GFIS ECOTWIN

Project proposal

Chatake Innoworks Private Limited
SIH engineering programme · 9 September 2026

The operator problem

Anaerobic digestion turns organic substrates into biogas through microbial processes. Operators must interpret gas output together with temperature, pH, loading and sampling conditions. A gas-output change alone cannot establish process failure. GFIS EcoTwin presents those inputs together and records the evidence behind an advisory.

SIH alignment

SIH26200, AICTE / MIC Student Innovation, Software, Renewable / Sustainable Energy: innovative ideas that help manage and generate renewable / sustainable sources more efficiently. The official SIH table was checked on 9 September 2026. GFIS applies explainable process monitoring, temporal-model evidence, digital-twin software and gas-storage scenarios to renewable bioenergy management. The college SPOC confirms eligibility, nomination and the current template before submission.

Working demonstration

The delivered plant lab has two modes. Research replay loads the public GFIS RBL or SBL reactor history and keeps absent measurements absent. The 48-hour teaching simulation updates production, gas storage and demand at 15-minute steps. Overfeeding, heating and probe-loss scenarios change the same alert engine used by the visual scene. Each event can be acknowledged and exported.

Student contribution

GFIS existed before this team and remains attributed to Akash Shivadas Chatake and Chatake Innoworks. The SIH student contribution is the sensor gateway, explainable alert workflow, offline replay, plant asset visualisation, event memory and a tested demonstration. The team must maintain a dated contribution log and identify reused source modules.

Hardware prototype

Use an ESP32 gateway with a temperature probe and safe electrical signal emulation for pressure, pH and gas flow. Calibrated probes and certified gas instruments belong in a supervised second stage. No student should generate, compress or ignite biogas for the hackathon demonstration. A bench packet generator is an engineering demonstration, not a working industrial sensor installation.

Expected outcomes and evaluation

Measure missing-packet detection, event export integrity, correct scenario response, page accessibility and replay reproducibility. Field savings, leak-detection accuracy and plant safety effectiveness require independent field validation. The demonstration has no actuator output and no automatic control authority.

Resources and sponsorship

Chatake Innoworks sponsors technical mentorship and access to existing GFIS demonstration resources. A planning allowance of INR 3,500–8,000 covers a basic gateway and safe probe-emulation bench, subject to supplier quotations and owner approval. Calibrated gas analysers, industrial enclosures, travel and SIH fees are excluded. No cash commitment is created by this estimate.

Delivery plan

Use the 14-day workflow in this package. Freeze the sensor schema first, integrate one complete input-to-alert path, then expand the visualisation. Each member has a reviewable deliverable. Vijayalaxmi integrates the release and Prof. N. K. Mane supervises college progress. Akash reviews technical claims and industry scope.