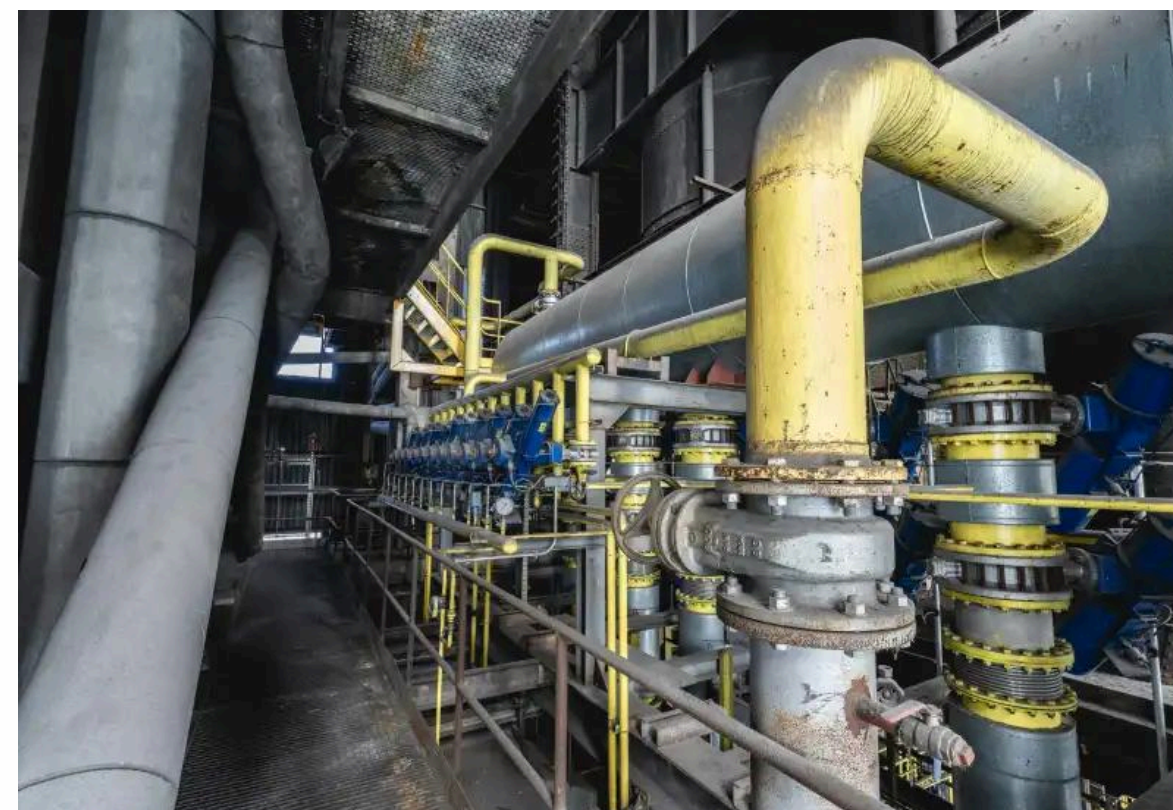


CASE STUDY

Industry 4.0 Smart Industrial Pump Control



In a facility that needs to operate multiple pumps, it becomes difficult for pump operators to go to each pump in a timely manner to set or change its operating parameters or to turn them on or off. This is especially crucial when the imprecision in pump operations can alter the results of a scientific experiment or pharma products.

A research lab that had several pumps wanted the ability to control multiple pumps from a single location by being able to set different parameters of individual pumps and turn them on or off as required.

SpringCT developed an Android App to monitor and control Masterflex pumps used in research labs and pharmaceutical industry. The App communicates with the Masterflex pump over Bluetooth Low Energy to read various parameters such as flow, velocity, direction of rotation and pump status. The operator can control the pump directly from the App and also set a program (from pre-defined recipes) for the pump.

Product Features

- **Automatic Pump Discovery**
Automatic scanning and discovery of pumps in the vicinity with seamless connection capabilities.
- **Real-time Monitoring**
Monitor and record important pump parameters including flow, velocity, direction of rotation and pump status.
- **Parameter Control**
Change pump operating parameters (tubing size, flow unit, flow rate, flow direction, on-timer, off-timer, batch count, Volume).
- **Operational Control**
Control pump operations (Start, Stop, Pause, Resume) directly from the mobile application.
- **Cloud Integration**
Transfer data to the cloud for historical analysis and archival purposes.

Key Technical Achievements

- **Multi-Pump Data Acquisition**
Data acquisition from multiple pumps over Bluetooth Low Energy (BLE) with high efficiency.
- **Real-time Control**
Real time pump control with high efficiency and low latency for critical operations.
- **Alarm Monitoring**
Monitor important parameters for alarm conditions and provide timely alerts.
- **Role-Based Access Control**
Provide role based controlled access to various features of the system for security and operational control.

Technology Used

- **C# & Xamarin:** Cross-platform mobile development framework for building native Android applications.
- **Android Platform:** Support for Android 4.4 to 7.1 versions ensuring broad device compatibility.
- **Bluetooth Low Energy (BLE):** Wireless communication protocol for efficient data transfer and pump control.
- **Cloud Integration:** Data storage, analysis, and archival capabilities for historical pump performance tracking.
- **Mobile App Architecture:** Scalable and robust design for managing multiple pumps and users simultaneously.

Results

- Built a highly scalable and robust pump monitoring & control system
- Used latest software technologies for cloud and mobile based deployment available at that time
- Efficient data communication, data storage, analysis and presentation
- Achieved centralized control of multiple pumps from a single location
- Improved operational efficiency and reduced manual intervention requirements

Conclusion

SpringCT fulfilled customer's expectations by building a highly scalable and robust pump monitoring & control system by utilizing the latest software technologies for cloud and mobile based deployment, data communication, data storage, analysis and presentation. SpringCT successfully achieved the goal of building an advanced system that is easy to use and effective from end users' perspective.