Case Study: ITC Barn Monitor

Cloud-Based Real-Time Tobacco Barn Monitoring And Data Analysis System :: ITC, India’s largest tobacco based products manufacturer stepped into IoT race using BOLT IoT® Platform.

Indian Tobacco Company Limited or ITC, a leader in FMCG market in India esp. in Tobacco products, was looking for IoT solutions to remotely monitor and analyze its tobacco leaves curing process performed in the curing Barns. The system was deployed in villages that still have bullock-carts for transportation. The first ever interaction with the internet they had is with BOLT IoT® platform and not with Google or Facebook.

Implementing Cloud-Based Real-Time Tobacco Barn Monitoring and Analytics System, Inventrom with its BOLT IoT® Platform helped ITC to connect its Tobacco curing barns to the internet, create a single data tunnel to store, analyze the parameters in real time, process alerts to the operators and keep a check on the process parameters.

Insights that we got:

**Insight 1:** The farmers do not follow the traditionally suggested temperature and humidity levels for barn monitoring.

The highest scientifically allowed temperature for the midrib drying process of the tobacco curing in Barns is 160°F, but the observed temperature was 213.6°F, even higher than the boiling point of water.

**Insight 2:** There is a high correlation between temperature and relative humidity inside the barn.

A high negative correlation of about 0.8 can be seen in most of the barns.

**Insight 3:** The temperature and humidity levels in barn should not be based only on time.

The temperature used is dependent on various factors other then just the time, like: leaf size, rains at the time of curing, and the time available to complete the curing cycle.

**Insight 4:** Curing curve cannot be same for all

Based on the aforementioned factors all three factors have to be considered in order to come up with customized curing curves. The farmer could select the most optimum curve based on the conditions like leaf size, rains and time available.
Sector

Internet of thing, Cloud-based storage, monitoring, analytics and control

Customer Profile

ITC is one of India's foremost multi-business enterprise with a market capitalization of US $ 45 billion and a turnover of US $ 8.31 billion as per the session 2012-2013. It employs over 25,000 people at more than 60 locations across India. ITC is rated among the World's Best Big Companies, Asia's 'Fab 50' and the World's Most Reputable Companies by Forbes magazine and as 'India's Most Admired Company' in a survey conducted by Fortune India magazine and Hay Group are few among many achievements and recognitions received by the company.

Established in 1910, the company completed 100 years in 2010.

Business Requirements

ITC’s IoT strategy was aimed to drive the following business requirements:

- Achieve Real-Time Monitoring of the Tobacco Curing Process
- A Data Collection and Storage Platform
- On Ground Alarm Systems
- Cloud Based Alerts & Alarms
- Data Analytics & Visualization
- Seasonal Reports

Challenge

As a part of BOLT IoT® Solutions, the customer primarily wished to leverage IoT for real-time monitoring of the Operational Parameters like Temperature and Humidity, Data Storage, Data Visualization & Analytics and Cloud-based Exchange of Information or Commands.

But there were several challenges at the outset:

Firstly, these farmers or Barn drivers have been completely alienated to any of the latest technologies till date. The internet connectivity in these villages is very low. BOLT IoT® platform is the first interaction they ever had to the internet, not with Google or Facebook. Hence, primarily ITC was looking for a partner who could connect these curing barns to a single Cloud platform and also make everything from bottom to the top, i.e., from providing hardware to be place within the barns to gather and transfer data, to a cloud platform for monitoring, storage, analytics and visualization, to communicate locally and through internet in case of any attention required at the barns; a complete end-to-end solution.
Secondly, the amount of data, extreme operating conditions and their requirement of access management, real-time monitoring & analytics requires a platform capable of offering these features and handling the load, also it has to be robust, scalable and flexible.

Thirdly, the platform should be able to create different profiles and segregate data based of different user logins. Also the platform should be secure, and intelligent to process and analyze the data gathered in order to generate actionable insights and reports.

Lastly, the system has to be deployed within 28 days, this required understanding the process requirements, design research & development, manufacturing the hardware interface units, installing hardware interface units in barns and establishing connectivity to the BOLT IoT® cloud. So, the system has to such that it can be made and deployed, and scaled up to the required units and given usage in a very short time period.

Solution

Inventrom determined their IoT integration requirements and filled in their technology gap with BOLT IoT®, a scalable cloud-based IoT Platform by Inventrom.

