Case Study

Industrial Automation

Moving from a Wired to a Wireless Industrial Monitoring and Control System
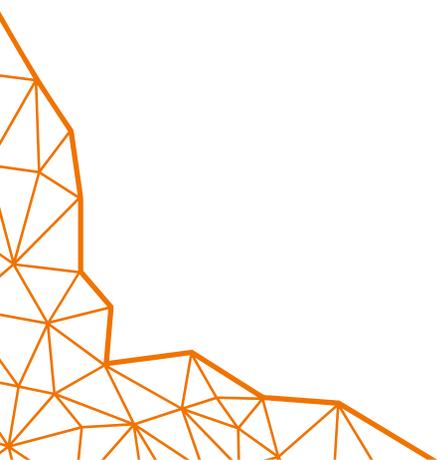
Moving from a Wired to a Wireless Industrial Monitoring and Control System

Challenge

Our client operates complex industrial machinery and uses a proprietary monitoring system with a set of wired sensors. By monitoring vital parameters and transmitting data to the central server, the system enables predictive maintenance in order to minimize the machine downtime and improve operational efficiency.

The machinery includes various motors, gearboxes, pumps, spindles, fans, compressors, and more. Sensor nodes are placed to monitor the performance of the critical components such as bearings or fan blades. The nodes can feature various sensors that allow to measure temperature, pressure, speed, hours of operations, as well as other parameters, including vibration. The goal is the early detection of any irregularities in the performance of the mission-critical components and mechanisms, thus avoiding costly damage and machine downtime.

The monitoring system was inflexible and expensive to operate. Unwieldy cables make it difficult to place the sensor nodes in the hard-to-reach spaces and in the vicinity of the rotating parts and mechanisms. Proprietary communication protocols limit the data collection software upgrade options as well as the overall system's flexibility. Going wireless and incorporating the standard communication protocols was the way to overcome the system's limitations and improve its efficiency, while reducing the operating costs.
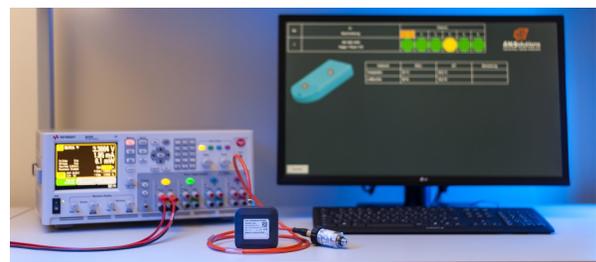
**Industrial Monitoring Solution**

A.N.Solutions

Solution

A.N. Solutions started with a thorough assessment of the legacy system and identified the areas of improvement. The key was to add the wireless capability using IEEE 802.15.4-based communication protocols to the existing wired sensor units, and seamlessly integrate the sensing data with the monitoring and control software. Sensor nodes form an intelligent mesh network exchanging data and commands with the controller nodes featuring a secure cloud connection to the client's back-end server. Wireless nodes are battery-powered and can operate in an autonomous mode for up to two years.

Industrial equipment with its metal-made rotating parts and vibrating motors is an extremely challenging environment for RF signal propagation. A.N. Solutions tapped into its unique expertise in antenna design to develop wireless extensions to the existing sensor nodes connecting them via legacy interface.

Enclosed in a robust IP65/67 housing, the wireless extension is based on a 2.4 GHz @ANY RF platform with an integrated antenna featuring a unique diversity scheme that ensures a reliable data transmission in an industrial environment. By fine-tuning the antenna's output power for optimal performance, A.N. Solutions engineers were able to compensate for the absorption effects of the enclosure material and minimize interferences.

Additionally, Essential computations are performed on the node, which helps to optimize the wireless transmission time and improves the battery life. A.N. Solutions designed the system with the right balance between the edge computing and the cloud. Wireless data is seamlessly integrated with the client's back-end system and is available via Web-based and mobile interfaces. Built-in algorithms control mission-critical processes and intervene automatically. If necessary, an operator can also supervise the entire system, while setting up and fine tuning the monitored parameters.
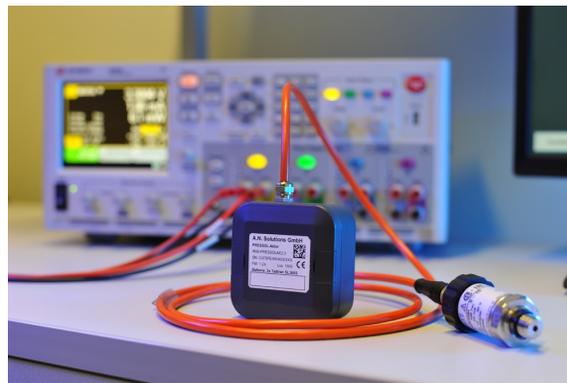
@ANY2400-SC-3-2 – Based Wireless Extension Node

Results

- Significant cost reductions:
  - Quicker installation
  - Optimized predictive maintenance
    - Reduced machine downtime
    - Breakdown avoidance
  - Remote diagnostics and troubleshooting
  - On-demand service, training and consulting

- Intuitive setup, easy reconfiguration and scalability:
  - Compact wireless extensions connect to the legacy sensor units
  - Wireless nodes can be easily placed even in hard-to-reach spots
  - The entire system can be reconfigured and expanded in minutes
  - Self-organizing mesh networks quickly adapt to the changes

- Reliable real-time monitoring and control of the machinery:
  - Robust and stable wireless data transmission
  - Online and mobile data access
  - Automated data recording for preselected parameters
  - Preprogrammed commands on the nodes

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