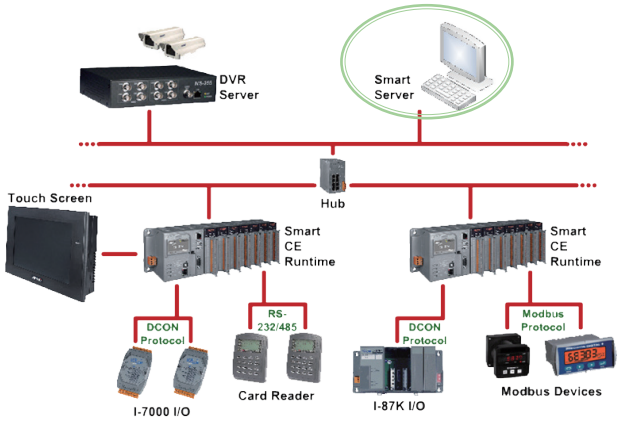
The following figure shows the specifications of the M-7051D:

M-7017Z-10/20-channel Analog Input Module with High Voltage Protection

M-7017Z is a module for front-end data acquisition. In this case, it will receive the analog signals of the sensors from the peripherals devices of the generator, and send back the data such as: the liquid level of the oil tank via RS-485 to the WinPAC controller. The following figure shows the specifications of the M-7017Z.

Software

Software Architecture



Smart CE Runtime(Distributed and Independent Operation)

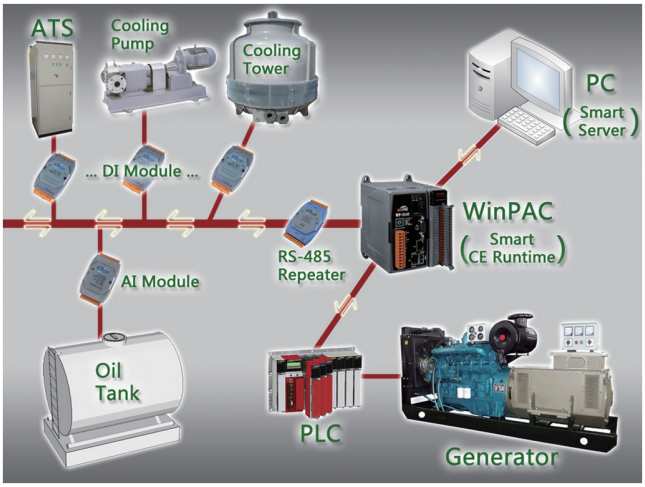
Smart CE Runtime is able to collect information of the WinPAC module and the expansion module. It can process I/O logic and provides a simple HMI for display, please refer to the following link for the devices that is currently supported: http://smart.icpdas.com/smart4/spec.htm

Smart Server

Smart Server can connect to multiple Smart CE Runtimes, so the information for each Smart CE Runtime can be shown on the PC in real time as event alarms. The users can design customized HMI, record the events for management, review, and report generation, etc. 6 levels of access control with different authorities can be set for the users. And it can also connect to video recorders such as: DVR and NVR, etc., when an event occurs, the related scene can be displayed accordingly. Please refer to the following link for the video reorders that is supported currently: http://smart.icpdas.com/smart4/spec.htm ◦

Network System

System Architecture



Monitoring Loading/Unloading System

The loading/unloading information of the system can be sent to the WinPAC by Quantum PLC via Modbus RTU protocol. The Smart CE Runtime software on the WinPAC will take care of all of the received information and send them to the PC (with Smart Server installed) for further analysis for graphic control display and management.

Monitoring Information of ATS, Cooling Pump, Cooling Tower, Oil Tank

The hardware status information can be received by the distributed modules such as I-7051D, I-7017Z ... etc., and then can be sent to the WinPAC via RS-485. The Smart CE Runtime software on the WinPAC will take care of all of the received information and send them to the PC (with Smart Server installed) for further

analysis for graphic control display and management.

Benefits for Using WinPAC(Smart CE Runtime) as Centralized Data Acquisition

In the past, the data acquisition for PLC is usually performed by PC. And each time when the PC crashes, the users will be difficult to get the real-time information of the devices. And generally the PC tends to increase the risk of crashes as the time of use increases; it is quite risky.

WinPAC is industrial level computer that is able to survive in harsh environments, it is relatively stable comparing to the PC. In this case, the WinPAC can be used for the data collection; and the Smart CE Runtime on the WinPAC will provide a basic HMI for user to view the information, when the PC experience a crash, the WinPAC can still function normally and the user can view the data from the HMI provided by WinPAC without missing any important information. After the PC is resumed and connected to the network, it can seamlessly take over the management and display of the data immediately.

Extensibility:

◆ The same communication protocol is used for easily adding new features if required

The same communication protocol is used in this system, therefore if required; it is easy to add new features to the system without modifying the existing system as long as the newly added modules or hardware support the same communication protocol.

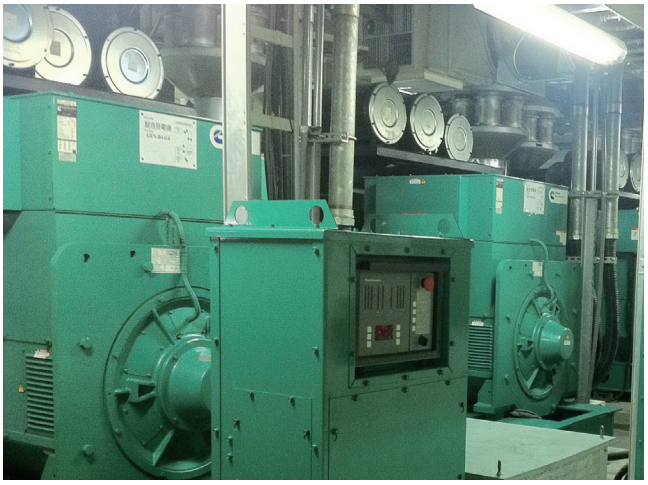
◆ Modularized design for easy maintenance and expansion

The information of hardware status can be acquired by the distributed modules. For the functionality of each distributed module is independent, if one module is damaged, it can be replaced directly without affecting the operation of the existing system. The users can also freely choose different modules that are specifically designed for different functionality when adding new features to the system, and the newly added modules can be immediately accessed via the existing network.

◆ Expansion Suggestions

1. GSM module

In the conventional architecture, the information is always acquired via viewing HMI on the PC. When the user is away from the PC, they can’ t get the latest information. In addition, the system won’ t automatically send out the information therefore when unusual events occur, the user may not be able to get the important information in real time.

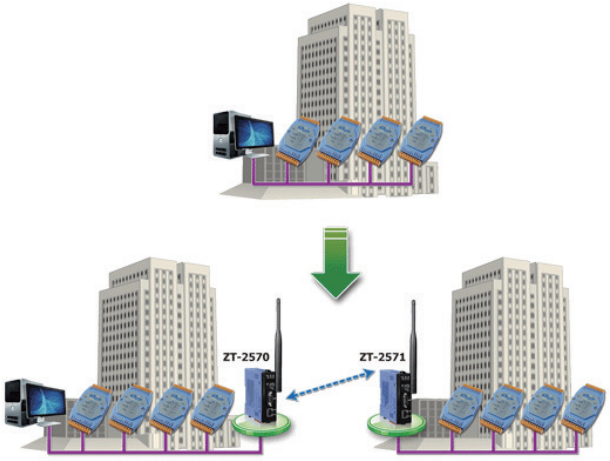


Nowadays, almost everyone has a cell phone, and the pervasive nature of cell phones brings real-time access to information in automation applications. With the GSM module, the user can preset to send messages right away when unusual events occur. The related personnel can be notified in real time for immediate response.

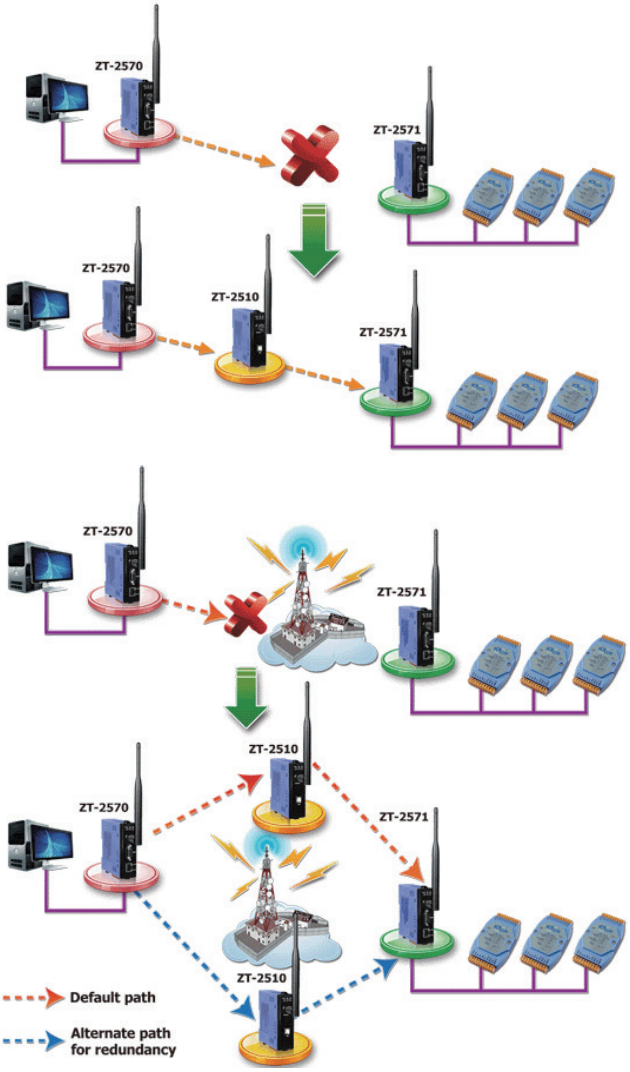
2. Wireless Module (ZigBee)

Wiring deployment is always a big issue when upgrading the old systems to new ones or when adding new functions to an existing system. Especially in harsh environments where wiring deployment is extremely difficult and may be expensive; with wireless modules such as ZigBee modules, the wiring problems can be easily solved and the cost can be reduced.

- ZigBee I/O Module
  The information of the status of the devices are acquired and then transmitted via ZigBee module.



- Zigbee Converter Module
  The ZigBee communication can be transferred to standard RS-485 protocol by using Zigbee Converter Module.
- ZigBee Repeater Module
  The ZigBee Repeater Module can be used to reduce the noise and strengthen the signal.



FCU (Fan-Coil Unit) Control System Solutions

By Cony Yu

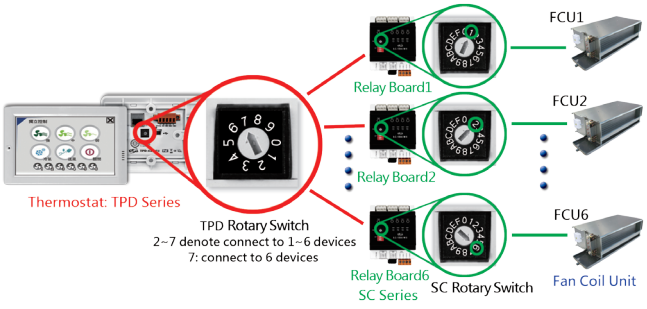
Introduction

FCU(Fan Coil Unit) is widely used in commercial building for air conditioning system, with relay board and thermostat, it allows easy control for maintenance of comfortable indoor temperature. To maintain user-defined indoor temperature, the relay board is used for controlling the air flow of FCU, and the flow rate of the two-way valve or three-way valve for the chilled-water and hot-water in FCU. And the thermostat provides users interface for easy set-up of the temperature and air flow.

Features

One-to- many Architecture to Quickly Build a System

A TPD supports up to six SC series control modules, to set up how many SC series control modules to be connected to one loop, just adjust the rotary switch (2 to 7) on the back of the TPD (2 to 7 indicates connecting to 1 to 6 relay boards), and then set up the loop address (1, 2, 3, 4, 5, 6) on the front of each SC series control module to complete the settings.

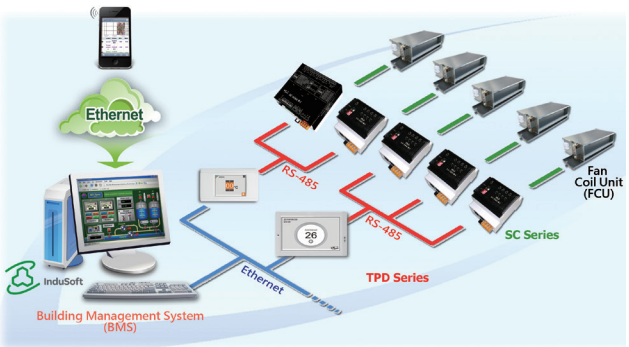


No programming required & intuitive interface

The TPD preloads 15 operation pages with full-range features. With the intuitive interfaces, no programming is required for users to set up operations such adjusting temperature or start/stop the FCU. In addition, the preloaded interfaces also make it easy for operations in schedule setting, temperature compensation and remote control, etc.

Seamless Integration with Buildings Management System (BMS)

Unlike the commercially available thermostat that requires installation of network concentrator when integrating with the Building Management System; the TPD series can be integrated with the Building Management System directly via Modbus TCP protocol by Ethernet; therefore lower the complexity of system implementation and reduce the future maintenance/operation costs.



Product Information

TPD Series

The TPD series is equipped with high-resolution touch screen, RTC, and a variety of communication

interfaces, including RS-232/RS-485, Ethernet and USB. The TPD series provides HMIWorks development tool that can be used to design ladder diagrams for softPLC logic for TouchPAD. A single TouchPAD becomes a touch HMI device which runs ladder logics.

TPD-433	4.3” Color Touch Screen, Suitable for the Outlet Box in United States, Support PoE, RTC (RoHS)
TPD-433-EU	4.3” Color Touch Screen, Suitable for the European 86 x 86 mm Outlet Box, Support PoE, RTC (RoHS)
TPD-283U	2.8” Color Touch Screen, Support PoE, RTC (RoHS)

Relay Board

The ICP DAS SC series control module in FCU works not only as a relay board, it also provides functions such as: assigning network address, switches testing, delay of power output. And with the TPD series color TouchPAD (works as thermostat, preloaded with intelligent control procedures), in addition to temperature setting function, it can also perform various functions such as: schedule setting, temperature compensation, remote control, and remote schedule setting, etc. The users can experience a more visual upgrade interface with intelligent features that mechanical or monochrome LED HMI cannot achieve.

SC-4104-W1	4-channel Relay board, support 3 speed Fan Coil Unit, power 100W or less, and 1 cold water (or hot water) valve (RoHS)
SC-6104-W	4-channel Relay board, support 3 speed Fan Coil Unit, power 500W or less, and 1 cold water (or hot water) valve (RoHS)
SC-6105-W5	5-channel Relay board, support 3 speed Fan Coil Unit, power 500W or less, and 1 cold water vale & 1 hot water valve (RoHS)
SC-4104-W1-AC	4-channel Relay board, support 3 speed Fan Coil Unit, power 100W or less, and 1 cold water (or hot water) valve , AC power supply (RoHS)
SC-6104-W5-AC	4-channel Relay board, support 3 speed Fan Coil Unit, power 500W or less, and 1 cold water (or hot water) valve , AC power supply (RoHS)
SC-6105-W5-AC	5-channel Relay board, support 3 speed Fan Coil Unit, power 500W or less, and 1 cold water vale & 1 hot water valve , AC power supply (RoHS)

BMS (Building Management System)

InduSoft Web Studio SCADA software has been widely used in Building Automation applications and has been proved that it is powerful, and with integrated collection of automation tools including all building blocks needed to implement building automation projects. It can design, monitor and control the building automation systems in all kinds, such as: schools, communities, hospitals, drug store, warehouse and residential buildings. By using InduSoft Web Studio, the system can be designed to connect and communicate to devices from most manufactures. It supports more than 240 device drivers (including BACnet and Modbus) and it also supports integrating to OPC DA, OPC UA and OPC .NET 3.0 software as well.

Development Package for Windows	Development Package for Building Management System based on Windows, Windows Embedded or Windows Embedded CE systems.
Runtime Package for Windows	Runtime Package for Building Management System based on Windows or Windows Embedded systems.
Runtime Package for WinCE	Runtime Package for Building Management System based on Windows Embedded CE system.

Lighting & Air Conditioning Service in KTV

By JE Wang

Nowadays, KTV has become one of the most popular entertainment places for modern people. In order to win and keep customers, automation control has been introduced to enhance services already provided and create add-on values by providing new services.

System Description

Lighting control and air conditioning are the most important parts for indoor entertainment places, especially for KTV private rooms, lighting control usually plays an important role in creating pleasant atmosphere and air conditioning helps to get rid of odd smells and adjust temperature to makes a comfort environment.

Lighting Control System

In the past, when it comes to the design of lighting control system, the designer usually tries to break down the operations into as many details as possible; and the user has to perform a lot of operations to manually adjust and turn on/off multiple switches to achieve desired effect for specific lighting requirement. Nowadays, as the requirements of lighting control is getting even more complicated and people prefer simplified all-in-one-touch operation; a control panel with convenient one-click options to meet various lighting requirements is getting popular.