The System offered:

Contains Temperature & Humidity sensor that is connected to the controller via a long, high-temperature sustaining wire. The LCD in the Barn Monitor displays the current temperature value, humidity level, smoke level and the sensor status. There are buttons provided to choose the stage of the curing process and a buzzer to work as a local alarm in case the process parameters crosses the defined threshold ranges. This system was powered by a couple of batteries, which were used alternately, as one is being used up by the system, the other is being charged and will be replaced when the former is exhausted and put for recharging.
The barn monitor transfer all the data gathered to the BOLT IoT® cloud storage by the means of the Internet, which is provided by the onboard GSM module.

The BOLT IoT® cloud platform stores all the data gathered by all the farms; tags this data to different barns, different processes and cycles; process the data across the defined limits/ranges for these parameters across different processes and generates alerts in case the data seems to be out of the range. It also analyze the data gather, and make it available for visualization in the form of various types of charts and graphs, provide analytical insights based on the data and make the data ready to be downloaded in a variety of file types at any point in time. These alerts generated by the BOLT IoT® cloud can be in the form of SMS, e-mails or push notifications to the internet connected mobile and computer devices.
With the installation, the system started streaming real-time data to BOLT IoT® cloud as a centralized platform. The operators (barn driver and the supervisor) are able to login into the mobile/web application to track the barn’s current temperature and humidity levels; they can also visualize all the collected data, analyze system behavior in general and against the predefined range of values for these parameters. Also, they can analyze the data falling out of the range and comprehend the reason for such a behavior. It provides a direct insight into how the system is behaving and what & where the improvements can be made in order to make the process more efficient.

The BOLT IoT® platform makes application development and integration very easy with its intuitive APIs. Further BOLT IoT® provides a flexible pricing model which means that the customer only pays for machines and a very reasonable cost for the BOLT IoT® cloud server usage. This offered a lot of flexibility where no up-front investment required for the BOLT IoT® cloud platform.

Outcomes

Inventrom with its BOLT IoT® Platform and trusted partner network was able to connect all of the ITC’s tobacco curing barns in the village of Guntur, seamlessly & quickly and provided an end-to-end solution, right from sensor & hardware setup to data acquisition to processing with state of the art business relevant applications on top of BOLT IoT® Platform.

With BOLT IoT® platform, ITC was able to transform their existing Tobacco producing barns. Some of the important outcomes of deploying BOLT IoT® platform are:

1. **Centralised Process Data**

By connecting and pushing the temperature and humidity data from tobacco curing barns, Inventrom provided for a centralized platform – a single source of truth for all operational metrics and data analytics of Process Parameters, Condition Monitoring, Errors, Sensor Calibration, Data Visualization and Alerts in real time.

Barn data analysis reports are now available anywhere and at any time. And with the Internet connected Barns, ITC could use different monitoring tools it need to immediately see inefficiencies and identify bottlenecks in real time.

2. **Monitoring & Maximizing Process Efficiency**

Temperature, Humidity, Smoke levels and Sensor status could now be monitored in the barn in near real time.

By having a real time analysis of the process parameters and a highly efficient alert system, the overall process was

a) actually been observed and analyzed for the first time. It showed how far off the temperature and humidity levels were used to be, without any monitoring, previously it was just a play of guesswork.
b) able to be kept within the bars, which resulted in a better quality of the cured tobacco leaves.

3. Data Visualization & Analytics

A real-time data monitoring and visualization has been offered, that offers remote monitoring and analysis based on the data gathered. This made understanding of the data easier and saved time cost by pin pointing the areas where attention was required.

4. Error Report

The platform also provides a feature to error % report generation, which displays the error percentage of the process parameters’ observed values. This provided a better barn driver profiling and offered an actually monitoring on various barns. By this they were able to discuss with barn drivers about the process steps they were talking and what should actually be done.

5. Report generation and data download

The BOLT IoT® cloud platform also offers seasonal reports based on the data gathered, this contains all the data gathered by the barn, average temperature & humidity levels maintained across various process, a comparison against the average for best quality of cured tobacco leaves, error % report, and insights over these data.

6. Quick ROI

Bolstering not only the bottom line, but also the top line ITC in collaboration with Inventrom, achieved the predefined objective of analyzing the reality behind the actual process operation and the theory; this made them look into the aspects to be worked upon and make the process more efficient and better. With this success, they are now planning to horizontally deploy the solution across 100 thousand barns across 2 states in the Southern part of India.

To learn more about us please visit us at www.boltiot.com or write us at contactus@inventrom.com. Looking forward to solve your problems by deploying IoT to serve you.