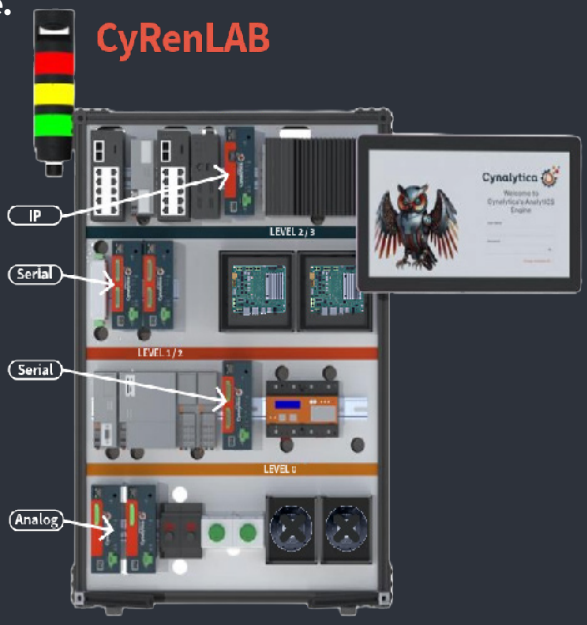
CyRenLAB

A Lab Environment Purpose-Built to Span the Full Range of ICS/OT Communications

Hands-on ICS/OT Research, Validation, and Training Laboratory for Analog, Serial and IP

CyRenLAB is the only laboratory environment that combines analog, serial, and IP communications in a single modular platform. Other ICS labs cover the IP layer alone, leaving out the analog measurements and serial data streams that most industrial processes actually run on. CyRenLAB provides real signal and protocol coverage from Level 0 to Level 3 on physical hardware.



- **Run cyber-physical attack scenarios against real equipment**
- **Monitor and detect anomalies across analog, serial, and IP in a single view**
- **Build behavioral baselines and write detection rules against them**
- **Exercise and refine incident response plans**
- **Perform forensics and root cause investigations**
- **Research industrial protocols across Levels 0-3**

Built for NOC/SOC operators, control and automation engineers, OT security teams, incident responders and forensic analysts, researchers, and educators.

Why It Matters

OT Teams Lack Safe, Realistic Environments

Most ICS and OT teams operate without access to lab environments that reflect real industrial conditions. This limits their ability to rehearse threats, train effectively, or test tools without risking disruption to production systems.

Critical Gaps in Visibility and Contextualized Data

Visibility into analog and serial communications remains limited, and the gap is worst below Level 3 where most physical processes actually live. Without curated, contextualized data across the Purdue model, teams struggle to baseline behavior, detect anomalies, or develop effective AI and ML driven detection strategies.

Key Capabilities

Full Stack ICS Protocol Support

Analog 4–20 mA instrumentation, Modbus RTU and IEC 101 over serial, and Modbus TCP and IEC 104 over Ethernet.

Multi-Level Support

Spans the full ICS stack, Level 0 to Level 3 of the Purdue model, on physical hardware.

Real Devices

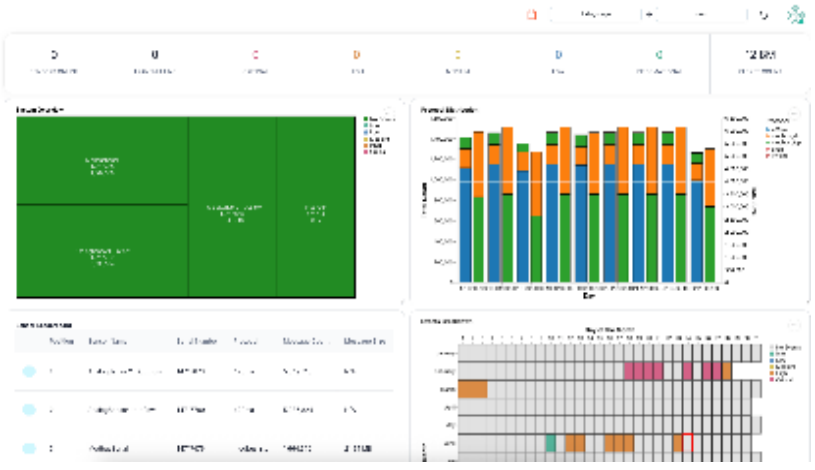
Hardware-in-the-loop with SCADA controllers, drives, meters, and sensors.

Secure Testing

Train, validate, and test without risking live production environments.

Advanced Functional Capabilities

- Compare process values across analog, serial and IP to expose hidden manipulation
- Reproduce cyber-physical faults with known ground truth
- Validate detection rules before deployment using repeatable attack scenarios
- Export correlated analog, serial, and IP telemetry for offline analysis
- Visualize communications paths and protocol behavior in a single view



Also Available

Instructor-led ICS/OT Cyber Defense Training runs on this environment, delivered on site or live remote. No purchase of CyRenLAB is required to attend.

Explore the training → cynalytica.com/training

Specifications

Level 3 — Operations	
Server	Industrial PC
Server software	Cynalytica AnalytICS Engine
Controller	Programmable Automation Controller
Network	Industrial Ethernet switch (×2)
Gateway	Ethernet to serial
Monitoring sensor	OTNetGuard with IP module
Level 2 — Supervisory	
Monitoring sensors	OTNetGuard / SerialGuard with RS-485/422 module
Power monitor	IEC 60870-5-104
Tower light	5 segment
Level 1 — Control	
Controller	Programmable Automation Controller
Power monitor	IEC 60870-5-101
Monitoring sensor	OTNetGuard with RS-485/422 module
Variable speed drives	DC brushless with Modbus RTU (×2)
Level 0 — Process	
Monitoring sensors	OTNetGuard with 4-20 mA input (×2)
DC brushless motors	24 VDC, 5000 RPM (×2)
Digital inputs	24 VDC in (×2)
Analog inputs	4–20 mA (×2)
Front-panel controls	Manual analog adjustment, inflow and outflow

Protocols	
Analog	4–20 mA current loop
Serial	Modbus RTU, IEC 60870-5-101
Ethernet	Modbus TCP, IEC 60870-5-104
Purdue coverage	Level 0 through Level 3
Physical and power	
Dimensions	800 × 635 × 483 mm (31.5 × 25.0 × 19.0 in)
Weight	≈ 25 kg (55 lb)
Power supply	120 VAC to 240 VAC
Current draw	2 A at 120 V, 1 A at 240 V
Included	
Documentation	Instructional workbook and lab exercises
Query language	CyRenQL
Exercise tooling	OWL (Offensive Workload Launcher)
Data export	JSON and CSV