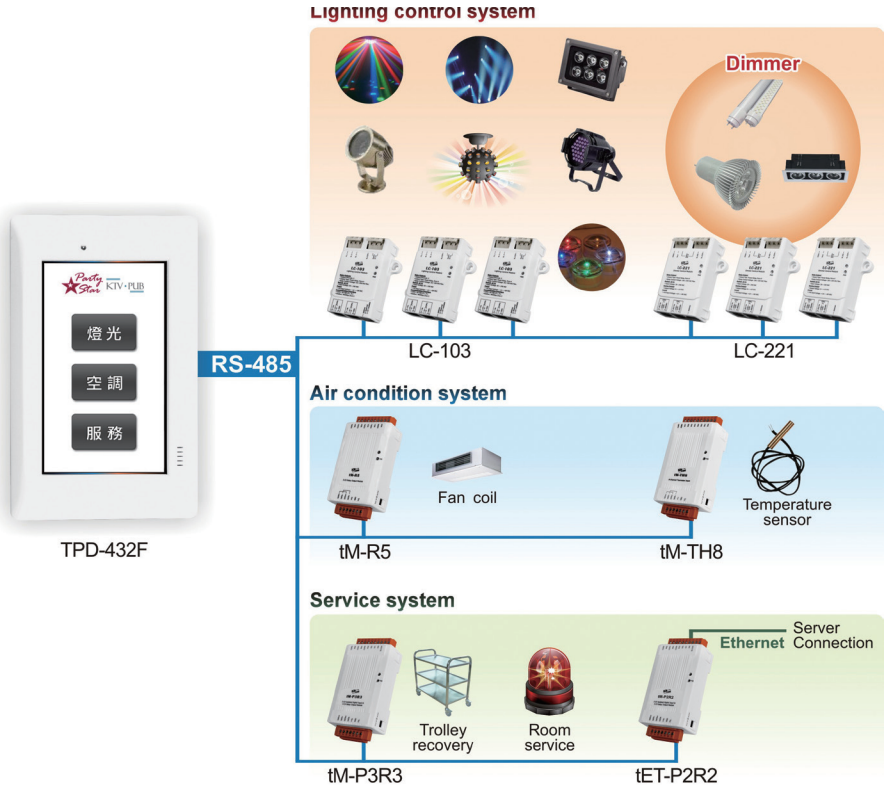
Air Conditioning System

Unlike typical window air conditioners used for general household, the air conditioning systems for large-scale applications such as commercial offices, buildings, shopping malls... and so on, usually adopt central air-conditioning systems. To adjust air conditioning in a certain region of a central air conditioning system, it usually requires the measurements of temperature sensors and to control the valves in accordingly, therefore, 3 major operations: “Start/Stop the Switches”, “Adjusting the Air Volume” and “Settings of the Target Temperature” are involved. In the past, the operations are done by turning on/off and adjusting the switches to control the air volume to achieve desired temperature; these operations are done by

analog regulations; the interface usually is lacking of guiding and the configuration is hard to perform. In recent years, as the advance of the technology, all these tedious operations can be replaced by an integrated control panel with intuitive interfaces for users to easily perform all the tasks.

System Architecture

In this system, the architecture is planned by carefully taking all requirements into consideration from an integrated view. The design for communication connections and modules selected are all planned by collected data based on the scale and needs. The communication protocol of this system is implemented by Modbus protocol. For ICP DAS provides a wide range of Modbus modules to select from, it is easy to choose Modbus modules with most appropriate I/O combinations to meet specific requirements based on the control operations and functions of the devices.



Lighting Control

Mode	Module	Description	Note
Digital Turn ON/OFF	LC-103	1-channel AC Digital Input and 3-channel Relay Output	Max. Load Current 5A
Analog Dimming Control	LC-221	1-channel Analog Output	0 to 10 V Dimmable Ballasts

Air Conditioning

Mode	Module	Description	Note
Valve Control	tM-R5	5-channel Relay Output	Max. Load Current 5A
Temperature Sensor	tM-TH8	8-channel Isolation Thermistor Input	Support Precon ST-A3, Fenwell U, YSI L100, YSI L300, YSI L1000, YSI B2252, YSI B3000, YSI B5000, SI B6000, YSI B10000, YSI H10000, YSI H30000 and User-defined

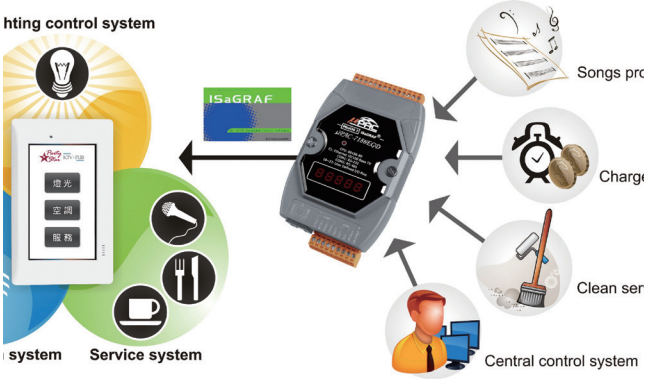
Service System

Mode	Module	Description	Note
Local Service Options	tM-P3R3	3-channel Relay Output and 3-channel Wet Contact	Max. Load Current 5A
Remote Service Signal	tET-P2R2	2-channel Relay Output and 2-channel Wet Contact	TCP Protocol, Max. Load Current 5A

System Integration

In this modern world, an independent system without distributed resources is gradually eliminated due to lacking of efficiency and flexibility. Small systems (subsystems) - as the basic parts of "Internet of Things" - feature flexibility, cost-effective and energy-efficient; therefore are getting popular. They can work independently and at the same time, provide interconnectivity communication if required.

This KTV system is also implemented based on the subsystem concept, each subsystem such as lighting control system, air conditioning system and service system can function independently and can communicate with each other. Under this distributed



architecture, ISaGRAF PAC works as an agent controller for information exchange and for linking actions and communication between newly-added service and the original operations of the KTV system.

A. Song Menu System

The songs stored in the database are classified as 4 modes: "bright", "soft", "romantic" and "dynamic". When a song is played, a signal will be sent to the lighting control system to launch the corresponding lighting control operations.

B. Timing System

The system can perform related operations of time charging of the room. It also can automatically turn on the equipments in the private room just right before the time start to charge. And when the room is idle, the equipments can also be automatically turned off for energy saving.

C. Cleaning Service System

In this KTV, dining carts and plates are used for dining services. When a private room requires cleaning service of the used plates, they can put the dining cart and used plates in a certain zone in the room, by infrared position detection, a message for cleaning service can be automatically sent for immediate notification.

D. Central Control System

The Central Control System requires perceiving full information of the private room status in real time for best arrangements and efficient operations. For the private rooms may be far from the control center, Ethernet is used for communications between the private rooms and the Central Control System.

Summary

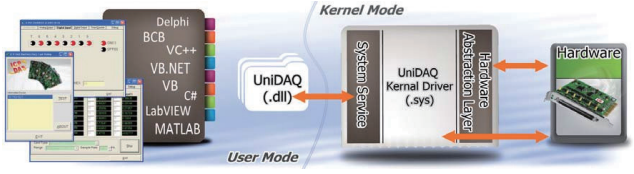
In this KTV application, each private room is equipped with lighting control system, air conditioning system, service ring (service system) as well as a few services for other purposes. In the original deployment, each service is independent from each other therefore requires an independent control interface (mounted on the wall) which makes users confused and hard for maintenances. By using ICP DAS solution, all services can be integrated and operations can be linked for most efficient performance. The resource and information can be shared, and the integrated data can be easily collected for further analysis and management from an overall perspective. The integrated touch screen HMI controller allows all control interfaces to be displayed as pages on a single touch screen; the operations can be simple, intuitive and efficient to bring customers a whole new better service experience.

UniDAQ - Development Software of ICP DAS PC-based I/O boards

By Dan Huang

Introduction

In order to meet all kinds of requirements from different applications, ICP DAS has developed more than 132 industrial control I/O boards. UniDAQ is a software tool specially designed by ICP DAS to help users easily implement applications for these I/O boards. UniDAQ supports most frequently used ICP DAS PCI Bus and PCI Express boards and the sample code in various languages such as Visual C++ 6.0, Visual Basic 6.0, Delphi, Visual Basic.NET, Visual C#.NET, LabVIEW and MATLAB are also available for users to quickly implement control applications of the I/O boards.



Features

Support Windows 8

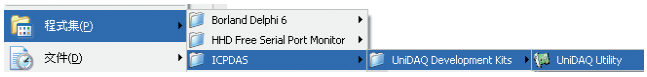
UniDAQ supports operating systems from Windows 2000 to Windows 8. It also provides kernel driver for 32 and 64-bit versions. It is compatible with various generations of Microsoft operating systems so that users can freely develop their applications without being limited by the operating systems they are using.

High portability in programming

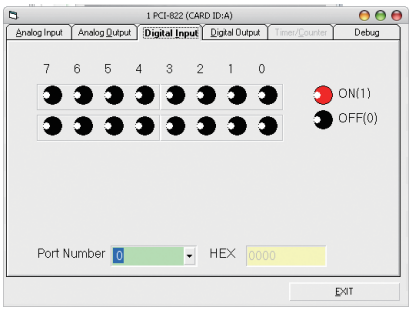
When undergoing a hardware downgrade or upgrade, if the board is UniDAQ supported, the original code can be seamlessly immigrated to the new hardware without hassle. It significantly reduces labor and time on the system redevelopment.

Built-in UniDAQ Utility in UniDAQ development software

For users who use ICP DAS board for the very first time or who are not familiar with coding, they can use UniDAQ Utility to test the board with ease. The UniDAQ Utility can be found in "All Programs" on the start menu after the UniDAQ is installed.



Start the UniDAQ Utility and the connected ICP DAS boards (with UniDAQ supported) will be shown on the Information Device section. Select the board to be tested, and click "TEST" to bring up the menu for testing options, and then select the function to be tested.



Summary

The UniDAQ provided by ICP DAS is a reliable development software tool with powerful functions and integrates most ICP DAS PC-based I/O Boards. The UniDAQ function library contains a wide range of API functions and a lot of sample code. The users don't have to spend a lot of time studying the register address to implement a project; they only need to write program to call ready-to-use API functions to easily develop applications for specific requirements.

For more detailed information about UniDAQ, please refer to the following webpage:

http://www.icpdas.com/products/Software/UniDAQ/unidaq.htm

WISE Controllers Play a Key Role in the Hydraulic Control

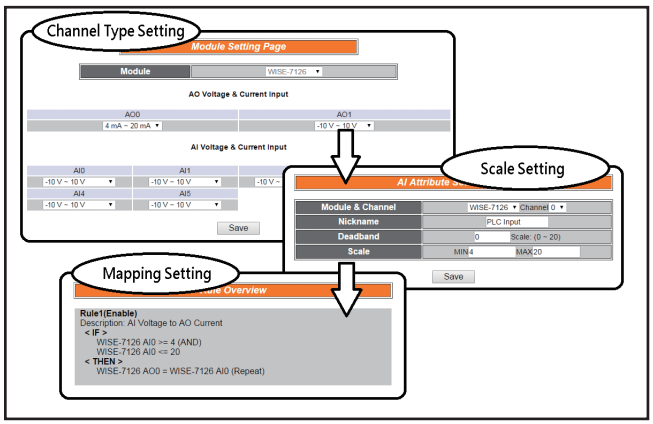
By Michael Lai

Introduction:

In the automation applications of hydraulic system, usually the PLC are used to perform the interlocking controls of various valves such as: proportional valves, solenoid valves and pressure reducing valves; so that the hydraulic system can function accurately. For the drive input range of each valve/switch may varied; some requires -10V to +10V input voltage and some may require 4 to 20mA for control operations. And most PLCs do not support such a large variety of type and range of signal output, thus causing difficulties in system design and implementation.

ICP DAS WISE-7126 offers two DI channels, 2 DO channels, 6 AI channels and two AO channels, and is equipped with functions that perform linear conversion for AI channel Input value and the AI channel value can be forwarded to AO channel for output operation. Thus, by using WISE-7126 as a signal converter between PLC and proportional valves, offers an easier, faster and more flexible way to implement hydraulic system applications.

Description:



In this scenario, the PLC used only supports -10V to + 10V voltage output, and the input current range for proportional valve is 4 to 20mA. The AI channel 0 of WISE-7126 is connected to the output of the PLC, and the AO channels 0 of WISE-7126 is connected to proportional valve.

On the web configuration interface of WISE-7126, set up the input signal type to be "voltage" and the input range to be "-10V to + 10V" for AI channel 0. And then convert the input range value from "-10 to 10" to "4 to 20" by using the linear conversion. Then set up the output signal type to be current and range to be 4 to 20mA for AO channel 0. Finally, set up IF-THEN-ELSE logic rule so that the value of AI channel 0 can be forwarded to AO channel 0 to output the output value. By WISE-7126, the signal conversion between voltage and current and the corresponding control between PLC and he proportional valve can be done with ease.

Why WISE?

- No programming required to implement logic settings of the system
- Build up the system quickly, dramatically reduce the labor and cost spent on system development
- Support multiple voltage and current ranges of Input / Output, and the values can be freely converted by a few simple steps of settings
- Easy-to-use setting and monitoring webpage for real-time information access

For more WISE product information, please refer to the following sites : http://www.icpdas.com or http://wise.icpdas.com.

Web Inside Smart Engine

WISE

Web Anywhere, Automation Anywhere!

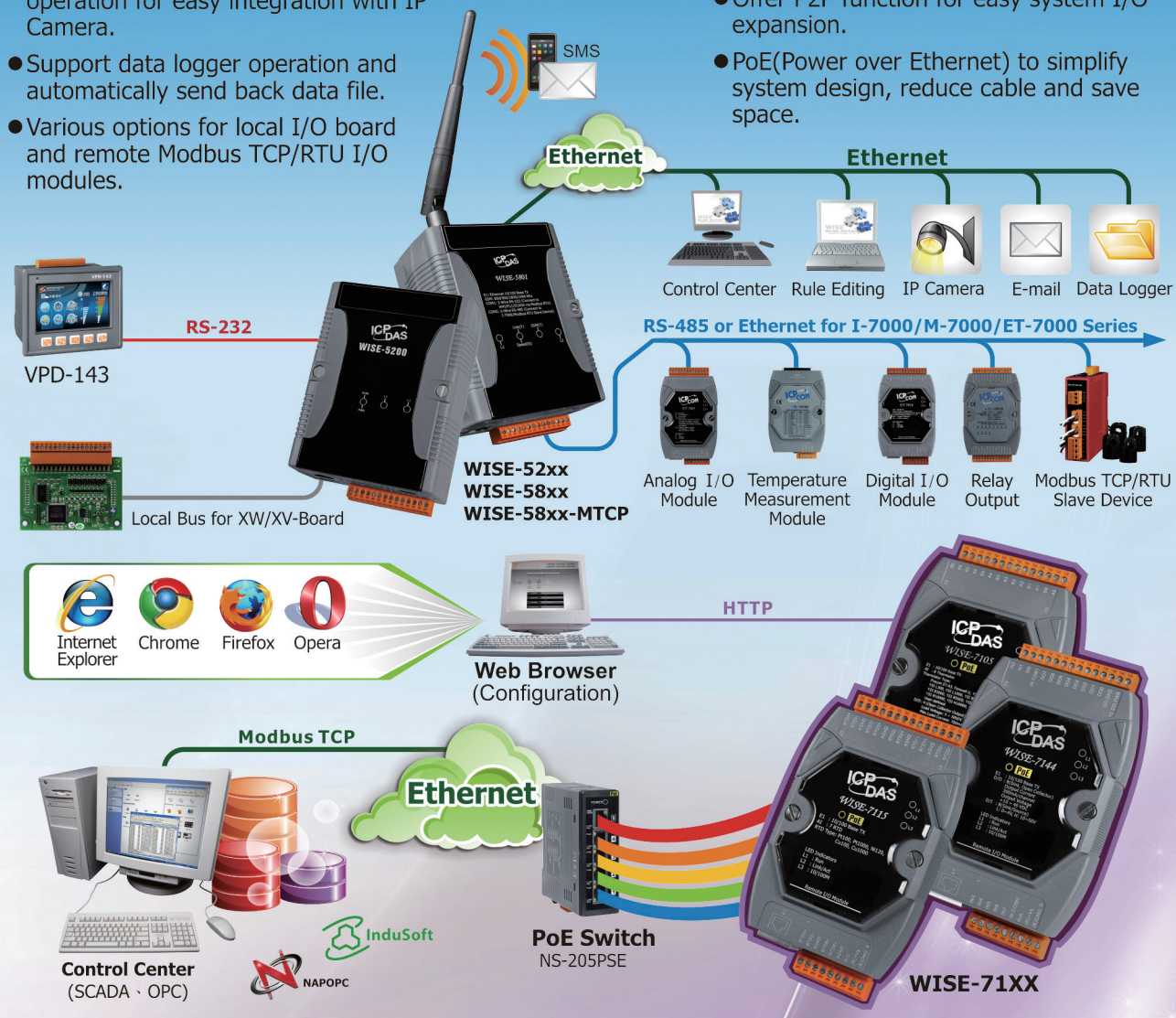
TAIWAN EXCELLENCE 2016 2013 2012 2011

WISE Controller Features

- Built-in IF-THEN-ELSE logic Engine Include: Timer, Schedule, SSL Email sending, mathematic operation...etc.
- Support Modbus TCP/RTU, SNMP V2c, SNMP Trap and MQTT.
- Support DDNS communication Mechanism.
- Support HTTP/CGI interaction operation for easy integration with IP Camera.
- Support data logger operation and automatically send back data file.
- Various options for local I/O board and remote Modbus TCP/RTU I/O modules.

