Proactive Maintenance Creates New Business Model for Elevator Suppliers

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Introduction

The Era of the Internet of Things has seen a proliferation of inexpensive cheaper sensors, transducers, and data transmission vehicles. This, accompanied with enhanced security technologies, has made customers in various vertical markets more willing to allow their data to stream over the network for IoT applications. Equipment manufacturers, faced with such market trends, are considering how to leverage new technologies to seize the newly burgeoning business opportunities.

Our customer in this case is one of Asia's most active elevator/escalator suppliers, who has installed over 3,500 elevators/escalators in Taiwan alone, not to mention their growing business base in mainland China and other Asian countries. Imagine the complicated management and huge resources involved in their repair and maintenance works.

With new technologies available, they were seeking a new management system that could help remotely monitor and control their installed elevators/escalators, and therefore develop a more proactive and intelligent maintenance model that streamlined their workflow with improved efficiency and economy. They wanted to replace their traditional, regular itinerary of on-site inspections and failure-reactive model.

Leveraging the solution provided by Advantech, our customer successfully developed a proactive elevator/escalator maintenance system that collects real time operation data from the elevators/escalators, automatically halting the operation of elevators or escalators where monitored parameters reach dangerous thresholds, and alerting the company for needed repairs or component renewals. After a 4 to 5 month development period, the system is ready for rolling out, about one and a half years earlier than if they had done it on their own without the help of the Advantech solution.

Application Requirements

After deploying sensors including motor temperature and vibration on each elevator/escalator, the customer needed to install an IoT gateway near the elevator/escalator control system to collect data from sensors via wireless or wired transmission and convert the data (either digital or analog with different formats) into a unified IoT protocol data format and upload the data over the Internet to the remote backend server at the elevator company. If the gateway were provided with sufficient computing power and intelligent capabilities, it would be able to preprocess data, implementing certain monitoring control tasks and uploading only significant data to the backend server. This would help reduce server loading and save tremendously on communication expenses. An intelligent server with adequate computing power was recommended for this gateway deployed at the edge of the network.

System Solution

The Advantech Edge Intelligence Server (EIS) is more than an IoT gateway deployed in the field; it is a solution-ready platform integrating the hardware and software packages needed to enable IoT-based edge intelligence, network connectivity, data acquisition, and management and cloud services.

The EIS series has with WISE-PaaS software packages, IoT development tools, and pre-configured cloud services preinstalled. By leveraging WISE-Agent SDK tools contained in the packages, the system developer can easily develop modules to enable sensor data collection, conversion, and integration. With WISE-Agent, data collected from an elevator control system, brakes and motors (temperatures and vibrations) can be converted into MQTT format for IoT communication and applications.

The built-in software platform also contains the Node-RED logic flow configuration tool, which provides a browser-based graphic flow-style programming environment for the system developer to create modules for data processing and flow control. With Node-RED, the EIS can be enabled to transform analog sensor data into digital format, implement pre-processing, and upload only significant data to the backend server. The system manager can also set alarm thresholds; when any monitored data is judged to have reached a dangerous level (for example, abnormal motor temperatures or vibration), the EIS will automatically shut down the problematic elevator(s)/escalator(s) to prevent failure, and notify the management center to send R&M engineers to the site.

In the past, before the availability of IoT technology, engineers had to program flow controls and install the codes on the field controllers to enable these functions, and they had to visit the sites for re-editing, and complete settings and modifications. But now, with Node-RED and the Advantech WISE-PaaS platform, they can simply edit the flow controls at the central management center and send the modules via the Internet to all the remotely located EIS.

WISE-PaaS/RMM is a software platform for remote monitoring and management. Application developers use the RESTful APIs included in the EIS solution to access related functionality and WISE-PaaS IoT data, thereby building up connectivity between remote devices at all monitored elevators/escalators and the backend platform. With the IoT enabled remote monitoring system, users can sit in their offices and oversee the operating status of all elevators/escalators, check with repair and maintenance records, and stay vigilant to alerts and alarms.

Benefits

- Enables real-time data acquisition from a huge number of elevators and escalators remotely located across a wide geographic range, with cross-equipment data integration and centralized management
- Highly integrated solution with well-rounded software packages provides resources for fast IoT system development, saving the customer tremendous time and effort
- Open and standard structure and components allow easy upgrading and future expansion; for example, the preconfigured Azure cloud service will facilitate future development of cloud-based preventive maintenance systems with big data analysis capability
- Helps the elevator/escalator company create a brand new business model providing proactive R&M services for higher efficiency and economy

for User   Repair Records   Alarm Thresholds   Device Management Dashboard

Microsoft Azure
Pre-configured Cloud Package

ADVANTECH
WISE-PaaS
IoT Software Platform

MQTT

IoT Development Tools
- Node-RED Data Flow Logic Designer
- Dashboard Builder
- Protocol Plug-in SDK & Configuration Tools

WISE-PaaS/RMM
- Data & Device Management
- Built-in 15+ Real-time Monitoring Widgets
- Up to 1000 Device Connections

Edge Intelligence Server(EIS)

Wi-Fi   RS-485   RS-485   Wi-Fi

Controller   Controller   Controller   Controller