GFIS EcoTwin

Explainable renewable-energy intelligence for bioenergy plants

SIH26200 · Software · Renewable Energy
Industry-sponsored student engineering project

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Industry Mentor: Akash Shivadas Chatake
College Guide: Prof. N. K. Mane, HOD, CO Department

Official college name and team ID: complete after SPOC nomination

The operator’s monitoring problem

Gas output needs context

Temperature, pH, feed history and missing data can change its interpretation.

An alert needs an explanation

Show the observation, source, screening rule and next inspection action.

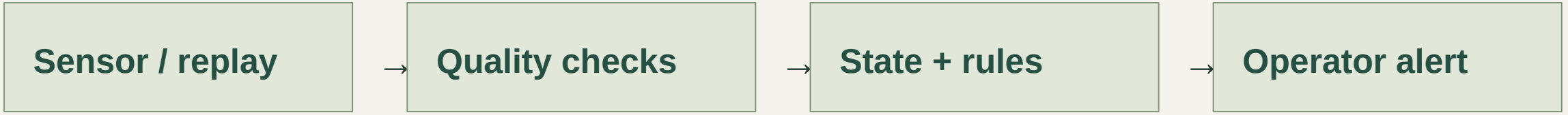
A recorded event needs continuity

Preserve the state and operator acknowledgement so another engineer can replay it.

SIH use case

Renewable bioenergy management through plant monitoring, digital-twin software and traceable gas-storage scenarios.

System architecture

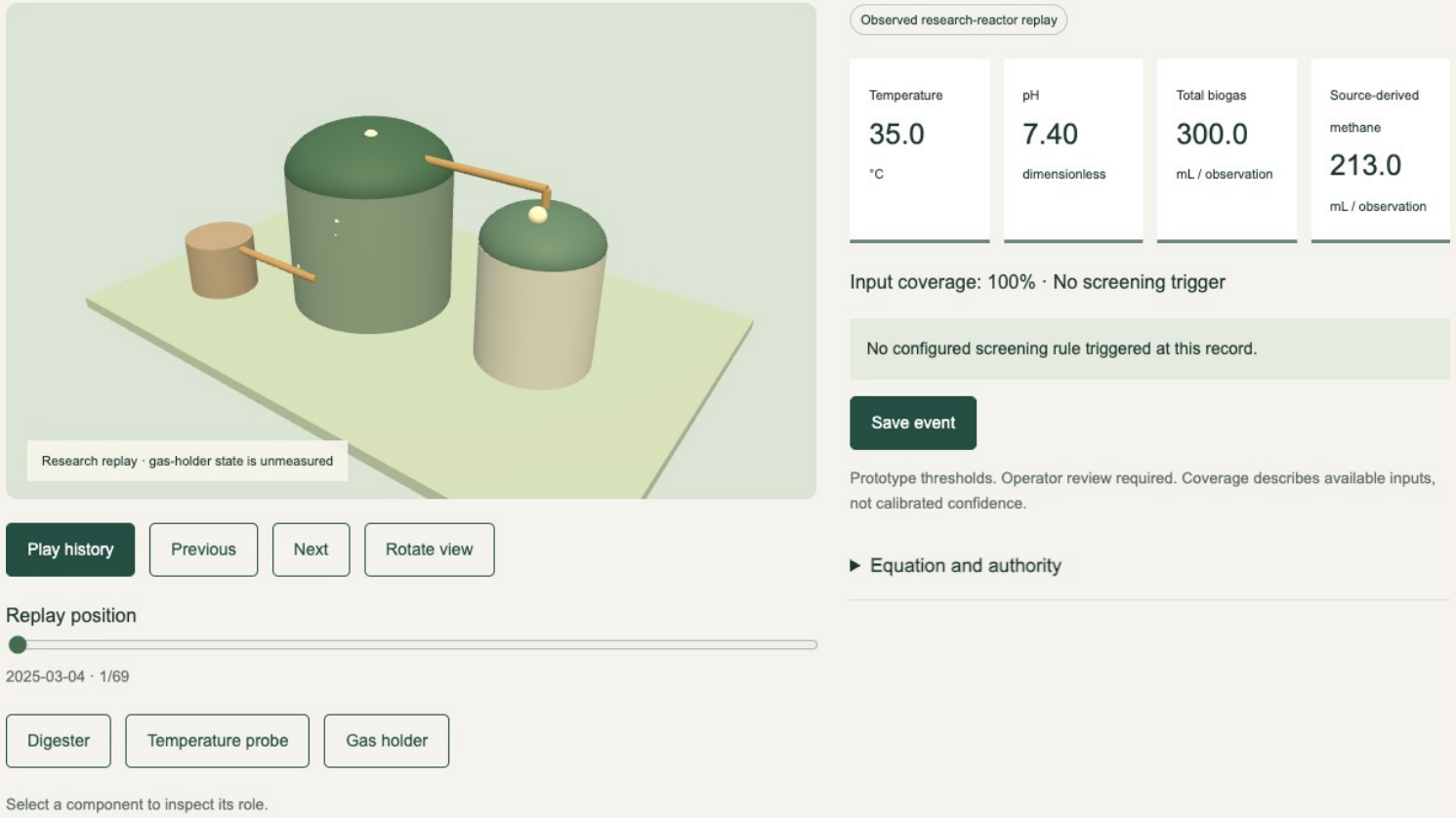


Plant twin displays the same state. Event memory preserves the decision.

Temperature / pH / gas observation
Units, timestamps and missingness remain visible

Persistence is computed locally
XGBoost / LSTM evidence stays in the GFIS workbench

The working demonstration



Research replay

RBL and SBL
69 API records each
4 March–7 July 2025

Synthetic fault tests

48-hour model
Heating / overfeeding
Missing-probe alert
Save and export event

Actual interface screenshot. Research observations and teaching simulations use separate modes.

Evidence and student innovation

Existing foundation

GFIS research, public reactor records, temporal-model workbench and product interfaces remain attributed to their source.

New SIH implementation

Sensor packet contract, missing-data handling, alert lifecycle, plant assets and repeatable failure tests.

Tests that can be reproduced

Gas balance, bounded storage, null handling, scenario response and event import/export.

Field work still required

No field leak-detection accuracy, autonomous control or multi-plant validation is claimed. Hardware needs a supervised bench test.

Team roles and presentation order

Vijayalaxmi · CO · Team Leader / integration
Sunaina · IT · Data / ML / data / models
Shweta · CO · Sensor gateway
Samina · CO · Alerts / event memory
Sneha · IT · 3D twin / ROS2 visualisation
Sakshi · CO · 3D / ROS2 replay / tests

Presentation order

1. Vijayalaxmi + Sakshi: idea / ROS2
2. Sunaina + Sneha: data / 3D twin
3. Samina + Shweta: alerts / telemetry

Industry: Chatake Innoworks
College guide: Prof. N. K. Mane
Hardware budget requires quotations