WISE I/O Module Features

- Support Web Server, allows to perform configuration via browser.
- No more programming required; just click and get done.
- Modbus TCP Protocol for SCADA Software Seamless Integration.
- Support I/O, Counter, Timer, Email operations.
- Offer P2P function for easy system I/O expansion.
- PoE(Power over Ethernet) to simplify system design, reduce cable and save space.



ICP DAS CO., LTD.

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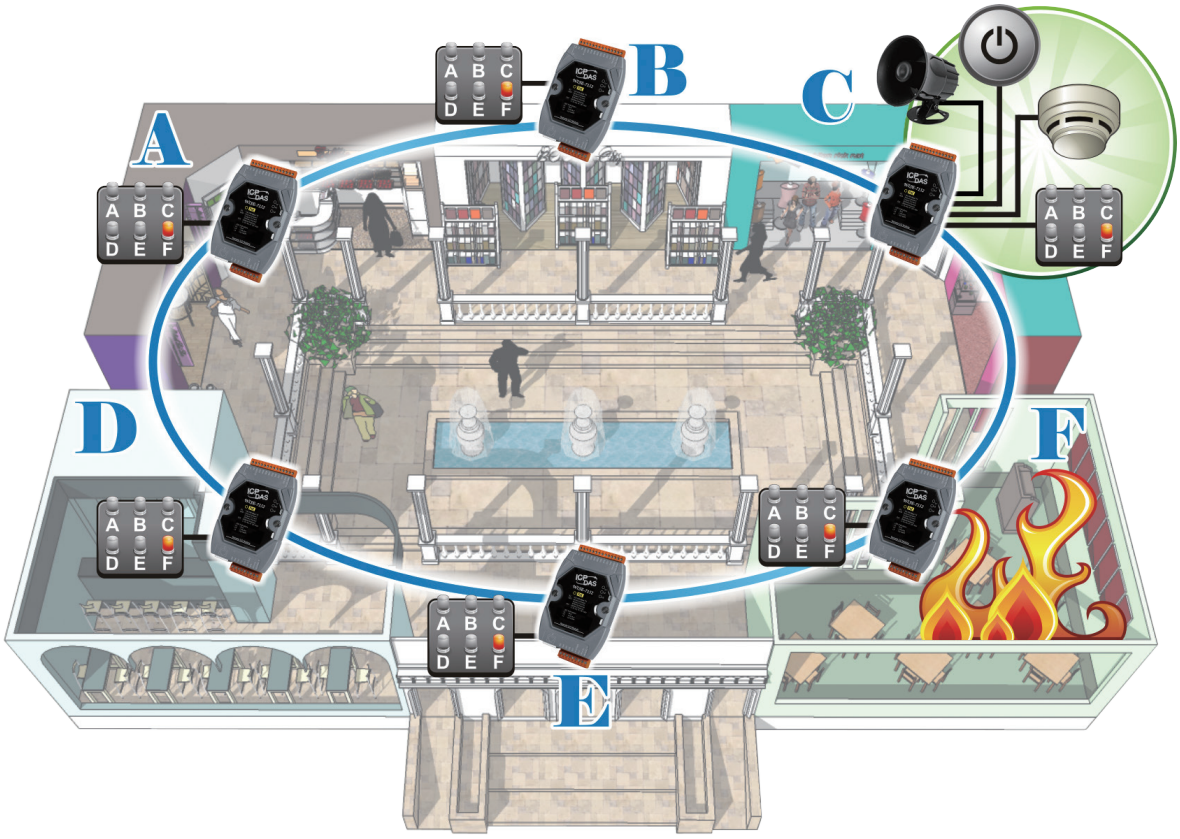
TEL：+886-3-597-3366 FAX：+886-3-597-3733 e-mail：sales@icpdas.com

WISE Application in Fire Alarm Linked System

By Alan Jhu

For decades fire warning alarm systems have proved very important in saving lives and property for fire accidents happen all the time and they can be fatal. By using the traditional fire alarm system, when a fire is detected, the system will send alarm to the control center notifying where the fire is. However the occupants nearby the fire scene will not receive the notification and may not know the exact location of the fire accident. They may not have enough information to find the best escape route or make best decision to protect their lives and property. By using WISE, the advanced P2P function can be used to build an intelligent fire alarm linked system to provide better solutions for fire alarm applications.



Description:

Assume that in a building, there are six regions require installing linked fire alarm system. Install 6 WISE-7152 modules in these 6 regions, and the DI channels on each WISE-7152 are connected to several temperature or smoke sensors to detect if a fire occur in that region. One dismiss alarm button that allows dismissing the alarm manually. At the same time, the DO channels on each WISE-7152 are connected to 6 warming lights and one warning speaker. Each warning light represents one region and shows if there is any unusual event that happening in that region.

The Advanced P2P function of WISE makes it

possible to share the data in real time. When any WISE-7152 detects that a fire accident occurs, it will immediately notify all WISE-7152 modules distributed in other regions. And the corresponding warning lights connected to each WISE-7152 will be turned on to show the exact region the fire accident occurs. The alert will be broadcasted to guide occupants nearby to leave the fire scene. At the same time, the related personnel also receive the notification and are able to response to the emergency immediately. After the fire accident is under control, the related personnel could push the dismiss alarm button to dismiss the alarm. At this point, all warning status on WISE-7152 modules will be reset to normal again.

In addition, in order to ensure the network linked operations function appropriately between WISE-7152 modules, another WISE-7152 could be installed to monitor the network status of all other WISE-7152 modules. Through the sharing information ability of advanced P2P function, this WISE-7152 will communicate with the other 6 WISE-7152 modules regularly, and the light indicators of the 6 DO channels on this WISE-7152 will show the network status of the entire fire alarm system. The operator could easily verify the network status of each module in this fire alarm linked system by the indicator and could quickly find and fix the module that is failed to response, therefore, ensure the normal operations of the system.

Device:

WISE-7152

WISE-7152 features 8 DI channels & 8 DO channels and 8-channel. It offers a user-friendly and intuitive web site interface that allows users to implement IF-THEN-ELSE control logic on controllers just a few clicks away; no programming is required. This module WISE-7152 supports Counter, Timer, Email operations and Modbus/TCP protocol to make seamless integration with SCADA software available.

Benefits:

- No programming required to implement logic settings of the system
- Build up a system immediately; it will dramatically reduce the time and labor spent on system development.
- By using Ethernet as the communication network for the entire system and with the POE feature WISE supported allows to reduce wiring.
- With advanced P2P function, multiple WISE modules could share channel information via network in real-time and could response immediately.

For more WISE product information, please refer to ICP DAS web page: http://www.icpdas.com or refer to WISE web page: http://wise.icpdas.com.

Download WISE Intelligent Controllers Brochure:

http://www.icpdas.com/root/support/catalog/pdf/Brochure/WISE-Brochure-en.pdf

WISE in the Application of Aquaculture

By Michael Lai

Introduction :

In recent years, due to global fisheries have been overfished, the marine resources is getting depleted rapidly. The development of capture fisheries is getting limited and the aquaculture production continues to be fast growing for being eco-friendly and sustainable. With the advances in technology and rising labor costs, greater levels of automation such as monitoring of environment in water temperature, oxygen content and pH value, etc. are gradually introduced into aquaculture production applications to reduce cost and improve the production. By using WISE-5801, you can always monitor the aquaculture ponds and perform routine control operations in accordance with the schedule. In addition, WISE-5801 is equipped with SMS sending function (for alarm report) and SMS command receiving function. Even in the absence of network connection, it still can perform two-way interactions to implement tasks in real-time.

Description:

For most aquaculture usually involves high stocking density, to avoid the death of aquaculture species due to lacking of oxygen, not only it requires using water pumps for water circulation to maintain water quality, it also requires water tankers aerators to increase the oxygen saturation. In this application, ICP DAS WISE-5801 is connected to water pumps and water tankers aerators, by using the Schedule function of WISE-5801, the aerators are set to start at 10:00 and stop at 17:00 daily for routine automatic aeration operations. When there is an unusual event or damage occurs, WISE-5801 will send SMS message to notify the operators for immediate response to the emergency and real-time maintenance. The operators can also send out SMS commands to WISE-5801 to start the water pumps and increase the pressure to produce more splashing water to increase oxygen saturation as an emergency alternative arrangement so that it won't cause massive death of the aquaculture species due to the malfunction of aerators. In addition, WISE-5801 can be connected to various devices such as temperature sensors or water quality sensors to monitor and record various status of the aquaculture ponds in real-time. And by setting IF-THEN-ELSE logic rules, it can immediately inform the operator when unusual events occur such as low temperature or unusual PH value measurement. By using WISE-5801, it will dramatically reduce the losses due to unexpected accidents and enhance the functionality of the entire aquaculture system.

Device:

WISE-5801

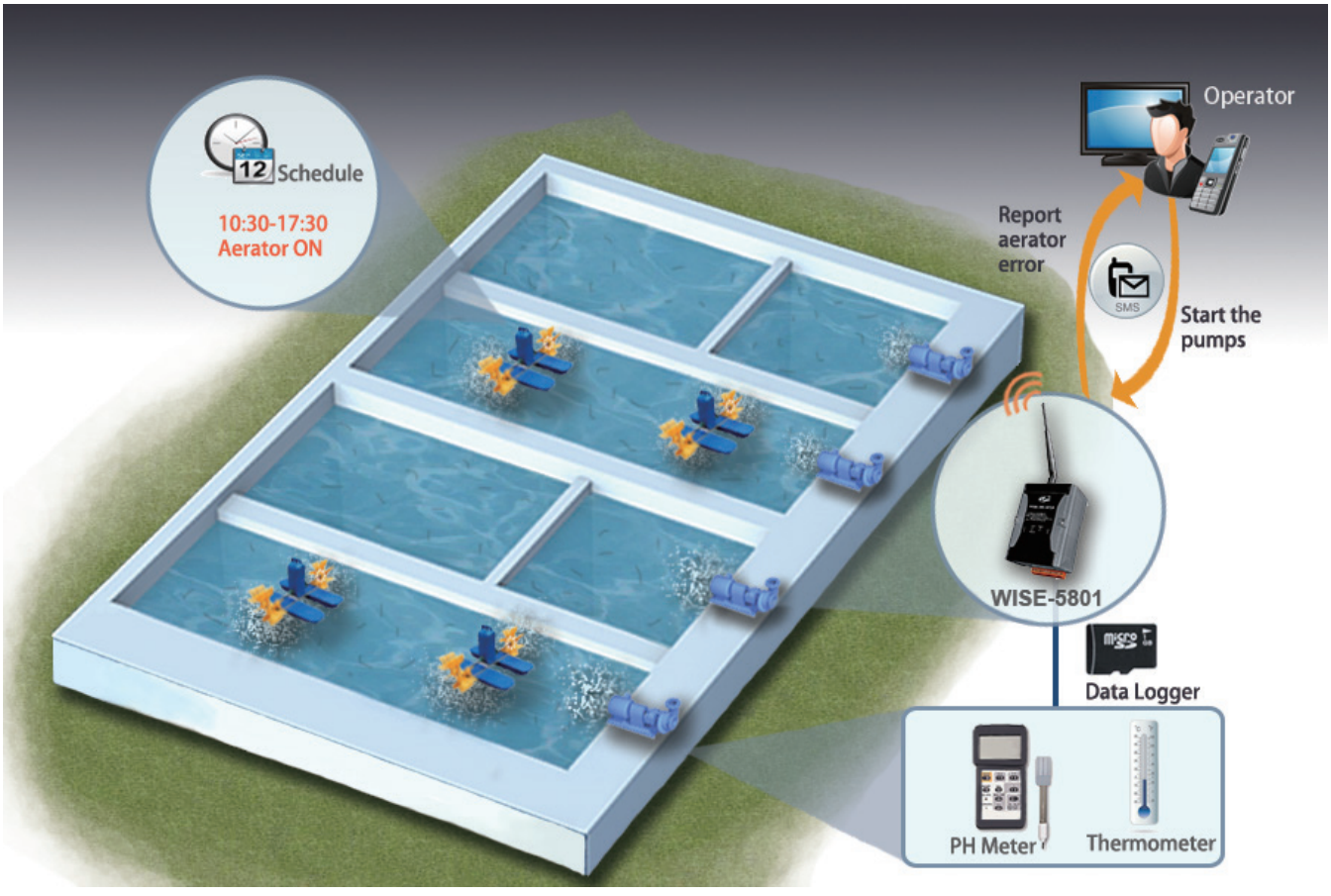
In addition to merits inherited from the existing WISE series, WISE-5801 even provides more supports in I/O functions. It allows connections with a wide range of XW-Boards, I-7000 / M-7000 Remote I/O modules and Modbus RTU slave devices that enables users to freely choose the most suitable I/O modules. With the microSD card, it provides Data Logger function to real-time record the I/O data of the controller and send the data files by FTP or Email to the control center at a scheduled time for further administration management or data analysis. WISE-5801 also features SMS sending function for alarm report and SMS command receiving function to

perform two-way interactions with the operators in real-time.

Benefits:

- ❑ No programming is required to implement system logic settings.
- ❑ Build up a system immediately; it will dramatically reduce the time and labor spent on system development.
- ❑ Built-in IF-THEN-ELSE logic rules execution engine
- ❑ Support ICP DAS XW-Board, I-7000/M-7000 modules and standard Modbus RTU Slave modules for I/O channel monitoring.
- ❑ Support Counter, Timer, Schedule, Email sending and Recipe functions.
- ❑ Support Data Logger and data log files send back function.
- ❑ Support Modbus TCP/RTU protocol for seamless SCADA software integration.
- ❑ Support SMS message alarm sending and SMS command receiving function.

For more WISE product information, please refer to ICP DAS web page: http://www.icpdas.com or refer to WISE web page: http://wise.icpdas.com.



PMC-5151 used in Power & Air Conditioning Monitoring System Application in Campus

By Tomy Lai

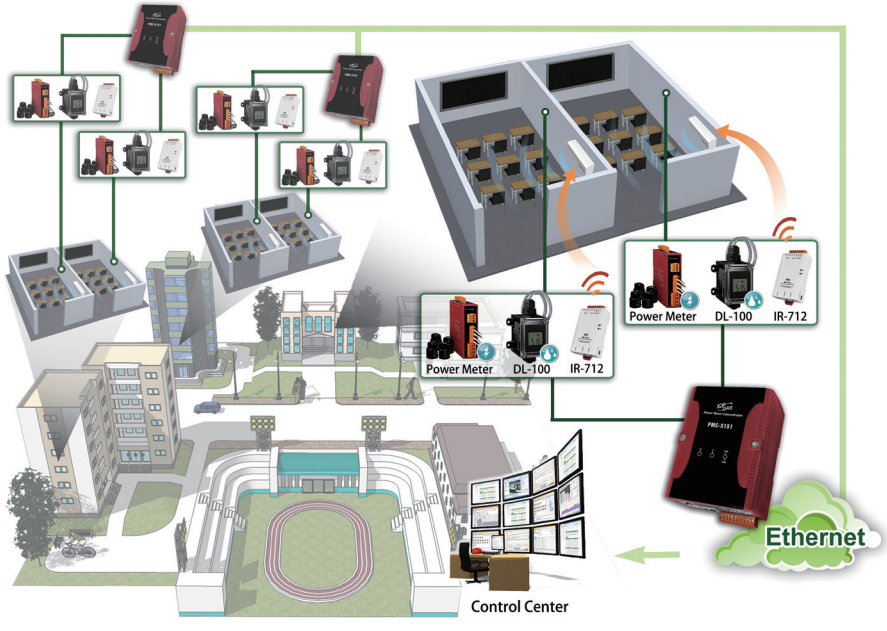
For the resources of the earth are getting depleted faster in recent years, industries in all fields all set off a wave of energy saving and carbon reduction in order to avoid rising energy costs and save money. Under the trend of energy saving and carbon reduction, power monitoring gradually becomes an important project. In this application, PMMS (Power Monitor & Management Solution) from ICP DAS is used to monitor power & air conditioning in a campus. By using PMMS, the administrators in school can perceive the power consumption information of each building, classroom and electrical device in real time, and is able to analyze, assess or manage the usage of electricity, and then establish appropriate policy to achieve effective electricity usage, reduce the electricity bill and avoid penalties for exceeding contract capacity.

Description:

The power & air conditioning monitoring System in Campus features the following 3 aspects:

- Collection and recording of power, temperature and humidity data in classroom.
- Real-time evaluation for electricity demand by logical rules setting.
- Real-time operation of air-conditioning, fans and lighting devices to avoid waste and improve efficiency of electricity usage.

This application adopts ICP DAS PMC-5151 power meter concentrator. With built-in Modbus RTU / TCP protocol, it allows connections with the ICP DAS PM-31xx series (both 3-phase and single-phase power meters) smart power meters for power consumption information gathering and DL-100 series temperature and humidity data logger modules to record and show the change in temperature & humidity for each classroom in various buildings. The real-time power demand and statistic reports are provided so that the administrator can monitor, assess and determine the reasonable power demand, and by IF-THEN-ELSE logic rules setting function in PMC-5151, it makes possible for automatic instant reaction and even send SMS or email to notify authorized receivers for real-time response.



