APPLICATION STORY

ADDING IoT TO WATER WORKS WONDERS FOR MALAYSIAN RICE GROWERS

KONTRON EASES PRESSURE ON MALAYSIAN RICE FARMERS

- KONTRON'S INDUSTRIAL COMPUTING PLATFORM ENABLES INNOVATIVE IoT PRECISION FARMING SOLUTION

POSSIBILITIES START HERE kontron

IN MALAYSIA DEMAND FOR RICE PUTS THE COUNTRY'S WATER RESERVES UNDER PRESSURE. AN INNOVATIVE IoT PRECISION FARMING SOLUTION USING KONTRON'S KBOX INDUSTRIAL COMPUTING PLATFORM HELPS RICE FARMERS BOOST CROP YIELDS WHILE CONSERVING PRECIOUS WATER.

// CANAL

Kontron is at the forefront of accelerating the development of world-class Internet of Things (IoT) solutions for eventual full-scale deployment in a wide range of sectors. For example, working with the Universiti Sains Malaysia (USM) and other world leading technology vendors Kontron has already helped establish the Collaborative Research in Engineering, Science & Technology (CREST) organisation and an IoT development laboratory.

Based in Malaysia CREST is undertaking a number of IoT-oriented Proof of Concept initiatives including various Precision Farming projects and it was through this connection that Kontron was introduced to local IoT solutions specialist Abbaco Controls. This subsequently led to Kontron embedded IoT-ready technology being used in a recent project to increase rice production on behalf of the Malaysian Ministry of Agriculture (MOA).

CONTENT

THE CHALLENGE

While such an initiative as this offers huge potential in a country where rice is a staple part of the national diet, some 70 percent of the nation's available water resources are consumed for rice production. It was therefore a necessity that any proposed water management solution for boosting crop yield also had to enable rice farmers to use water as efficiently as possible, with any reduction in usage allowing more water to be made available elsewhere.

At the same time the system needed to improve on the MOA's established supervisory control and data acquisition (SCADA) system which controls the country's water gates for agricultural supply purposes. Key performance criteria would therefore focus around measurable improvements to the accuracy of actual and predicted water levels, speed of response times, system operational costs, water conservation and, of course, crop yields.

The pilot system was deployed in mid-2014 at one of Malaysia's largest rice growing areas about 70 kms from Kuala Lumpur and was closely monitored and evaluated by the MOA and the farmers concerned over a period of 12 months.

// DECENTRALIZED INTELLIGENT CONTROL SYSTEMS

THE SOLUTION

The water supply and demand management system was designed and implemented by Abbaco Controls and features an IoT gateway based on Kontron's Industrial Computer Platform KBox A-201.

For local data acquisition, this fanless system supports a broad range of industrial interfaces such as 2x Gbit Ethernet, 2x USB 2.0, as well as an optional CAN bus and /or Profibus interface, whereas legacy installations benefit from two serial interfaces (RS232/485). For wireless connection to the cloud or the local network, the Kontron K-Box A-201 mini can be equipped with LTE (4G) and GSM (2G/3G) or Wi-Fi. Three external antenna connectors enable high signal quality.

The integrated solid-state drive (SSD) with up to 64 gigabytes capacity delivers rugged and fast storage capacity for the operating system and data, and a trusted platform module (TPM) is integrated for increased data security, all in a compact footprint.

// KONTRON KBOX A-201

The water management system was designed to provide farmers and MOA personnel with actionable information polled from multiple sensors and devices attached to a series of water sluice gates. The data collected by the sensors covering such parameters as current water levels, water flow rate, temperature and acidity was communicated in real-time over Modbus TCP protocol to the IoT ready Kontron Industrial Computer Platform running pre-validated Intel® IoT Gateway software. Together these performed the device management and configuration and necessary data aggregation before information was sent securely over TCP/IP connection to a private cloud server for processing by Abbaco Control's data mining and analytics software.

MOA officials were subsequently able to view highly accurate real-time reports on their PCs for monitoring current and predicted water levels, while farmers were empowered to take immediate action via their smartphones by remotely opening or closing water gates at the optimum time. The solution also triggered early warning alerts to enable preventive action should water levels become too high or low.

BUSINESS BENEFITS

The real-time data managed via Kontron's gateway technology has been instrumental in the successful deployment and trialling of Abbaco's IoT water irrigation system. Based on this experience it is expected the MOA will make this innovative IoT solution available to rice farmers throughout the country with the ultimate goal of doubling crop yields.

The total cost of the Abbaco IoT Precision Farming solution has proved to be around half that of an equivalent SCADA system and has the added advantage of scalability and flexibility through the Kontron PC Gateway's ability to support a multitude of devices with the addition of I/O modules from other vendors. In addition the robust Kontron IoT gateway design, its support of the open ModBus communications protocol and industry standard MQTT messaging have all ensured optimal TCO for the overall solution thanks to ease of configuration and low maintenance requirements.

Compared to the SCADA system, users could securely remote monitor and control water supply from anywhere and at any time of day or night. Previously, authorised personnel were still required to drive considerable distances between water gates which was time consuming and costly and highly dependent on manpower being available at the right time.

Through the depth of information available MOA personnel and farmers were also able to conduct trend analysis comparisons based on historical rainfall, water and temperature levels to more accurately determine the minimum level of irrigation required for producing maximum rice crop yields.

Finally the inherent usability of the Abbaco water irrigation system's architecture has demonstrated its potential for deployment in other field-based agricultural and industrial IoT applications such as water recycling, flood management, factory automation and buildings energy management.

// SENSOR

"I have been very impressed by the Kontron KBox PC Gateway's processing power, robustness, adherence to industry standards, ease of configuration and deployment," said Chang Yew Cheong, Owner and CEO of Abbaco Controls.

"As our requirements grow the KBox's ability to scale through the provision of multiple I/O interfaces will be very important as will its low maintenance requirements which ensure our overall system operating costs can be kept to a minimum."

// CONTROL STATION

PRODUCT SHOWCASE

The water supply and demand management system features an IoT gateway based on Kontron's Industrial Computer Platform KBox A-201. For local data acquisition, this fanless system supports a broad range of industrial interfaces such as 2x Gbit Ethernet, 2x USB 2.0, as well as an optional CAN bus and/or Profibus interface, whereas legacy installations benefit from two serial interfaces (RS232/485). For wireless connection to the cloud or the local network, the Kontron KBox A-201 mini can be equipped with LTE (4G) and GSM (2G/3G) or Wi-Fi. Three external antenna connectors enable high signal quality. The integrated solid-state drive (SSD) with up to 64 gigabytes capacity delivers rugged and fast storage capacity for the operating system and data, and a trusted platform module (TPM) is integrated for increased data security, all in a compact footprint.

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About Kontron

Kontron, a global leader in embedded computing technology and trusted advisor in IoT, works closely with its customers, allowing them to focus on their core competencies by offering a complete and integrated portfolio of hardware, software and services designed to help them make the most of their applications.

With a significant percentage of employees in research and development, Kontron creates many of the standards that drive the world's embedded computing platforms; bringing to life numerous technologies and applications that touch millions of lives. The result is an accelerated time-to-market, reduced total-cost-of-ownership, product longevity and the best possible overall application with leading-edge, highest reliability embedded technology.

Kontron is a listed company. Its shares are traded in the Prime Standard segment of the Frankfurt Stock Exchange and on other exchanges under the symbol "KBC". For more information, please visit: **www.kontron.com**

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