Case Study - IIoT Industrial Operational Parameters and IoT Integration by MPS Digital

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Overview

This case study is about an industrial laboratory set up where the user wanted to monitor the laboratory environment - the ambient environment for temperature and humidity, vis-a-vis electrical energy consumption in order to assess the functioning of air conditioning/cooling/heating equipment. Furthermore, it was required to monitor the premises for the security and log entry/exit doors, human movement especially during off days, activate / deactivate lighting based on the event and capturing the exceptional events by camera. For both these different kinds of parameters, a single system was desired which would log the activities and parameters, send the alerts upon variation in process parameters and exceptional events. It was also required to have the interface available at any remote location and monitor the entire system using mobile and/or desktop devices.

Implementation Scheme

For implementing the integrated Iot and industrial IoT for this case the solution was divided into two major branches. The first branch was related to monitoring of operational parameters e.g. Temperature and Humidity of ambient as well as of lab control room along with electrical energy related parameters. Second branch was to implement the security monitoring IoT infrastructure using various sensors including human motion sensors, door sensors, camera, light switches, relays, alarms etc.

Sensors and Network Topology

For the operational parameters, the sensors were developed having multiple channels for sensing and transmitting the data about temperature and humidity of multiple locations using industry standard MODBUS protocol. Further, a standard RS485 based device was used for the electrical energy consumption. All the process parameters transmitters were linked to one RS485/TCPIP gateway. In the second branch of IoT events, sensors, switches, lights and camera were based on standard message bus protocol. Both the above types of networks i.e. process parameters and IoT events, switches and camera were integrated into one common network on the ethernet bus. The Edge device and server was set up and installed on the common network.

Edge Device

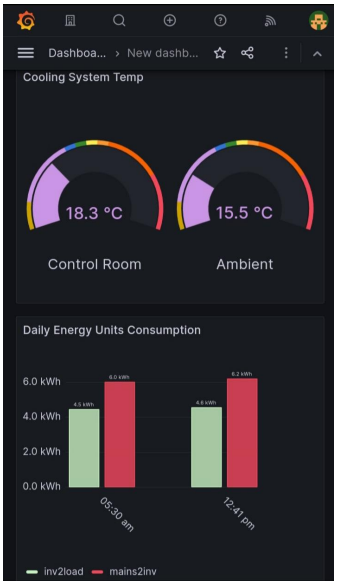
As per the needs, the function of the edge device was also two fold. The first one was related to the operation parameters - temperature, humidity, voltage, current and power and the second part was capturing the events and responding to events. The two modules were merged into a common module and the data from both collected and stored into the common database in different repositories. Before ingesting the data, the same was also sanitized by eliminating spurious signals and values. Secondly, for the operational parameters an averaging logic was deployed to average values in a 3 minute window so as to reduce the data and get better values, smoothing out sharp transient variations. The edge device was optimized for speed and a data synching mechanism was used to push the data to a more powerful and dedicated cloud server for anywhere access. Caching mechanism ensures retention of data during intermittent network outages for up to 2-4 days (customizable).

Cloud Server

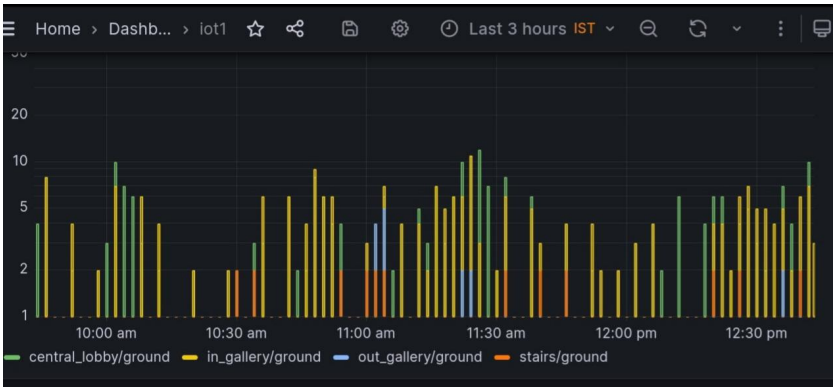
Final set up was done on a cloud server for multiple functions - viz. Performing computational analysis on data on a continuous basis, logging the computed data, analyzing deviations, reporting the basic data and deviations in the form of scheduled emails and reports. Alerts are generated in case of unexpected variations and broadcast to the key personnel. The capacity of the cloud server is able to hold the data with precision for up to 2 or 3 years for any need of reports and investigations later. Another major function of the cloud server is to present the easy to understand aesthetically appealing visual dashboards and panels which are accessible from anywhere and on mobile and desktop devices. The reports and visualizations on mobile devices are also available for the longer period spanning into months and years.

Visualization and Sample Reports

Some visualizations from the dashboard - both on mobile and desktop devices and also sample reports are shown below.



Sample Visualizations of OT metrics on Mobile



Sample Visualizations of events log with event rates

Benefits

This setup has made it possible for the client to optimize their operation and be alerted inside or outside the premises in case of major issues in variance of parameters or on unexpected process and security events.

Ready to have a live demo or discuss your needs? Please contact us today at rt@mps.in or visit https://www.mps.in for contact details.