With ICP DAS IR-712A Infrared Remote Control Module, the administrator can pre-set the IR commands such as startup, shutdown, raise or lower the temperature for

IR-712A, and then connect to PMC-5151 via Modbus RTU protocol. Then by using the Schedule function and IF-THEN-ELSE logic rule settings on PMC-5151, the IR-712A will send infrared commands to the air conditioning devices automatically for real-time operations. And according to real-time demand, forecast demand, ambient temperature or other conditions, it is able to adjust the temperature settings or perform rotational load shedding to dynamically adjust the electricity consumption and avoid penalties for exceeding contract capacity.

In addition, the PMC-5151 can regularly send back data files to FTP. The control center in school can obtain complete power data log files for data aggregation and analysis. By collecting and analyzing the data of each device of buildings in the campus, the electricity consumption can be fully tracked and further more is able to establish effective policy to achieve energy saving and carbon reduction.

Devices:

PMC-5151 Power Meter Concentrator

The PMC-5151 is a web-based intelligent Power Meter Concentrator developed by ICP DAS. It offers webpage interface, and features various functions such as: power data collection, logic control, power demand management, data logger, schedule setting and alarm notification functions.

PM-31xx Series Smart Power Meter

PM-31xx series is Smart Power Meter. With its high accuracy, the PM-31xx series can be applied to both low voltage primary side and/or medium/high voltage secondary side and enables the users to obtain reliable and accurate energy consumption readings from the monitored equipments in real time.

DL-100T series temperature and humidity data logger module

The DL-100 Series is a temperature and humidity data logger module developed by ICP DAS. It contains an RS-485 communication interface and an LCD display to show a variety of temperature, humidity and module ID data. The data storage memory can store up to 4088 temperature and humidity records.

IR-712A IR learning remote module

IR-712A is a universal IR learning remote module which can learn IR remote commands and interact with various electronic devices (with IR remote control function).

Benefits:

- Easy-to-use and no programming required PMMS system allows reduce cost for building power monitoring system and shorten application development time.
- Each classroom adopts distributed power information management and data logging, providing a more reliable and stable power information data logging mechanism.
- The operations of data logging of temperature & humidity and air conditioning monitoring are performed independently for each region. It fastens the response time for temperature control & load shedding and makes real-time management of power consumption possible.
- Real-time monitoring of power demand to avoid penalties for exceeding contract capacity.
- Enables automation of power consumption management to make more efficient energy usage and reduce labor costs.

For more PMC-5151 product information, please refer to the following sites: http://www.icpdas.com or http://pmms.icpdas.com/en/PMC_5151.html.

New ISaGRAF Application: Air Pollution Monitoring and Alarm System

By Janice Hong

With a highly developed industry and the increased use of fossil energy, the quality of human life has been changed. The exhaust from the industrial parks have been verified containing many pollutants such as suspended particulates (PM10), carbon monoxide (CO), carbon dioxide (CO2), sulfur dioxide (SO2), nitrogen dioxide (NO2), ozone (O3), etc.

The World Health Organization (WHO) has shown that air pollutants can be harmful to the human body, such as heart disease, respiratory system disease, children's mental retardation, decline in human fertility, or even chronic diseases cause cancers.

In recent years, the harmful substances of the atmosphere increased year-by-year. The residents especially living near the industrial parks are scared of poisoning events caused by toxic air pollutants as well as launched several protests, so that the government has ordered some related factory to suspend operations. The Environmental Protection Administration (EPA) recently also adopts preferential treatment and incentive measures to guide the manufacturers that actively installing the detection equipment or improve the process to meet the standard minimum emissions. At the same time, to cut the pollutants and protect the people's health and living environments.

Air pollution not only threatens the health of human beings but also increases the social burden on medical resources and disturbs the ecological balance. Humans should start to reconsider – what kinds of an advanced civilization do we need?

Whether back to the essence of human life during the process of pursuing industry evolution? Only the healthy living environment ensures the guaranty of sustainable evolution. Today, energy conservation & carbon reduction, renewable energy and green living are the important environment protection issues. As the citizen of the world, ICP DAS has been involving in all-round research on these topics and launching a variety of green technology solutions that applies to each industry to fulfil the goal of sustainable operation.

Application Case:

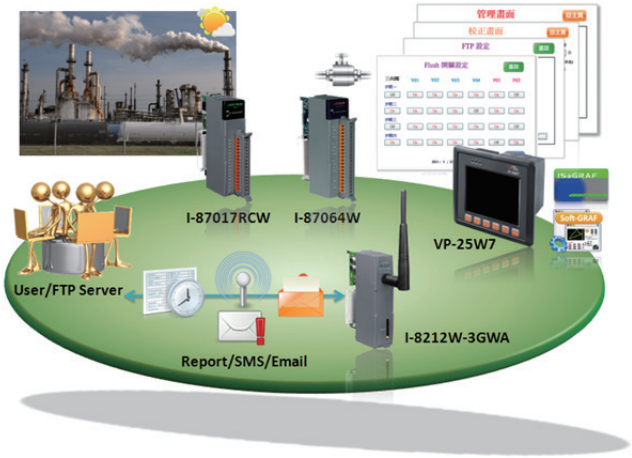
For the purpose of preventing exhaust pollution effectively, we will introduce an "Air pollution monitoring and alarm system" solution, so that the on-site operator can take immediate and effective measures when the pollutant reading is over the limited value, and to make sure the quality of working environment and people's health.

System Description:

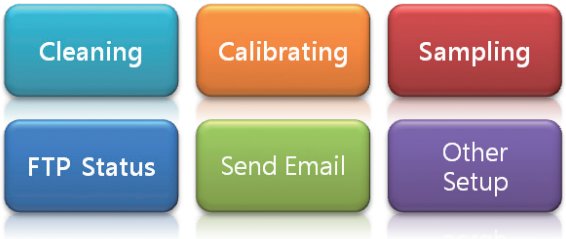
For high quality air monitoring system need, the system uses the I-87017RCW to monitor the air pollutant concentration and provides 24-hour monitor, and then record the data every 30 seconds to a daily file. Due to the monitoring system usually be installed

outdoors without wired networks, users can use the I-8212W-3GWA to meet wireless (3G) Internet access and to send daily reports by E-mail or FTP Server. When an exception occurred, the system will do air sampling and send the short message (SMS) to related workers to carry out the next required procedures. Vise versa the workers can activate the sampling function by sending a short message (SMS) to this system.

System Concept Map:



System Functionality:



The system is divided into six functional subsystems according to the user 's requirement:

1. Cleaning:

Automatic cleaning function. Before using a sampling bag, it must extract all the air in order to keep a vacuum and then use the nitrogen or pure air to wash the bag. Before cleaning, users need to set up the volume of sampling bag and pumping speed. The system will use them to calculate the cleaning time (Flush In/Flush Out) when users press the "Clean" button.

2. Calibrating:

Before sampling, it requires to set up a proper flow rate and permissible exposure limit for pollutants according to the analytical method of the given air, refer to the website - IOSH. In addition, this "Calibrating" HMI page provides the daily timing calibration settings, calibration coefficients and average values display and error tolerance value settings. The system will send a short message to related workers when the error tolerance value is over the limit.

3. Sampling:

This HMI page provides the high level trigger function, which means it will automatically do air sampling when the detected value is over the limit. Users can also turn off this feature and press the "manual sampling" button for sampling manually. In addition, it allows to set up the sampling time, display or set up the sampling bag number, display the current air concentration and to set up short message and cell phone numbers. The system can be set to send a short message automatically while doing sampling or when it was activated the sampling function via the user's short message.

4. FTP Status:

This HMI page can display the send/receive status of short messages, 3G wireless network or FTP connection status and FTP file upload progress, it can also set up the FTP upload time for daily report.

5. Send Email:

This HMI page can enable Email functionality, display connection time or status, set up the number of email sending and set up the email address.

6. Other Settings:

Management page, users need to input the password to login this page. This HMI page provides the three-way valve and pump switch setting that used for cleaning and sampling procedures and it can set up the email Server or FTP Server.

Application Products:

Software:

● **SoftLogic Software – ISaGRAF**

The ISaGRAF supports a range of IEC 61131-3 standard PLC programming languages, including Quick Ladder (LD), Function Block Diagram (FBD), Sequential Function Chart (SFC), Structured Text (ST), and so on, which enables you to quickly design and develop dynamic and user-friendly custom applications.

● **HMI Designer – Soft-GRAF Studio (Free!)**

Soft-GRAF Studio is an HMI software platform developed by ICP DAS. Editing the HMI pages is achieved via a simple drag-and-drop process, and a variety of HMI objects are provided in the included library to help you get started. With ISaGRAF software, it is easy to create a professional monitoring application without requiring any complex programming skills or knowledge.

Hardware:

● **ISaGRAF WinCE PAC**

This system uses the VP-25W7 and you can also choose the following ISaGRAF PACs according to your projects.

PAC	ViewPAC		WinPAC		XPAC	
Model	**VP-25W7**	**VP-4137**	**WP-5147 WP-5147-OD**	**WP-8x37 WP-8x47**	**XP-8x47-CE6**	**XP-8x47- Atom-CE6**
Software	ISaGRAF					
OS	Windows CE 5.0				Windows CE 6.0 R3 Core	
CPU	PXA270, 520 MHz				LX800, 500 MHz	Atom Z510, 1.1 GHz
Flash	96 MB	128 MB	64 MB	128 MB /96 MB	4G	8G
VGA (Resolution)	-	-	800x600	1024 x 768 /800x600	1024 x 768	1024 x 768
TFT LCD (Resolution)	5.7" (640x480)	10.4" (800x600)	-	-	-	-
USB	1	3	2	2/1	2	4
Ethernet	1	1	2	2	2	2
RS-232/RS-485	2	2	3	3 - 4	4 - 5	4
I/O Slots	3	3	-	1/4/8	0/3/7	1/3/7
I/O Bus	-	-	1	-	-	-

- **2G/3G Wireless Solutions:**
  This system uses the I-8212W-3GWA to implement the 3G wireless Internet access.:
  - Industrial Quad-band 2G GSM/GPRS module: I-8212W
  - Industrial Quad-band 2G GSM/GPRS module with GPS function: I-8213W
  - Industrial Quad-band 2G GSM/GPRS modem with RS232 interface: GTM-201-RS232
  - Industrial Tri-band 3G module: I-8212W-3GWA
  - Industrial Tri-band 3G module with GPS function: I-8213W-3GWA
  - Industrial Tri-band 3G WCDMA modem with RS232 and USB interface: GTM-201-3GWA

- **I-87K Series I/O Modules:**
  This system uses the I-87017RCW (8-channel, current input module) to monitor air concentrations and uses the I-87064W (8-channel, relay output module) to control the three-way valve and pump switch.

Related Products

For more information, please visit the following webpages:

◆ **ISaGRAF:**
http://www.icpdas.com/root/product/solutions/softplc_based_on_pac/isagraf/isagraf.html

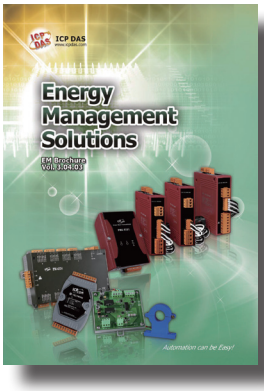
◆ **Soft-GRAF:**
http://www.icpdas.com/root/product/solutions/softplc_based_on_pac/soft_graf/soft-graf.html

◆ **2G/3G Wireless Modules/Modems:**
http://m2m.icpdas.com/m2m_layer2_gprs.html

◆ **I-87K Series I/O Modules:**
http://www.icpdas.com/root/product/solutions/remote_io/rs-485/i-8k_i-87k/i-8k_i-87k_selection.html

Full Product Catalog
http://www.icpdas.com/root/support/catalog/pdf/Catalog/Full_Product_Catalog.pdf

Energy Management Solutions
http://www.icpdas.com/root/support/catalog/pdf/Brochure/EM-Brochure-en.pdf



Industrial Communication & Networking Products
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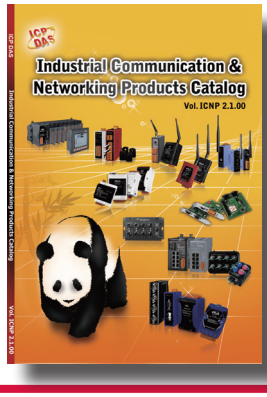
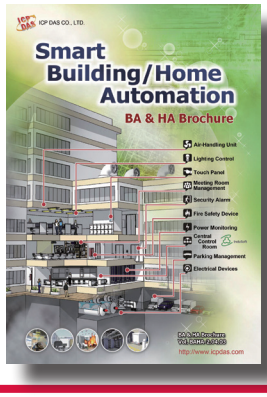


Smart Building/Home Automation – BA & HA
http://www.icpdas.com/root/support/catalog/pdf/Brochure/BAHA-brochure-en.pdf



PDS-700 Applications - Remote Access to Multiple Distributed RS-485 Devices

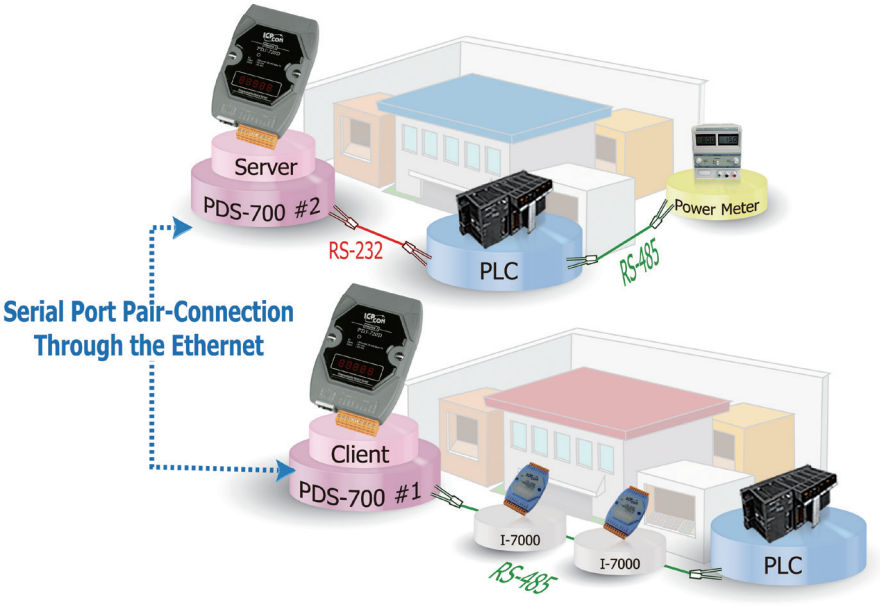
By Tammy Chuang

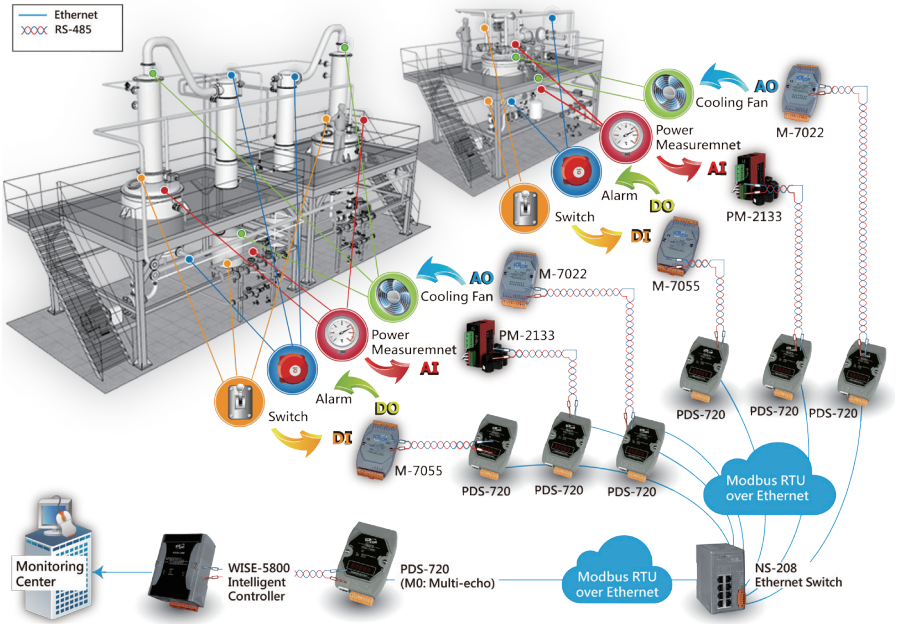
How to access multiple distributed RS-485 devices deployed in Serial-to-Serial mode? Users can use a few PDS-700 modules to create pair-connection application to access, control and manage the distributed RS-485 devices via TCP/IP communication.

Introduction

PDS-700 series module is a Programmable Device Server that is able to convert serial communication to Ethernet communication so that it allows to adding Internet connectivity to any RS-232 or RS-422/485 devices. By using the VxComm Utility, the built-in COM port of the PDS-700 can be virtualized as a standard PC COM port. With its independent operating system, protocol, compact size and high compatibility, it doesn't need extra software to implement various network applications.

