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DEPARTMENT OF
SCIENCE & TECHNOLOGY
सत्यमेव जयते

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TECHNOLOGY
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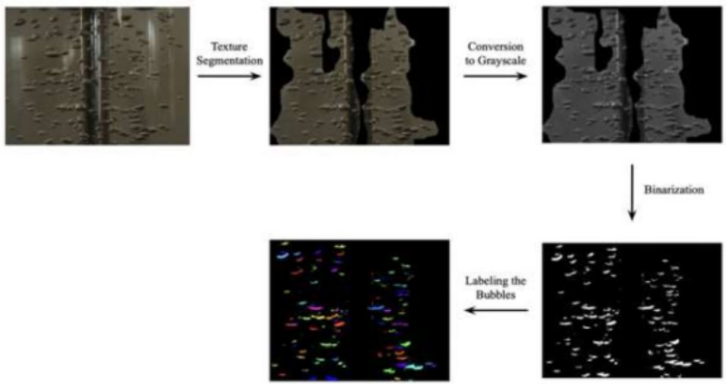
PENDING

(IN202311059053)
An apparatus for estimating bubble column reactor performance using smart hybrid image and data driven framework



NEED

Over 50% of bubble column reactors fail to optimize gas-liquid interaction due to poor control over bubble geometry and transfer rates. This leads to wasted gas, low yield, and frequent process halts. But what if this inefficiency could be corrected—before it even starts?

TECHNOLOGY OVERVIEW

This system uses camera-based imaging and software modules to track and analyze bubble formation in real-time. By calculating geometric parameters and transfer coefficients, it adjusts reactor settings dynamically, improving gas-liquid mixing efficiency and product yield without manual intervention or disruptive redesigns.

TECHNOLOGY KEY FEATURES

AI-assisted video analysis; geometric bubble tracking; real-time mass transfer feedback; autonomous reactor control; plug-and-play design; scalable for water and ozone; 20 ppm surfactant control; adjustable interfacial area; reduces manual calibration.

Read more here

MARKET ANALYSIS

Global bioreactor market projected at $10.2B by 2033 (8.6% CAGR); Indian industrial automation in chemicals and water treatment growing at 9.2% CAGR. Key drivers: process optimization, clean tech, and AI in chemical engineering. (Sources: MarketsandMarkets, IMARC)

Target Industries

, Bioprocess platform developers; chemical process automation providers; water treatment tech integrators; enterprises working on smart reactors in pharma, ozone purification, and biochemical production.

AT A GLANCE

- SDG 6 (Clean Water and Sanitation), SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production)

Technology is available for licensing/ co-development.

Reach out to Prof. Deepak Chitkara, Coordinator, BITS Technology Enabling Centre,
BITS Pilani Contact Details: tec.bits@pilani.bits-pilani.ac.in, 91 1596-255913

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