

Level Measurement defect classification using ML

Features for the dataset :

- 1.water_level → directly measured by the tank sensor in the model.
- 2.level_rate → can be computed using a derivative block on water_level.
- 3.valve_position → available as the actuator output (pump control voltage or valve opening).
- 4.pump_status → you can create a binary signal based on whether the pump voltage is above a threshold.
- 5.controller_output → PID controller output is available.
- 6.setpoint → the reference water level input to the system.
- 7.error_signal → can be computed as setpoint - water_level.

Target Values :

Output Label	Description
0	Normal operation
1	Leakage
2	Overflow
3	Clogged valve
4	Pump failure
5	Sensor fault
6	Controller fault

Pump not working at full capacity

Less water pumped into tank

Water level drops

Controller output maxes out trying to compensate

5 SENSOR FAULT

Level sensor gives noisy/incorrect readings

Controller receives wrong information

Erratic control actions

Actual level may be OK, but measured level is noisy

6 CONTROLLER FAULT

PID controller poorly tuned

Wrong gains cause poor control

Oscillations, slow response, or instability

System never settles properly