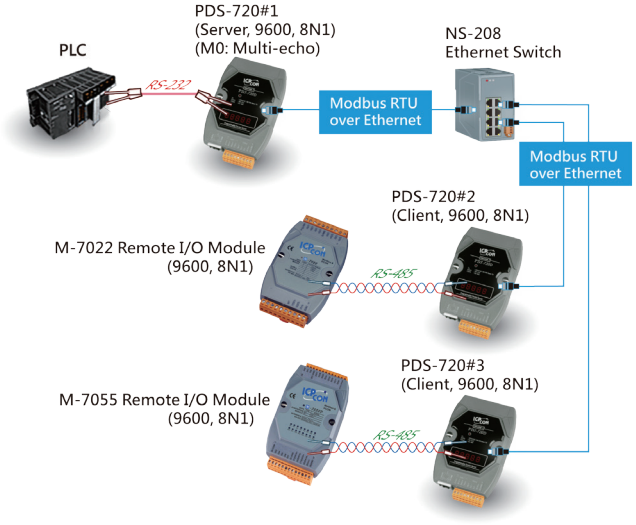
Nowadays, Ethernet protocol has become a standard protocol for local area network. By using PDS-700 via Ethernet, it is easy to implement applications in office automation, home automation, factory automation and disaster prevention. In addition, it also enables devices to access and share information between each other even the devices are from different vendors. And when VirtualCOM is not available in the local site, the communication still can be achieved by using TCP/IP. For example: assume in a factory, the connections of the devices are based on Serial-to Serial communication, to retrieve data from RS-485 devices





distributed in various locations, the user can use a few PDS-700 modules to create pair-connection application, and then the RS-485 devices distributed in various locations can be accessed, controlled, and managed via TCP/IP communication with ease.

Many-to-One TCP Client-Mode Settings



The following example shows how to connect multiple Client-Mode PDS-700 to the same Server-Mode PDS via TCP Client. With VxComm Driver/Utility and the easy-to-use interface provided by the built-in Web Server in PDS-700, the host PC can easily remotely access various RS-485 devices by PDS-700.

For PDS-700 series product information, please refer to:

http://www.icpdas.com/products/Industrial/pds/PDS-700_Series.htm

For more detailed information of PDS and other DS series products, please refer to:

http://www.icpdas.com/products/Industrial/pds/PDS_Series_Main_Page.htm

Features Comparison Table of ICP DAS Device Servers

Features	iDS	PPDS	PDS	DS	tDS	tGW
Programmable	Yes	Yes	Yes	-	-	-
PoE	Yes	Yes	-	-	Yes	Yes
Modbus Gateway	Yes	Yes	-	-	-	Yes
Multi-client	Yes	Yes	Yes	Yes	-	Yes
SNMP	Yes	-	-	-	-	-
Operation Mode	Virtual COM TCP Server TCP Client UDP Pair Connection RCF2217 Telnet Modem Emulator	Virtual COM TCP Server TCP Client Pair Connection				Modbus TCP Master Modbus TCP Slave Modbus UDP Master Modbus UDP Slave Pair Connection
Remarks	Intelligent	Professional	Powerful	Isolation for DS-715	Cost-effective, Entry-level	Cost-effective, Entry-level

HMI and Device Control on a Large Screen using a Small PAC

ISaGRAF & Soft-GRAF Software + WP-5147 PAC + Modbus I/O

By Janice Hong

Looking for an affordable, high-quality solution for HMI and device control? For many years, ICP DAS has continued to make steady progress by tailoring a wide variety of products targeted at individual industries in order to meet the needs of specific customers. Application fields now covered include industrial automation and control, transportation, educational institutions, government agencies, and so on. Consequently, with cost considerations in mind, ICP DAS has created a unique combination of perfect solutions that can be implemented in a wide range of applications.

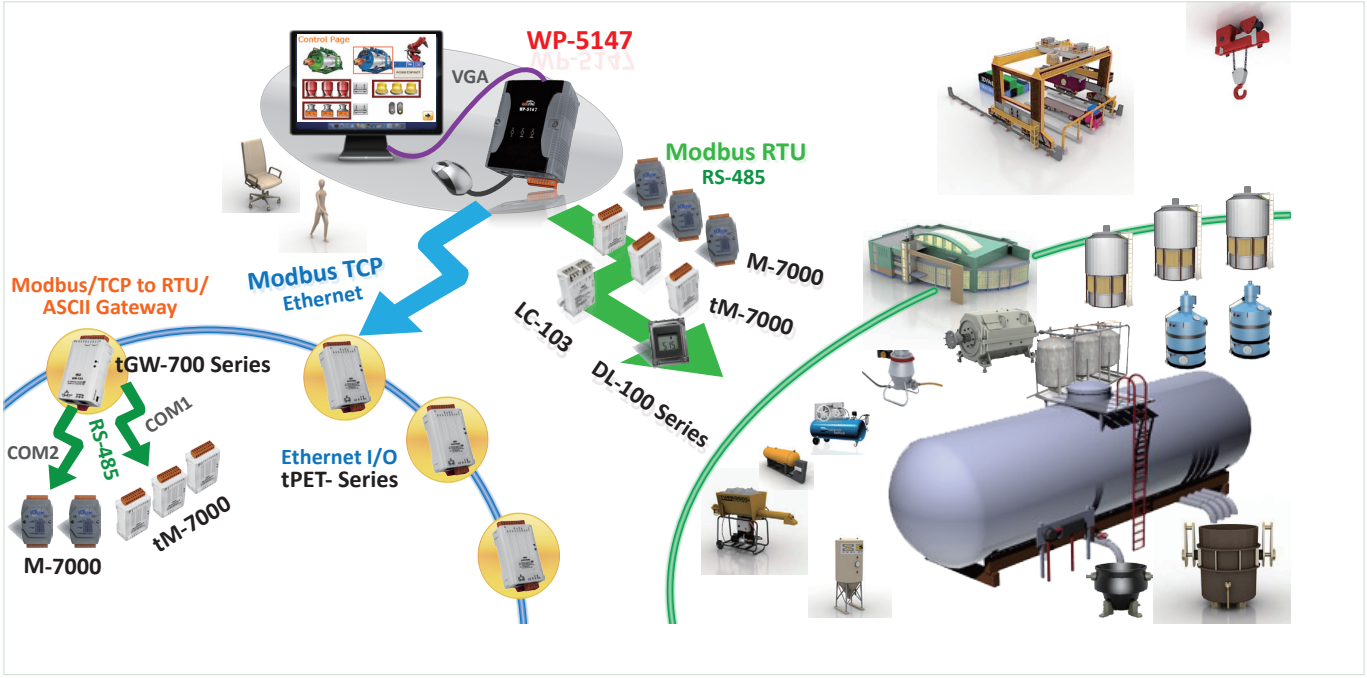
Affordable, High-quality Monitoring solution:

- WinPAC Series Palm Size PAC: WP-5147
- A wide range of Remote I/O Modules (Modbus TCP, Modbus RTU/ASCII, DCON)
- SoftLogic Software: ISaGRAF
- HMI Designer: Soft-GRAF Studio (Free!)

ICP DAS is the general agent for InduSoft in the Greater China region, and we highly recommend that you take advantage of this powerful SCADA software. Please contact us for more information, or visit:

http://www.icpdas.com/products/Software/InduSoft/indusoft.

Beneath its deceptively small exterior, the WP-5147 contains a powerful and flexible soul based on ISaGRAF. By taking a creative approach, system



designers can utilize ISaGRAF and Soft-GRAF Studio software to construct a simple yet dynamic and colorful HMI environment to achieve first class device control.

The following is a detailed overview of the ICP DAS solution:

WinPAC series PAC - WP-5147

ICP DAS has recently launched the WP-5147 (WP-5147-OD, with Audio port), and is the most cost-effective Windows CE-based PAC, including an embedded Windows CE 5.0 operating system, a range of connectivity options (VGA, USB, Ethernet, RS-232 /RS-485), and an I/O expansion bus that can support a single XW board. The WP-5147 uses an industry standard 24 V power input, and can be installed where space is limited using DIN-Rail mounting.

Still using a narrow monitoring screen due to the price considerations?

Compared with the 5" or 8" or 10" HMI, the WP-5147 can use a cheaper and larger 15" or 17" or 21" large-size commercially available computer monitor to achieve the equipment control. Users no longer forced to use a small HMI due to the expensive cost of large-size HMI. Just choose the WP-5147, users can upgrade it to a 15" or above monitoring screen to experience an excellent new vision.

WP-5147 support multiple Modbus protocol

For the upper layer (Client), the WP-5147 supports the Modbus TCP and Modbus RTU protocols and allows it to be connected to common SCADA software, such as InduSoft, iFix, InTouch, Wizon or Citect, etc. A single WP-5147 provides connections to 1 to 16 hosts (up to a maximum of 32).

For the lower layer (Equipment), the WP-5147 supports the following protocols:

1. **Modbus RTU/ASCII:**
   You can choose from any of the ICP DAS M-7000 series I/O modules, DL-100 temperature and humidity meters, tM series I/O modules, LC series lighting control modules or Wireless ZigBee I/O modules. Other brands of I/O devices that support the Modbus RTU/ASCII protocol can also be selected.

2. **DCON:**
   You can choose from any of the ICP DAS I-7000 series I/O modules, which all support the DCON protocol.

3. **Modbus TCP:**
   The WP-5147 can be used as a Modbus TCP Master to connect to a wide range of Modbus TCP Slave devices. This means that you can choose from any of the ICP DAS ET-7000 and tET series I/O modules, or use the ICP DAS tGW-700 series Modbus TCP to RTU/ASCII gateway to expand the remote device network.

4. **User-Defined Protocol:**
   The embedded ISaGRAF Driver in the WP-5147 allows you to create custom protocols by using RS-232/422/485 communication function blocks (such as COMOPEN or COMREAD and so on), and then implementing them on the corresponding devices.

I/O Expansion

The WP-5147 allows you to expand the local I/O connection options by attaching a single XW series board . You can currently choose from the models indicated below, but ICP DAS will be releasing additional XW series boards in the near future to allow even greater flexibility(Note:The WP-5147 does not provide support for XW5xx series boards when expanding RS-232/422/485 port connectivity).

Model	DI Ch.	DO Ch.	AI Ch.	AO Ch.	Isolation
XW107	8	8	-	-	-
XW107i	8	8	-	-	3750 Vrms
XW110i	16	-	-	-	3750 Vrms
XW304	4	4	6	1	-
XW310	3	3	4	2	-

SoftLogic Software - ISaGRAF

When using ISaGRAF software, the WP-5147 supports a range of IEC 61131-3 standard PLC programming languages, including Quick Ladder (LD), Function Block Diagram (FBD), Sequential Function Chart (SFC), Structured Text (ST), and so on, which enables you to quickly design and develop dynamic and user-friendly custom applications.

HMI Designer - Soft-GRAF Studio (Free!)

Soft-GRAF Studio is an HMI software platform developed by ICP DAS. Editing the HMI pages is achieved via a simple drag-and-drop process, and a variety of HMI objects are provided in the included library to help you get started. With ISaGRAF software, it is easy to create a professional monitoring application without requiring any complex programming skills or knowledge.

As you can see, ICP DAS has meticulously designed the most cost-effective combination for you. By selecting the WinPAC WP-5147, you can instantly improve your monitoring system at a lower cost, while enhancing your competitiveness within your industry. What are you waiting for?

For more information, please visit the following webpages:

- WP-5147:
  http://www.icpdas.com/root/product/solutions/softplc_based_on_pac/isagraf/isagraf_pac/wp-5147.html
- ISaGRAF:
  http://www.icpdas.com/root/product/solutions/softplc_based_on_pac/isagraf/isagraf.html
- Soft-GRAF:
  http://www.icpdas.com/root/product/solutions/softplc_based_on_pac/soft_graf/soft-graf.html
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- Remote I/O Modules:
  http://www.icpdas.com/root/product/solutions/remote_io/remote_io_products.html
- tGW-700 Gateway:
  http://www.icpdas.com/products/Industrial/pds/tgw-700.htm

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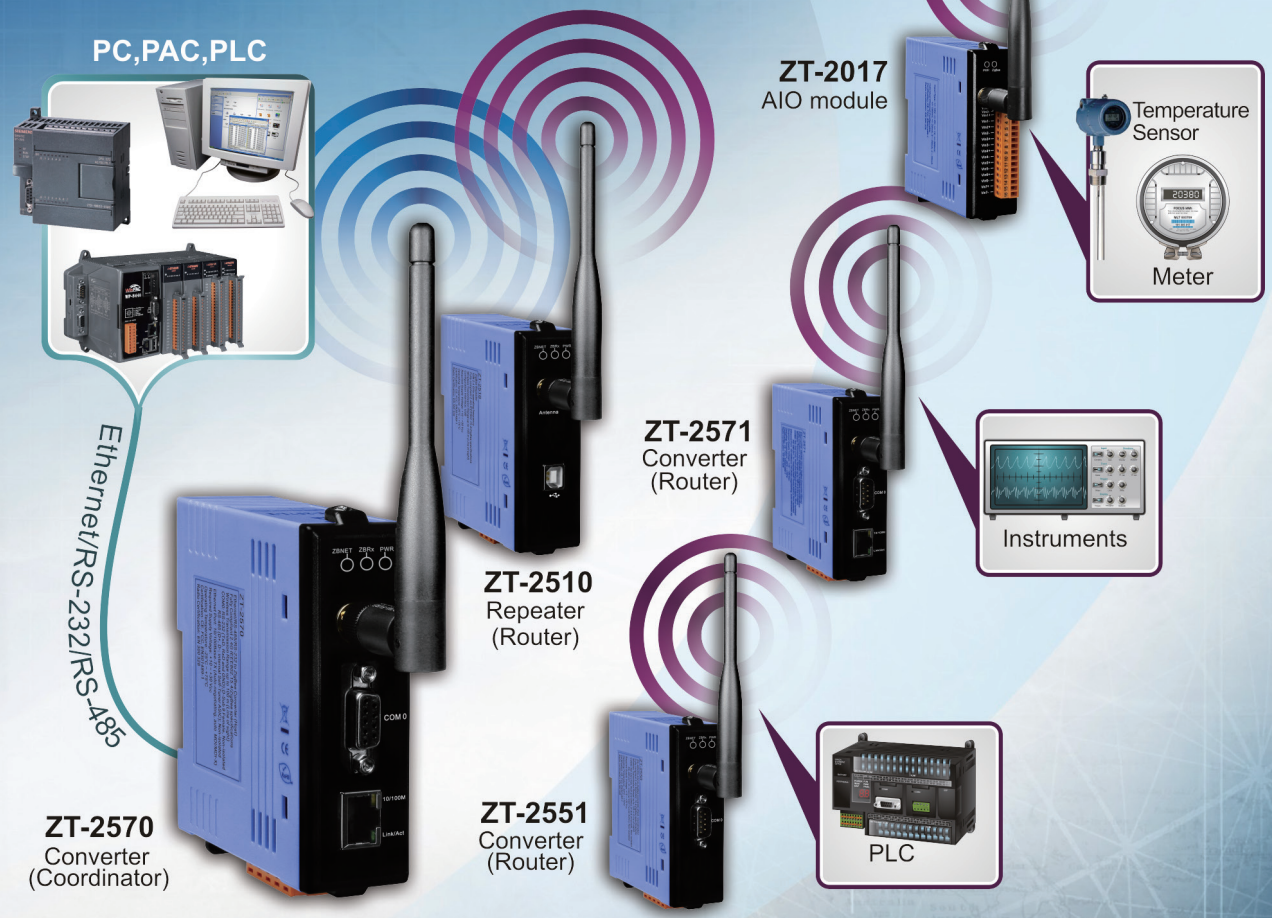
ZigBee Total Solutions

Wireless Mesh Networking

ZigBee Alliance

Features:

- ☑ ZigBee wireless solutions for Industry application, support up to 700M communication distance.
- ☑ Supporst intelligent automatic routing capabilities.
- ☑ Supports rich and complete product line; provides customers a variety of options.
- ☑ Offers a variety of ZigBee modules, including: AIO, DIO, Repeater, Converter, etc.
- ☑ Offers a variety of transmission modes, supports transparent, DCON and Modbus communication.
- ☑ Supports up to 255 ZT-2000 modules in the same network.
- ☑ User-friendly configuration tool; supports signal strength detection.



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ICP DAS ZigBee Application for Wireless Monitoring in a Conventional Factory

By Bao Huang

Introduction:

When it comes to factory automation, to be aware of the status of the equipment during operation in real time is a very important part for it may affect production process and product quality. In the conventional factories, the operation environments may have problems such as: high temperature, heavy equipment, sour gas, and other dangerous factors, etc. Therefore these factories most adopt semi-automated or fully automated devices to ensure the stability and security during the production process in order to reduce the risk of industrial accidents. On the other hand, the operation status of the devices may require to be sent to the control room in scheduled time for real time monitoring so that the related personnel can perform necessary maintenance in time to extend the life of the devices, and reduce the incidence of sudden machine shutdown as well.

However, the deployment of wiring for long distance is a big issue when building the architecture of such monitoring system. The complexity of various environment factors cause difficulty in wiring. Therefore, how to reduce the wiring has been an important issue for automation applications.

