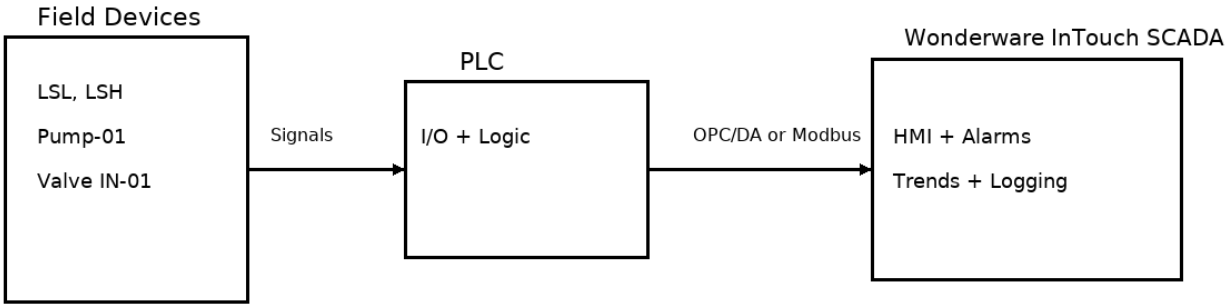
Tank Filling Automation Using Wonderware SCADA

Author: **M Shehazad** | Date: September 2025 | GitHub: github.com/shehazad-automation

Abstract

This report presents a Wonderware InTouch 2020 SCADA project that simulates automatic tank level control for a water treatment application. The system starts a pump below 20% and stops it at 80%, with a high-level alarm.

System Architecture



I/O & Tag List

Tag Name	Type	PLC Address	Description
LSL	Discrete In	I:0/0	Low-Level Switch (20%)
LSH	Discrete In	I:0/1	High-Level Switch (80%)
Pump_Running	Discrete Out	O:0/0	Pump status indication
Valve_Open	Discrete Out	O:0/1	Inlet valve open command
Alarm_HighLevel	Discrete Out	O:0/2	High Level Alarm
Tank_Level_Value	Analog In	I:1.0	Tank Level (%)

Full tag configuration available in *Tag_Configuration/Wonderware_Tag_List.xlsx*.

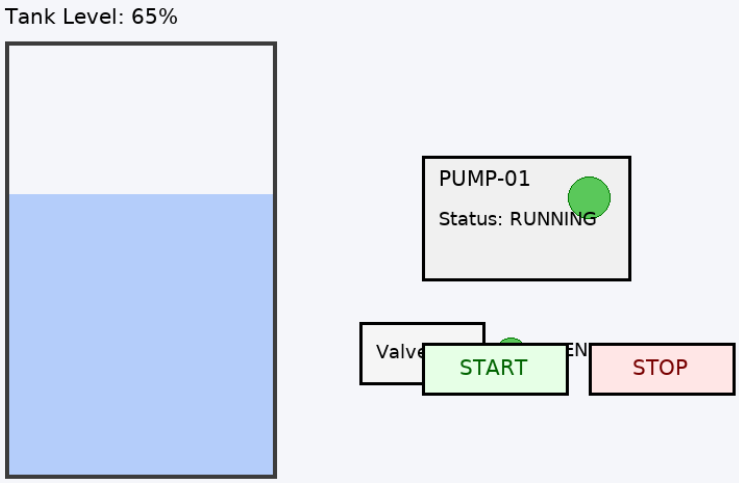
Control Logic (Auto Mode)

• Start pump when Tank_Level < 20% (LSL=1). • Stop pump when Tank_Level ≥ 80% (LSH=1). • Raise High-Level Alarm if Tank_Level > 80% while pump is running. Interlocks ensure Stop takes priority over Start.