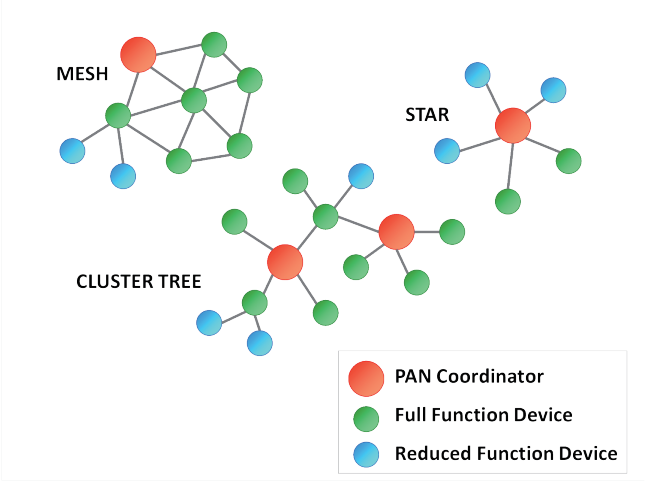
In order to solve the problem, in recent years, ICP DAS has been working on ZigBee wireless technology and provides integrated solutions for wireless control applications. ZigBee features wireless, low power consumption, compact design, easy-to- setup and mesh network etc. It is particularly suitable for used in low-speed and limited- space area wireless transmission system. By using wireless ZigBee technology-based monitoring & control system, it can save the cost of wiring, and the transmission will not be limited by the distance between each factory site; the operation status of the equipment can be monitored in real time. The following section will illustrate how to apply ICP DAS ZigBee wireless technology to fulfill wireless monitoring application in a conventional factory.

ZigBee Features and Applications:

Zigbee Alliance was established in 2001 and was committed to build an international standards-based wireless network protocol. ZigBee wireless transmission technology is in line with IEEE802.15.4

standard, the operation frequencies are:

1. Low power consumption: using general battery can last a few months or even a few years.
2. Low cost: low cost in manufacturing, installation and maintenance.
3. Low data rate: generally used for monitoring and control of small amount data transmission.
4. Large network capacity: support a large number of transmission nodes.
5. High reliability: self-repairing network topology



▲ Figure 1. ZigBee Network Topologies

ZigBee network topology includes: Mesh, Star and Tree, etc., is shown as Figure 1 and is composed by three roles:

1. Coordinator（Host）: initiate a ZigBee network by selecting the working channel of the network and personal area network identification (PAN ID). Once the network starts, the router and the end device will be able to join the network.
2. Router（Repeater）: to assist the Coordinator and End Device to transmit data or routing data, and to allow other routers or end device to join the network.
3. End Device（Slave）: not involved in data routing, so it can sleep when not transmitting or receiving data. When joining a ZigBee network, the parent-child relationship is formed between the devices, the added device is the child device and the device allows to join the network becomes parent device.

Three basic concepts for ZigBee networking:

1. Each Node requires the same PAN ID and communications channel.
2. There is only one Coordinator in a ZigBee network.
3. Each node requires a unique Node ID.

ZigBee can be applied to: consumer electronics, energy efficiency & management, health care, home automation, communication services, building automation and industrial automation.

For more detailed information please visit ICP DAS ZigBee webpage:
http://www.icpdas.com/root/product/solutions/industrial_wireless_communication/wireless_solutions/zigbee_introduction.html

System Architecture and Operation

Description and Requirement of the System:

The scenario is located in the Kaohsiung area in Taiwan where lots of factories produce raw materials for iron & steel and chemical industries. One conventional factory requires using heavy machine to hang the semi-products and wash the semi-products by acid pickling liquid. For the pickling process is highly dangerous, it usually use automated hanging devices to perform such operations. And during the pickling process, it is strictly forbidden for unauthorized personnel to enter the site to assure the safety and smooth going of the production process. There are more than 20 hanging devices operating in one track. Each hanging device performs different production process according to the logic rule in its PLC. For the maintenance personnel cannot always keep an eye on the warning light of the hanging device and the environment is noisy that one cannot tell the operating status by the sound. And furthermore, the hanging devices share the same track, if one hanging device encounter unusual situation, the entire production process will be affected. Therefore the customer want to build a system that the main controller in the control room can automatically send requests for the operation status, production process and operation location of various parts from the PLC of each hanging device at scheduled sequence, so that the entire production process can be monitored, possible conflict between each hanging device can be avoid and errors can be ruled out and fixed in real time to ensure smooth going production process.

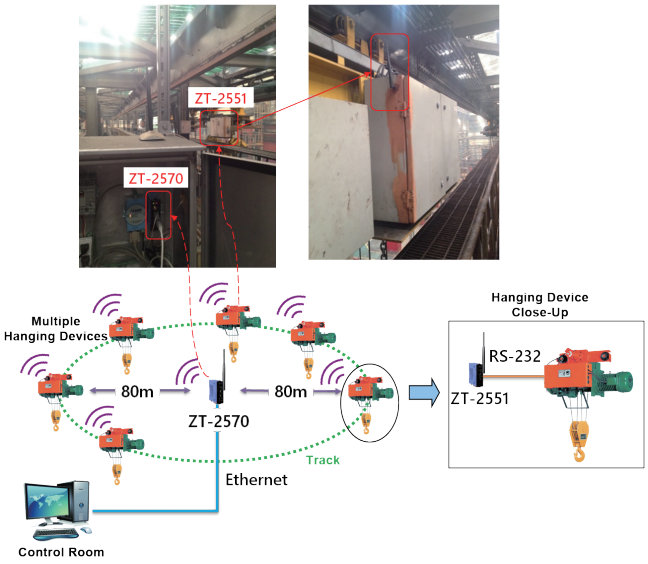
For the hanging device will move backward and forward to different locations, it is not feasible to deploy wiring between the hanging devices and the control room, in addition, there are metal girders and cranes all over the place, the obstacles in between may affect the transmission of wireless signals and even cause interruption of the communication.

Solution

The ZigBee wireless communication products of ICP DAS ZT-2000 series are used in this scenario to solve the problems mentioned above. The system architecture is shown in Figure 2. In the control room, the host PC is connected to ZT-2570 via the Ethernet interface and the signal from host PC is converted to ZigBee wireless signal. Each hanging device is equipped with a ZT-2551 module that can convert ZigBee signal to RS-232/RS-485 signal. The received ZigBee signal is converted to RS-232 signal and read by the PLC. For the data rate of the request command sent from the host PC in the control room and the received response information from the PLC on the hanging device only involve small data exchange; Zigbee solution can be used in this scenario.

The ZT-2570 offers VxCOMM communication technology; therefore when the host PC in the control room communicates with PLC via COM port of RS-232; by using VxCOMM technology, it does not require any modification on the software of the host PC. The VxCOMM driver will automatically transform the data of COM port to Ethernet data and send to ZT-2570 (ZigBee coordinator), and the ZT-2570 will send the data to the ZT-2551 connected to the hanging device. When the data size of the response data that PLC sends to the host PC exceed the maximum data allowance of the ZigBee wireless transmission packet, the ZT-2570 can deliver it by dividing the data into packets and compose it back to original data before sending it to the host PC to avoid possible error.

Because each ZT-2551 connected to the ZigBee network plays the role of a router; it can perform data transmission. When encounters any obstacle that cause the wireless information of one ZT-2551cannot be sent back to the ZT-2570, the information can be sent by other ZT-2551 on other hanging devices. Therefore there is no additional ZigBee repeaters required.



▲ Figure 2 Architecture of the Hanging Devices Monitoring System

ICP DAS ZigBee Product Solution

ICP DAS offers a complete ZigBee solution, including Converter, Repeater, I /O, and other related modules. The users may choose products specifically meet their requirements. For more detailed product information, please visit ICP DAS ZigBee webpage:

(http://www.icpdas.com/root/product/solutions/industrial_wireless_communication/wireless_solutions/wireless_selection.html#e)

ICP DAS ZigBee Wireless Product is perfect for Factory Wireless Monitoring Applications

ZigBee product is one of the ICP DAS wireless product lines providing a variety of ZigBee converters, gateways and I/O modules. They can be integrated into the PC/HMI or ICP DAS PAC to build specific monitoring systems for applications in all fields. Using ZigBee to implement a monitoring & control system in the factory, the monitoring of the operation status of the remote devices can be easily done and is flexible when requires expansion of the system.

ICP DAS has been working on ZigBee technology and products for years and is dedicated to provide a variety of specific solutions for applications in all fields. We keep on developing products that perfectly meet our customers' requirements. With extended experiences in wireless technology and industrial communication, ICP DAS provides solutions that are able to integrate different combination of industrial devices. ICP DAS is committed to continue developing solutions to challenge all kinds of difficulties that our customer encountered.

Type	Model	Description
ZigBee AIO (Router)	ZT-2015	Wireless 6-ch RTD Input Module with 3-wire RTD Lead Resistance Elimination
	ZT-2017	Wireless 8-ch Analog Input Module with High Voltage Protection
	ZT-2017C	Wireless 8-ch Current Input Module with High Common Voltage Protection
	ZT-2018	Wireless 8-ch Analog Input Module with High Voltage Protection
	ZT-2024	Wireless 4-ch Voltage/Current Output Module
	ZT-2026	Wireless 4-ch Voltage Input, 2-ch Voltage Output, 2-ch Digital Input and 2-ch Digital Output Module
ZigBee DIO (Router)	ZT-2042	Wireless 4-ch PhotoMOS Relay Output and 4-ch Open Collector Output Module
	ZT-2043	Wireless 14-ch Isolated Digital Output Module
	ZT-2052	Wireless 8-ch Isolated Digital Input Module with 16-bit Counters
	ZT-2053	Wireless 14-ch Isolated Digital Input Module
	ZT-2055	Wireless 8-channel Isolated Digital Input and 8-channel Isolated Digital Output Module
	ZT-2060	Wireless 6-ch Isolated Digital Input and 4-ch Relay Output Module
ZigBee Digital Pair-connection (Coodinator)	ZT-2052-IOP	ZigBee Pair-connection to the 8-ch Isolated Digital Input Module
	ZT-2053-IOP	ZigBee Pair-connection to the 14-ch Isolated Digital Input Module
	ZT-2055-IOP	ZigBee Pair-connection to the 8-channel Isolated Digital Input and 8-channel Digital Output Module
	ZT-2060-IOP	ZigBee Pair-connection to the 4-ch Isolated Digital Input and 4-ch Relay Output Module
ZigBee Sniffer	ZT-CHK	ZigBee Sniffer
ZigBee Repeater	ZT-2510	ZigBee Repeater (Router)
ZigBee Converter	ZT-2550	RS-485/RS-232 to ZigBee Converter (Coordinator)
	ZT-2551	RS-485/RS-232 to ZigBee Converter (Router)
	ZT-2570	Ethernet/RS-485/RS-232 to ZigBee Converter (Coordinator)
	ZT-2571	Ethernet/RS-485/RS-232 to ZigBee Converter (Router)
	ZT-USBC	USB to ZigBee Converter (Coordinator)

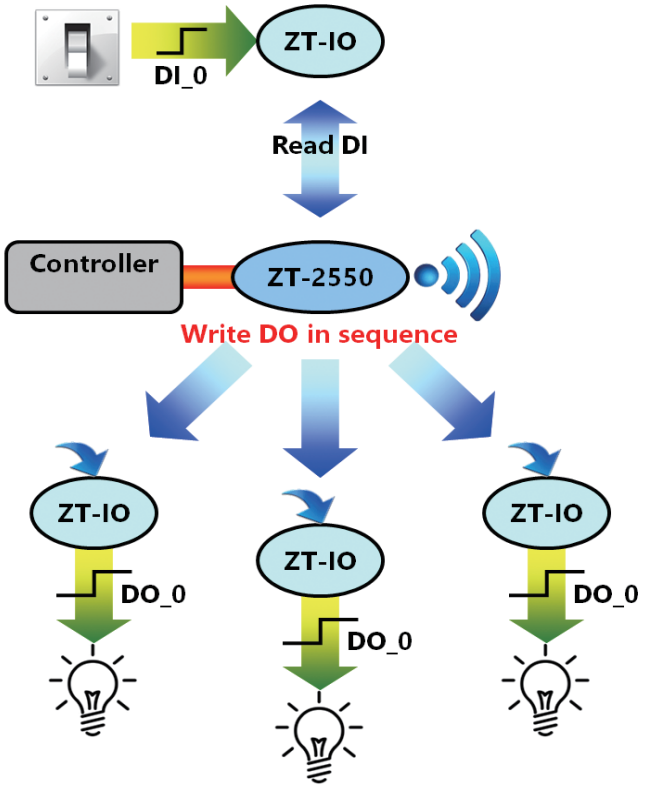
ICP DAS ZigBee I/O Pair-Connection Products and Applications

By YY Chang

ZigBee wireless transmission features low power consumption, low-power, low data rate, compact design, easy-to-setup and mesh network etc. It is particularly suitable for wireless transmission technology in a limited-space area. As we are in the Internet of Things era, there are numerous requirements in monitoring of the devices at the terminal end; therefore wireless communication becomes one of the most important applications. ICP DAS has been working on ZigBee wireless communication products for years; and with extended experiences in I/O monitoring applications, the new ZT-2000-IOP series product has been developed and introduced to the market to meet the increasing demands; it is an I/O Pair-connection product, no programming is required and features digital input & output channels, automatic I/O status synchronization via ZigBee. And with Mesh network properties; it can broadcast and update the messages to each terminal device immediately. ZT-2000-IOP series product is equipped with benefits of ZigBee system such as: wireless, low-cost, easy-to-deploy, etc.

Conventional Monitoring Architecture

In a conventional automation monitoring system, the system usually has to go through "read & write" process repeatedly to achieve automation operations.



For example: when there is a status modification of one Digital Input channel, the system will perform corresponding actions (such as: output Digital output) according to the preset logic on the controller.

However, in this architecture, a series of tedious issues such as: equipment selections, design of the software architecture, program writing, logic debugging, on-site installation, etc. always brought headache to the users and is inevitable to meet the following problems:

◆ High Cost

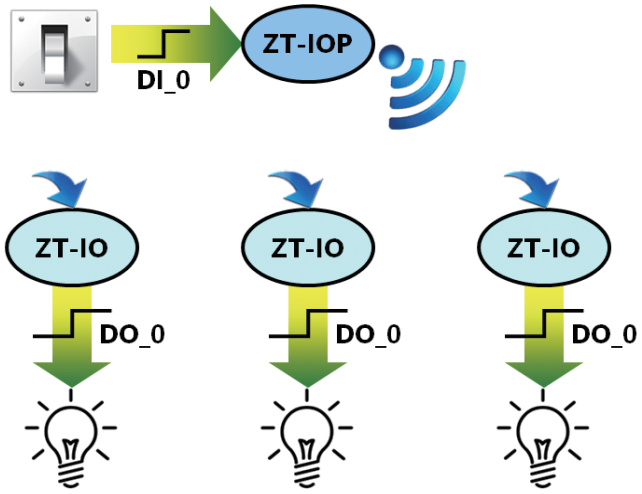
- It requires using of controllers, the cost of hardware is high.
- It requires programming, the cost of labor is high.

◆ Slow

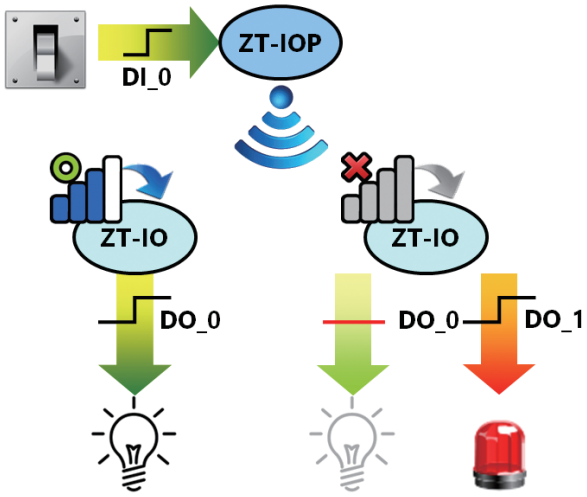
- It requires to update remote I/O module one by one via DCON/Modbus.

What is IOP (I/O Pair-connection)?

◆ IOP (I/O Pair-connection) indicates that the I/O channels are paired and bounded. Using ZT-2000-IOP series (below abbreviated as ZT-IOP) as an example; when the DI channel status of ZT-



▲ <Figure 1> When the DI_0 channel status of the IOP module changes, all remote I/O modules will update the status immediately and perform the same output (ON/OFF).



▲ <Figure 2> When the wireless communication is interrupted and ZT-IO cannot be updated the channel status via ZT-IOP; at this time, the Watchdog will be triggered, a preset Safe Value DO channel will be turn on to show failure warning of the node until the communication is resumed to normal again.

IOP module is changed, ZT-IOP will automatically broadcast the status of this DI channel to all ZigBee notes in the Zigbee network, and synchronize the DO channel status of ZT-2000 I/O series module(below abbreviated as ZT-IO). It does not require using of controller and no programming is required to achieve the update I/O channel status automatically.

◆ Low Cost

- No controller is required, reduce the cost of equipment
- No programming is required, reduce the cost of labor
- Wireless, reduce wiring and simplified wiring deployment

◆ Fast

- ZigBee Mesh network architecture enables fast broadcast updates

Prevent & deal with the interruption of wireless communications: Warning

Because it does not require using the controller for programming to complete the pairing control of I/O channels; it is occasionally when the ZigBee wireless communication is interrupted, and the users cannot be aware of the communication disconnection of the ZigBee notes. This may cause potential damage. Therefore, ZT-IOP and ZT-IO modules provide Safe Value option for warning purpose. The setting steps of the Safe Value is:

◆ Set up ZT-IOP hardware settings:

- Set the Safe Value of the DIP switch to be "ON"
- Set up the number of devices to be monitored by setting up the Pair Number of the DIP switch.

◆ Set up the ZT-IO software settings (via ZT Converter Series):

- Set up the specified DO channel as Safe Value
- Set Watchdog trigger time WDT (Watchdog Time)

Through a few simple steps, the refresh and reset operations of watchdog on the remote ZT-IO module can be done automatically. And once when the wireless communication of ZigBee is interrupted, the warning lights, buzzer can be triggered for warning purpose via Safe Value DO channel on the ZT-IO module until the resumption of communication.

Enhance ZigBee Wireless Signal Strength and Quality

ICP DAS ZigBee wireless product is compatible with IEEE 802.15.4 standard products. Its communication quality will be affected to the environmental and atmospheric conditions. If the environment of the application encounters interference sources such as: rain, snow, high/low level terrain, slopes, swales, or obstacles (such as buildings, metal objects or others), the wireless communication quality may be reduced and communication distance may be shortened; in some serious cases, it may even not be able to communicate at all. Therefore, initiate a communication test for the on-site environment is necessary. For each on-site environment may not have the same problem, the following solutions are provided to enhance the signal strength and quality; the users may choice best solution according to their specific on-site environment condition.

◆ Add ZigBee Repeater

ZT-2510	ZigBee Repeater (Slave, ZigBee Router)

◆ Change the External Antenna

ANT-15 (Omni-Directional)	15 dBi 2.4GHz External Antenna
ANT-18 (Directional)	18 dBi 2.4GHz External Antenna
ANT-21 (Directional)	21 dBi 2.4GHz External Antenna

◆ Add Antenna Extension Cable (Changing the Installation Location of the Antenna)

3S001-1	RG58A/U 1 Meter Long RP-SMA male to RP-SMA Female
3S003-1	RG58A/U 3 Meter Long RP-SMA male to RP-SMA Female
3S005-1	RG58A/U 5 Meter Long RP-SMA male to RP-SMA Female
3S008-1	RG58A/U 8 Meter Long RP-SMA male to RP-SMA Female

◆ Add Amplifier

ANF-2401	1W 2.4GHz Power Amplifier

Pairs		ZT-IOP Series	ZT-IO Series
Two-Ways	4	ZT-2060-IOP	ZT-2060
Two-Ways	8	ZT-2052-IOP	ZT-2042
Two-Ways	8	ZT-2055-IOP	ZT-2055
Two-Ways	14	ZT-2053-IOP	ZT-2043

▲ <Table 1> ZT-2000-IOP Series Products Default Matching Table

How to select and pair ZT-2000-IOP series modules?

ICP DAS provides total solution of wireless ZigBee products, the default factory settings of ZT-IOP products will match the ZT-IO module with the same I/O channels (refer to Table 1). The users can choose the modules according to their requirements.

- I/O Channel Numbers
- I/O Channel Mode

◆ Select the module as Digital Input from ZT-IOP series

ZT-IOP Series		ZT-2052-IOP	ZT-2053-IOP	ZT-2055-IOP	ZT-2060-IOP
DI	Channels	8	14	8	6
	Wet Contact	Sink/ Source	Sink/ Source	Sink/ Source	Sink/ Source
	Dry Contact	---	Source	Source	---
DO	Channels	0	0	8	4
	Type	---	---	Isolated O.C.	Power Relay, Form A
	Output Voltage	---	---	+3.5 to 50 VDC	250 VAC/30 VDC
	Max. Load Current	---	---	700 mA	4 A

◆ Select the module as remote Digital Output from ZT-IO series to match with the ZT-IOP module.

ZT-IO Series		ZT-2042		ZT-2043	ZT-2055	ZT-2060
DI	Channels	0		0	8	6
	Wet Contact	---		---	Sink/ Source	Sink/ Source
	Dry Contact	---		---	Source	---
DO	Channels	4	4	14	8	4
	Type	PhotoMOS Relay, Form A	Isolated O.C.	Isolated O.C.	Isolated O.C.	Power Relay, Form A
	Output Voltage	60 VAC/ VDC	+5 to 50 VDC	+5 to 50 VDC	+3.5 to 50 VDC	250 VAC/30 VDC
	Max. Load Current	700 mA	700 mA	1.1 A	700 mA	4 A

▲ <Note> If not using with its default matching module; it will require using of ZT Converter Series (ZT-USBC / ZT-255x / ZT-257x) for ZT-IOP software settings.

Compliance with environmental standards, electromagnetic compatibility (EMC)

ICP DAS concerns on product development as well as environment protection. From raw material to manufacturing, all processes are compliance with certificates such as: RoHS, WEEE, CE and FCC. From the product itself to a variety of packaging materials are in line with relevant regulations. In addition, ZT-2000 series modules are manufactured under electromagnetic compatibility (EMC) certification standard. The electromagnetic interference waves of the module will not affect the operations of other devices; therefore ensures each device can function appropriately under harsh industrial environments.

ZT-2000-IOP series modules are flexible to meet customized requirements

ICP DAS provides total solution of wireless ZigBee products. The standard ZT-IOP products are one-to-one (a DI channel binding to a DO channel), one-to-many (a DI channel binding to multiple DO channels) - which can synchronize the upgrade of status. If customers have specific application cases that require adding customized logic program, ODM project is available for customized service.

Introduction of tSH-700 Function & Application

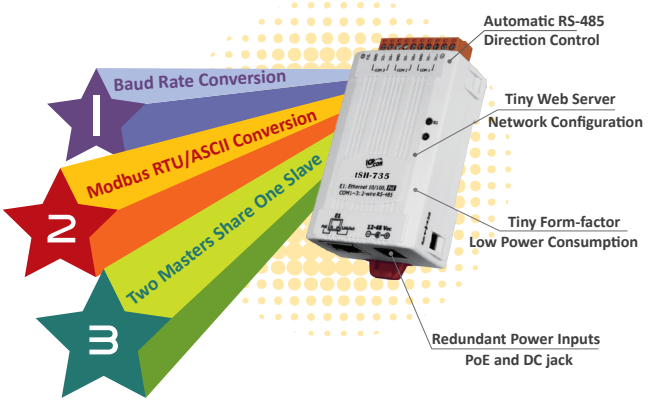
By Tammy Chuang

tSH-700 is Tiny Serial Port Sharer, it features:"Baud Rate conversion function", "Modbus RTU / ASCII conversion function" and "two Master devices access to a single Slave device function". It also features a built-in Web Server that provides web management interface; the users can easily and quickly set the parameters without memorizing any commands.

Introduction

The ICP DAS tGW/tDS-700 compact series modules have received highly positive feedback from our customers worldwide since they were released. In response to requirements from our customers, ICP DAS continue to develop new modules to achieve more functionality to meet the needs for various applications. Recently the new tSH-700 Tiny Serial Port Sharer is released and features three main functions: "Baud Rate conversion function", "Modbus RTU/ASCII conversion function" and "two Master devices access to a single Slave device function".

The tSH-700 module also features a built-in Web Server that provides web management interface; the users can easily and quickly set the parameters without memorizing any commands. It is palm-sized, compact space, and is equipped with removable terminal block connector for easy wiring. It automatically controls the direction either to receive or to send via RS-485. The tSH-700 module also provides Power over Ethernet (PoE) function that matches true IEEE 802.3af-compliant (Class 1) standard. It can accept power supply by PoE Switch (eg: NS-205PSE) over the standard Category 5 Ethernet cable or accept power supply via DC adapter. tSH-700 module is designed for low power consumption, it saves energy especially when using a large number of device servers.



Features:

Baud Rate Conversion Function

Allow a Master device to communicate with Slave devices with different Baud Rate or Data Format. In the Raw Data mode, it can be applied to most of the half-duplex communications that do not require protocol conversion (Request - Response), such as DCON. When the Data Size is less than 512 bytes buffer size (built-in buffer for each serial port), it can perform full-duplex communication.

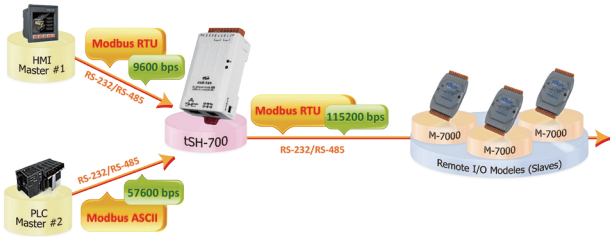
Modbus RTU/ASCII Conversion Function

Allow a Modbus RTU/ASCII Master device to communicate with a Modbus RTU/ASCII Slave device with different Protocol, Baud Rate or Data Format.

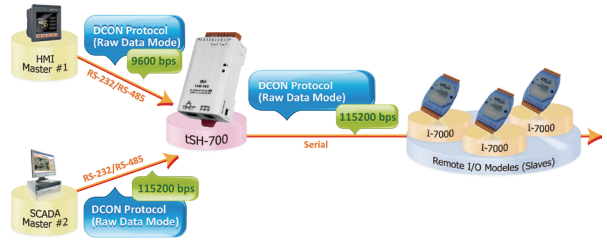
Allow Two Master Devices to Access a Slave Device

Allow two Master devices to connect to different serial ports and access to the Slave device. Modbus mode can be used to convert Modbus RTU/ASCII protocol, and Raw Data Mode can be used for DCON or other Request - Response protocols. Each serial port can be configured with different Baud Rate or Data Format (depends on connected devices). When two Master devices request the same Modbus information, the built-in Cache function will remove duplicated request message to reduce the load of communication of the Slave device serial port. Note: It may need to set up a longer Timeout for the Upper Computer.

- Modbus protocol and Baud Rate Conversion Function:



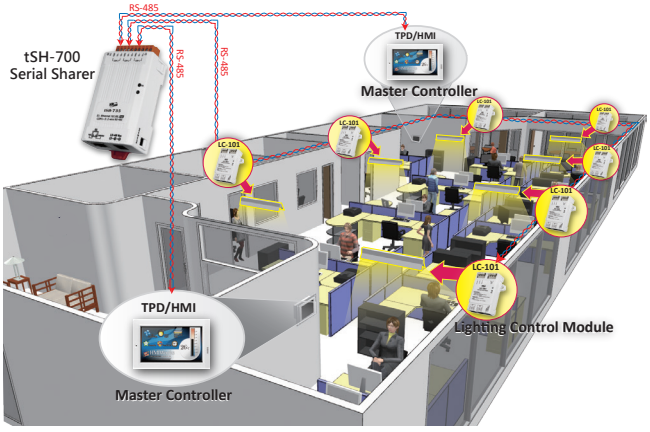
- Baud Rate Conversion in Raw Data Mode:



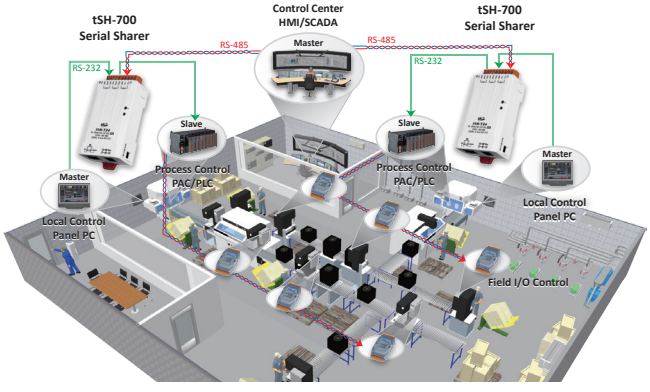
Office Lighting Control Application

Connect the two uplink serial ports on the tSH-735 module to the two control panels (Master controller such as TPD/HMI) in the front area as well as the back area of the office. And connect the downlink serial port on the tSH-735 module to the lighting control circuit (RS-485 bus). And then the lighting control of the office can be done by using the Master controller (TPD / HMI) in different locations.

Production Line Application



In this production line application, the monitoring & control center (HMI/SCADA) is connected to uplink serial ports on the tSH-734 module of the production line 1 and production line 2 via RS-485. And then the on-site Master controller (Panel PC) of the production line 1 and production line 2 are connected to another uplink serial port on the tSH-734 module via RS-232. Furthermore, the downlink serial port on the tSH-734 module is connected to the slave process controller (PAC/PLC) and then each on-site I/O module can be connected to the RS-485 serial port on the slave process controller (PAC/PLC) to achieve monitoring and control of the production process from the Monitoring & control center or from the on-site controllers.



tSH-700 Series Selection Guide

Model	RS-232	RS-485	Application	COM1	COM2	COM3
tSH-722	2	-	Converter	3-wire RS-232	3-wire RS-232	-
tSH-725	-	2		2-wire RS-485	2-wire RS-485	-
tSH-724	1			2-wire RS-485	3-wire RS-232	-
tSH-732	3	-	Sharer	3-wire RS-232	3-wire RS-232	3-wire RS-232
tSH-735	-	3		2-wire RS-485	2-wire RS-485	2-wire RS-485
tSH-734	2	1		2-wire RS-485	3-wire RS-232	3-wire RS-232

For more detailed tSH-700 series module specifications and functions, please refer to ICP DAS product page:

http://www.icpdas.com/root/product/solutions/industrial_communication/pds/tsh-700.html

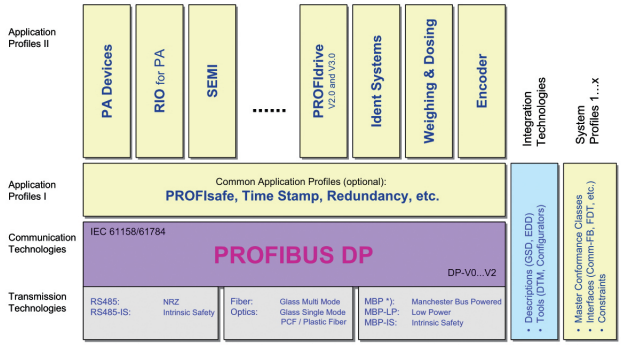
PROFIBUS Gateway Product and Application

By Ryan Lin

PROFIBUS is an open digital communication system. It can be used in wide range of applications; particularly in factory automation and process automation. PROFIBUS is perfect for time-critical applications that require fast response and involve complex communication work. In the application of steel factory cold rolling system, the GW-7552 can be connected to multiple inverters to transmit data between PLC and inverter with low cost, and is able to fast access to a variety of on-site status, and by using error diagnosis mechanism of the PROFIBUS, it can response to unexpected events in real time.

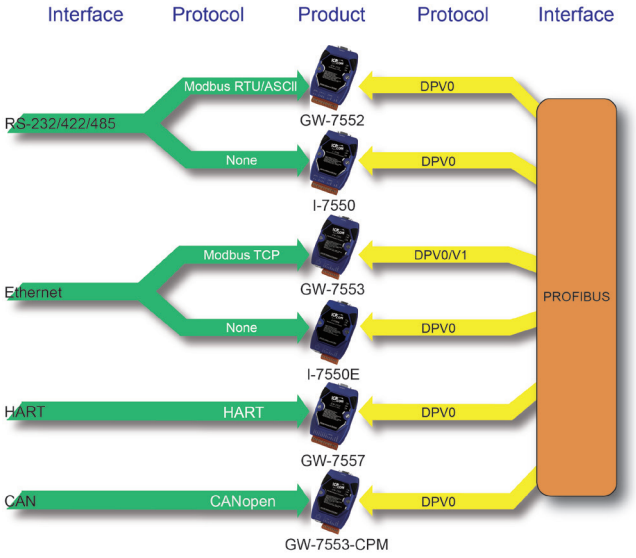
PROFIBUS was developed in 1987 by Siemens and a few enterprises and research institutions; it has now been incorporated into the international standard IEC 61158 and IEC 61784. PROFIBUS is an open digital communication system. It can be used in wide range of applications; particularly in factory automation and process automation. PROFIBUS is perfect for time-critical applications that require fast response and involve complex communication work.

PROFIBUS-DP is a popular protocol, providing a simple, fast, cyclic and deterministic way to perform data exchange between the main station and the sub-station.



PROFIBUS Technology System Architecture

Gateway Solutions



▲ Gateway Selection Guide

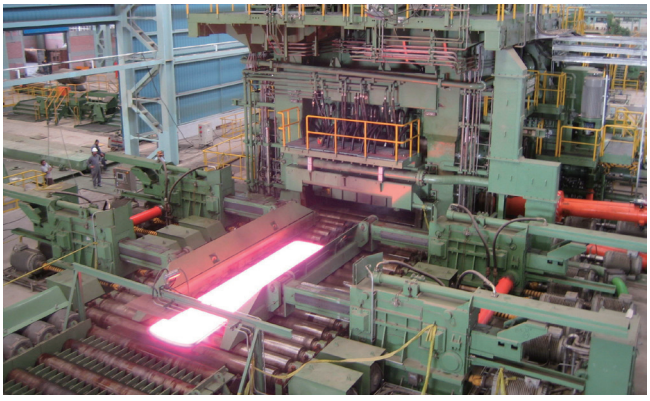
To meet requirements to convert between PROFIBUS and other field bus protocols, ICP DAS developed various gateways. The users can freely choose the gateway to integrate into PROFIBUS network according to the communication protocol they are using when planning the system architecture.

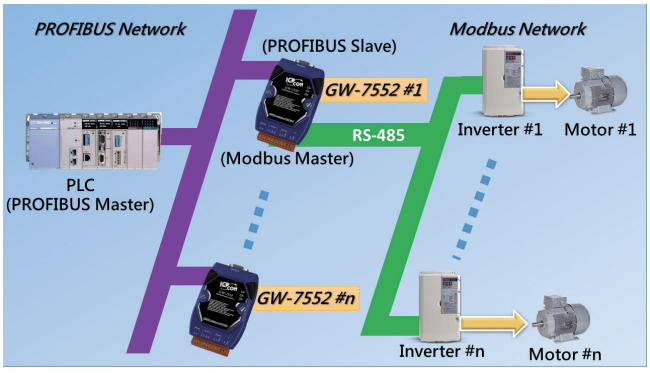
Application

The cold rolling system in the steel factory mainly includes three parts: unwinding, cold rolling and rewinding. The operation of each part is done by controlling the inverter via PLC, and then the inverter control the rotation of the motor to complete the operation. The inverter uses Modbus RTU communication protocol and the main controller PLC uses PROFIBUS communication protocol. Each inverter requires installation of the PROFIBUS communication module to communicate via PROFIBUS communication protocol. The cost to implement the system will be high.