Wonderware InTouch 2020 - HMI Screens

Main Screen (simulation mode):

Water Treatment - Tank Filling (Auto)



Alarms: High-Level Alarm = INACTIVE | Communications = OK

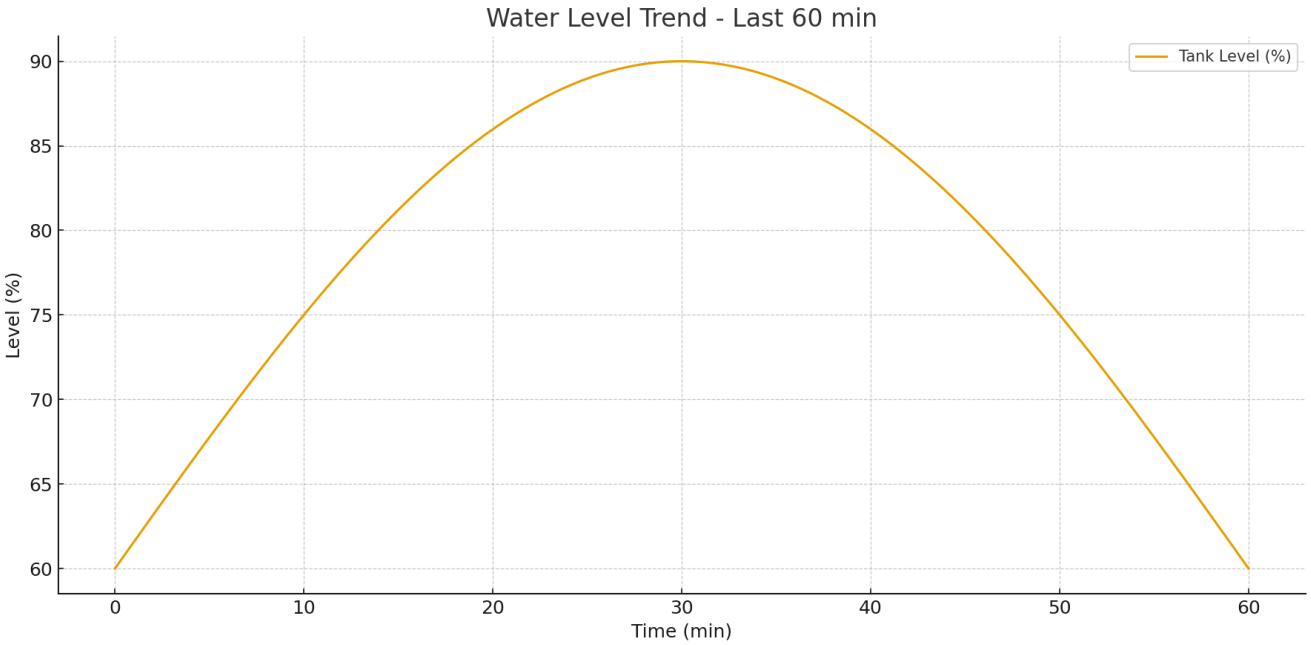
Wonderware InTouch 2020 - Simulation Mode

Alarm & Events:

Alarm & Events - Real-Time

Time	Priority	Alarm Tag	Description	Ack
2025-09-04 10:25:18	1	Alarm_HighLevel	Tank Level > 80%	ACK
2025-09-04 10:30:42	2	Comm_Warning	OPC comms delayed	ACK

Level Trend:


Water Level Trend - Last 60 min
Tank Level (%)
Level (%)
90
85
80
75
70
65
60
0
10
20
30
40
50
60
Time (min)

Step-by-Step: Build the Simulation

• Create a new application in Wonderware InTouch 2020.
• Add tags for LSL, LSH, Pump_Running, Valve_Open, Alarm_HighLevel, and Tank_Level_Value.
• Design the main window: tank graphic, level text, pump status, Start/Stop buttons, alarm banner.
• Configure an alarm on Alarm_HighLevel with Priority 1. Enable alarm banner display.
• Add a Trend Client to plot Tank_Level_Value over the last 60 minutes.
• Connect to a PLC simulator or OPC server (e.g., Modbus TCP). Map each tag to the PLC address.
• Run in WindowViewer (simulation). Toggle LSL/LSH or trend Tank_Level_Value to observe pump control.

Future Enhancements

• Add Manual/Auto selector and interlocks for maintenance.
• Implement historian logging with daily reports.
• Add flow/pressure transmitters and PID-based control.