To solve the problem, GW-7552 is used in this application. A GW-7552 can connect to multiple inverters to transmit the data between the PLC and the inverters. The cost will be much lower.

In this application, GW-7552 works as a Modbus RTU master terminal that retrieves the status information of each inverter. And in the PROFIBUS network, GW-7552 works as a PROFIBUS slave terminal. Therefore, by using GW-7552, the PLC can communicate with the inverters easily; and the users can quickly access a variety of on-site status and response in real time via the diagnosis mechanism of the PROFIBUS to deal with unusual events.





Device information

GW-7552: PROFIBUS-DP slave to Modbus RTU/ ASCII Gateway

- ❑ Supports PROFIBUS DP-V0 slave terminal function
- ❑ Features PROFIBUS transmission rates auto-detection function
- ❑ Transmission rate of PROFIBUS can be up to 12 Mbps, transmission rate of COM port can be up to 115.2 kbps
- ❑ The maximum input/output data length is 132/131 bytes
- ❑ Support Modbus master and slave operation mode
- ❑ Support Modbus RTU and ASCII data format
- ❑ Built-in self-tuner ASIC controller on RS-485 port
- ❑ Network Isolation Protection, 2500 Vrms High Speed Coupler for PROFIBUS
- ❑ 3000 VDC isolation protection for PROFIBUS port
- ❑ With 4 kV ESD protection

http://www.icpdas.com/root/product/solutions/industrial_communication/fieldbus/profibus/gateway/gw-7552.html

Converter Selection Guide

Module	 I-7550	 I-7550E
PROFIBUS Interface		
Connector	9-pin female D-Sub	
Baud Rate (bps)	9.6 k, 19.2 k, 45.45 k, 93.75 k, 187.5 k, 500 k, 1.5 M, 3 M, 6 M, 12 M (bps)	
Transmission Distance (m)	Depend on baud rate (for example, max. 1200 m at 9.6 kbps)	
Protocol	DP-V0 Slave	
Max Input / Output Data Length	128/128 bytes	240/240 bytes
UART Interface		
COM	RS-232/RS-485/ RS-422 (can't be used simultaneously)	RS-232
Baud Rate (bps)	1.2k to 115.2 k (bps)	115.2 k (bps)
Protocol	Modbus RTU/ASCII, Master/Slave	For setup via Utility software tool only
Ethernet Interface		
Channel	-	1
Baud Rate (bps)	-	10/100M
Protocol	-	TCP/UDP, Server/ Client
Hardware		
Watchdog	Watchdog IC (Refresh every 0.8 sec.)	
ESD Protection	4 kV class A	

Gateway Selection Guide

Module	 GW-7552	 GW-7553	 GW-7557	 GW-7553-CPM
PROFIBUS Interface				
Connector	9-pin female D-Sub			
Baud Rate (bps)	9.6 k, 19.2 k, 45.45 k, 93.75 k, 187.5 k, 500 k, 1.5 M, 3 M, 6 M, 12 M (bps)			
Transmission Distance (m)	Depend on baud rate (for example, max. 1200 m at 9.6 kbps)			
Protocol	DP-V0 Slave	DP-V0 Slave / DP-V1Slave	DP-V0 Slave	
Input / Output Data Length	132/131 bytes	240/240 bytes		
UART Interface				
COM	RS-232/RS-485/RS-422 (can't be used simultaneously)	RS-232		
Baud Rate (bps)	2.4k to 115.2 k (bps)			
Protocol	Modbus RTU/ ASCII, Master/ Slave	For setup via Utility software tool only		
Ethernet Interface				
Channel	-	1	-	-
Baud Rate (bps)	-	10/100M	-	-
Protocol	-	Modbus TCP, Server/Client	-	-
HART Interface				
Channel	-	-	4	-
Baud Rate (bps)	-	-	HART Master	-
Protocol	-	-	Point-to-Point/Multi-Drop	-
CAN Interface				
Channel	-	-	-	1
Baud Rate (bps)	-	-	-	10K, 20K, 50K, 125K, 250K, 500K, 800K, 1M (bps)
Protocol	-	-	-	CANopen Master
Hardware				
Watchdog	Watchdog IC (Refresh every 0.8 sec.)			
ESD Protection	4 kV class A			

More PROFIBUS Information

Please refer to the following link for more product information, such as product specifications, manuals, software tools and firmware updates:

http://www.icpdas.com/root/product/solutions/industrial_communication/fieldbus/profibus/profibus_selection_guide.html

Summary

The PROFIBUS series product is one of ICP DAS Fieldbus product line. With the help of ICP DAS PROFIBUS converter /gateway /repeater and I O modules, the old system can be improved by integrating different communication interface/ protocol into the PROFIBUS controller. It reduces the upgrade fee and enhances the efficiency of the entire system.

ICP DAS has been working on development of PROFIBUS products for a long time. We provide a variety of solutions for different applications and keep on developing specific products that meet customers' needs for applications in all fields. With extended experiences in industrial communication, ICP DAS will continue to develop more solutions to solve problems that our customers challenge us with.

ICP DAS Solution for Monitoring and Controlling Groundwater Pumping Systems

By Instruments CHT SRL

Introduction

A municipal water supply company in Romania intends to upgrade their groundwater pumping and water storage system with a modern SCADA solution. This system includes ground water extraction and pumping, chlorine water treatment, water storage in tanks, and pumping drinking water to a major city and to an industrial park.

The current SCADA system uses two-way radios for data transmission between locations, which are a few kilometers away from each other. The main requirements are to upgrade the outdated SCADA software, replace the old monitoring and control devices, implement TCP/IP data tansmission via fiber optic, and keep the existing radio system as a backup. The customer requests equipment designed for harsh conditions, surge and lightning protection, 24/7 system availability, autonomous and manual control, a modern SCADA system with remote access functionality, and long-term availability for spare parts.

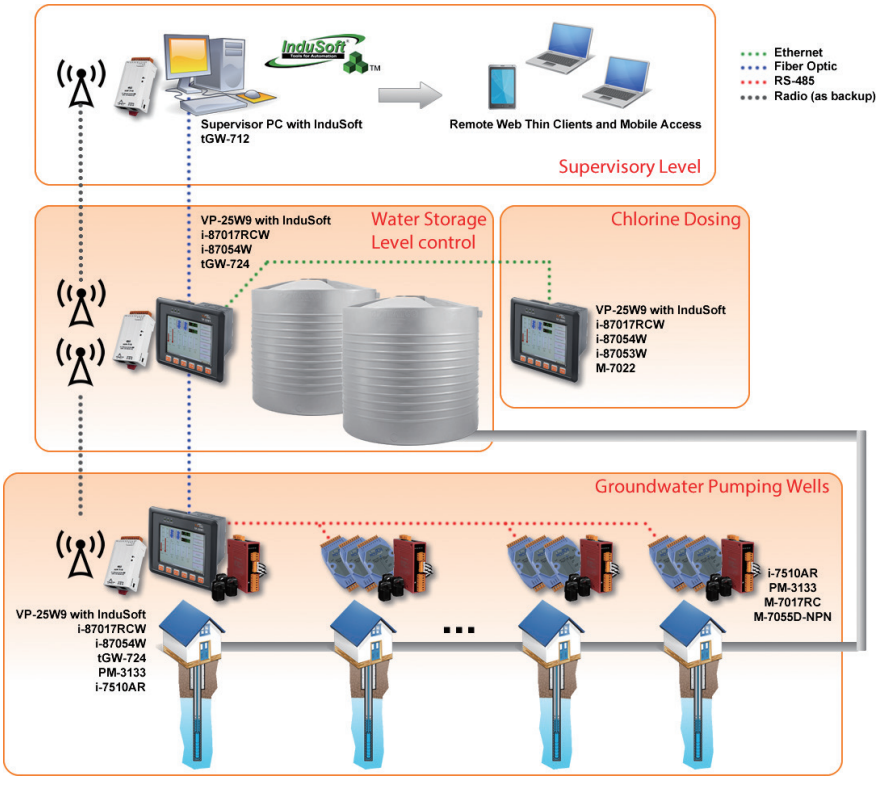
Solution

The ICP DAS solution met all project requirements and the previous SCADA system was upgraded without affecting the pumping system operation.

ICP DAS products for data acquisition and control proved to be a high quality and cost-effective solution for implementing the project, allowing great flexibility by meeting industrial standards like Modbus TCP and Modbus RTU.

The VP-25W9 programmable automation controllers powered by Windows CE 5.0 and InduSoft Web Studio were used for monitoring and controlling important nodes in the system, thanks to the high reliability and ability to function in harsh environments. The InduSoft Web Studio runtime allows the unit to act both as a PLC and HMI, with great flexibility and the ability to access the runtime remotely.

The tGW-700 Series gateway modules allowed to implement redundant data transmission via fiber optic (Modbus TCP) and via radio (Modbus RTU / RS-232). The InduSoft WebStudio runtime proved



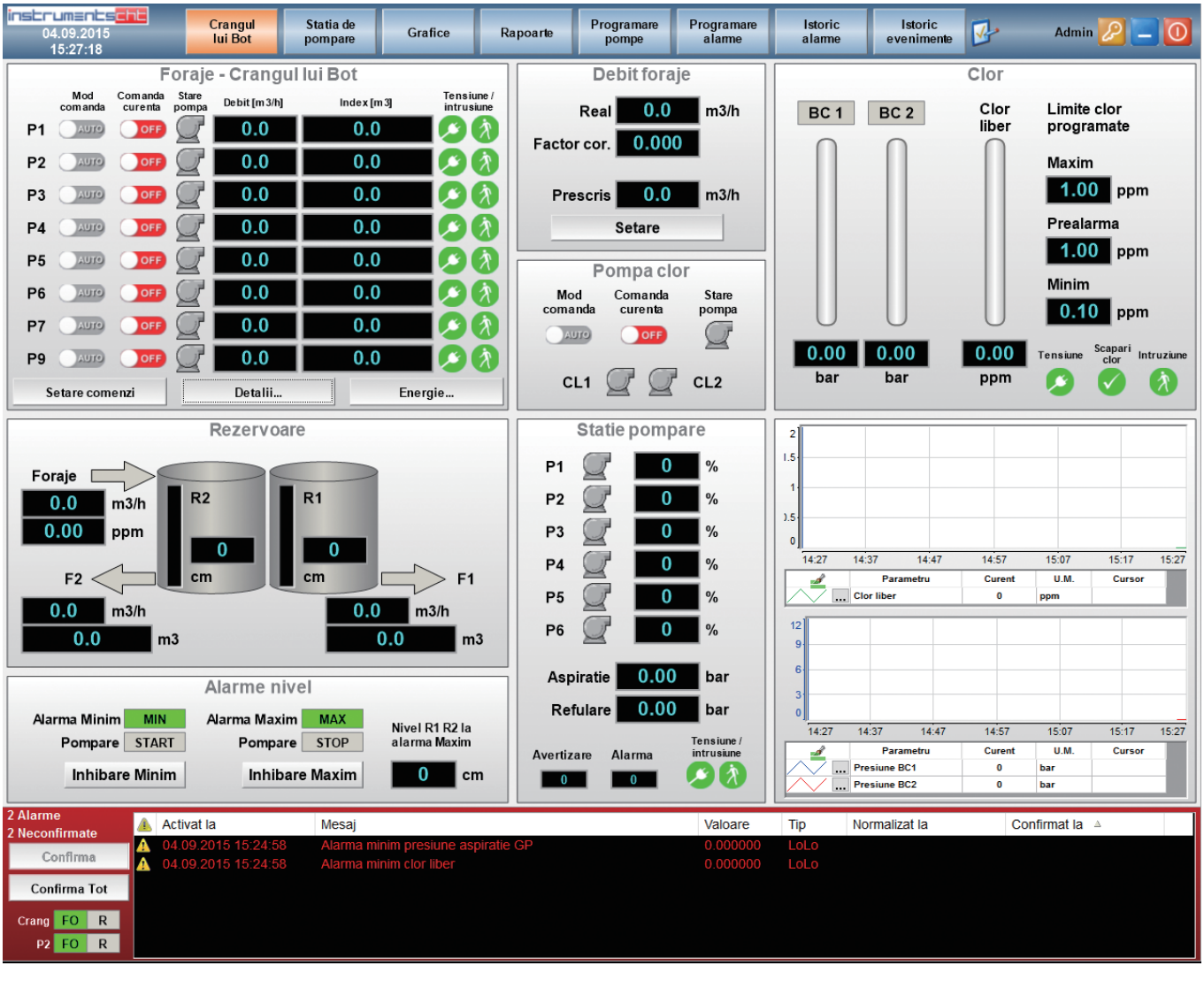
to be very versatile and allowed the use of both interfaces, and also switch between them automatically when needed.

I-7510AR repeaters were used to connect the equipment at each groundwater pumping location on the long RS-485 bus. Thanks to the three-way isolation provided by the repeater, the equipment is protected against surges caused by lightning storms.

Indusoft Web Studio is a very versatile and cost-effective SCADA platform, providing local operator interface, remote web thin client access and mobile access. Future development and upgrading is an easy task.

Company: Instruments CHT SRL
Location: Romania
Products:

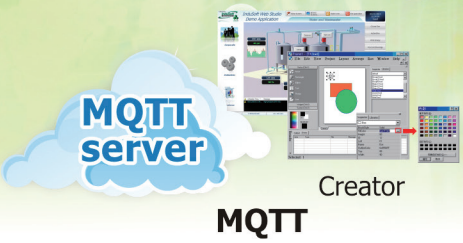
- VP-25W9 InduSoft-based Programmable Automation Controllers
- I-87K Series Modules for data acquisition
- M-7000 Series Modules for remote data acquisition
- I-7510AR Series Repeaters for RS-485 bus
- tGW-700 Series as Modbus gateways
- PM-3133 Series Intelligent power meters
- Indusoft Web Studio as SCADA and HMI solution



Wireless Sensor Network Solution

Wireless Sensor Network Solution

InduSoft




Smart Devices


HMI, PAC

Reliable Network

Wi-Fi, 2.4GHz/433MHz, ZigBee, 2G/3G/4G


Wi-Fi series


2.4GHz / 433MHz RF series


ZigBee series


2G/3G/4G series


2G/3G/4G Service Providers

Sensors


RFID Multifunction Reader


PIR Motion Detector


CO/CO2 Sensor


Temperature/ Humidity Sensor


Gas Detection Sensor

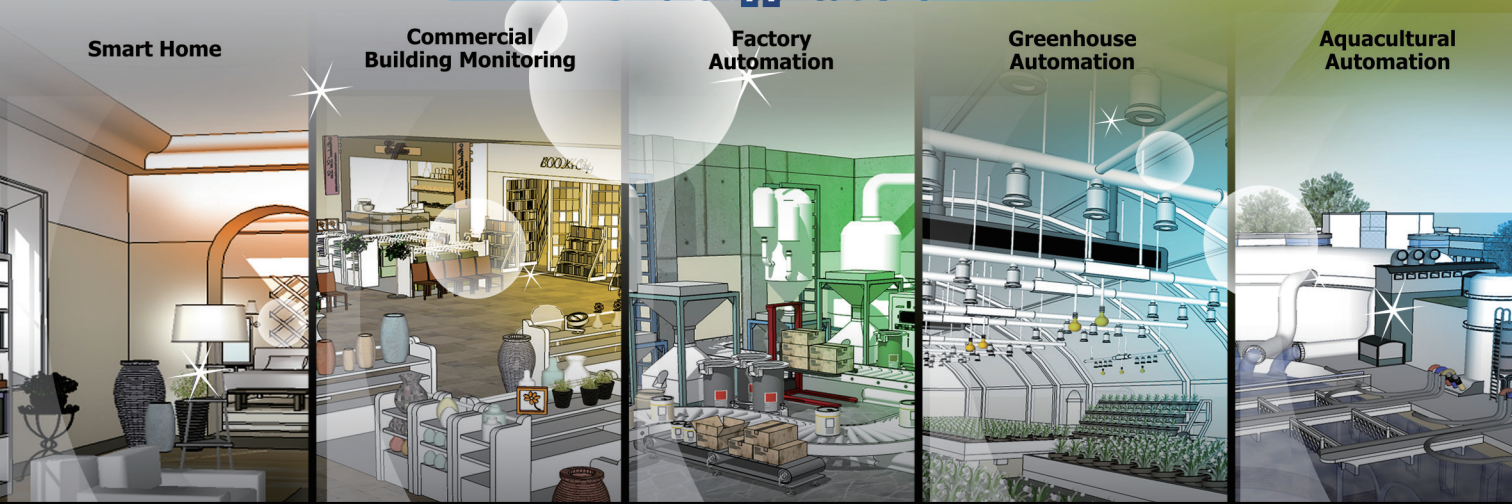
Solar Powered Module


Window Multifunction Sensor


Temperature/ Humidity Sensor


2G/3G/4G Controller

Smart Applications



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