

Innovation Supporting Evidence

Innovation Evidence Pack

What is genuinely new in XR-UAT · verified architecture and locally authored scope

Claim-to-evidence index

Claim	Evidence
Six-realm ecosystem	Site V13 + Unreal maps/modules.
Locally authored technical scope	IQ lab, Factory Land, PetroLand and practice data.
Evidence-producing practice	Attempts, safety, scoring, feedback and export.
Multi-profile delivery	Desktop/VR/OpenXR.
External validation	ANUIES 2025.

XR-UAT v. other similar leve

Comparator	Officially documented focus	XR-UAT position
PhET	Research-based interactive science/math simulations.	Local industrial/process context and immersive practice.
Labster	Virtual laboratory simulations and LMS integration.	Institution-owned multi-realm ecosystem and selected physical integration.
PTC Vuforia	Industrial AR instructions/training and 3D/IoT context.	Academic curriculum and VR/desktop engineering scenarios.
Ansys Twin Builder	Engineering digital-twin build/validate/deploy.	Learner-facing practice architecture rather than industrial engineering authoring.

Official sources: <https://phet.colorado.edu/en/about> · <https://www.labster.com/> · <https://www.ptc.com/en/products/vuforia> · <https://www.ansys.com/products/digital-twin/ansys-twin-builder>

Two laboratories, demonstrating breadth without losing depth



Processes and Separation Laboratory: 2,017 actors, 11 equipment families.

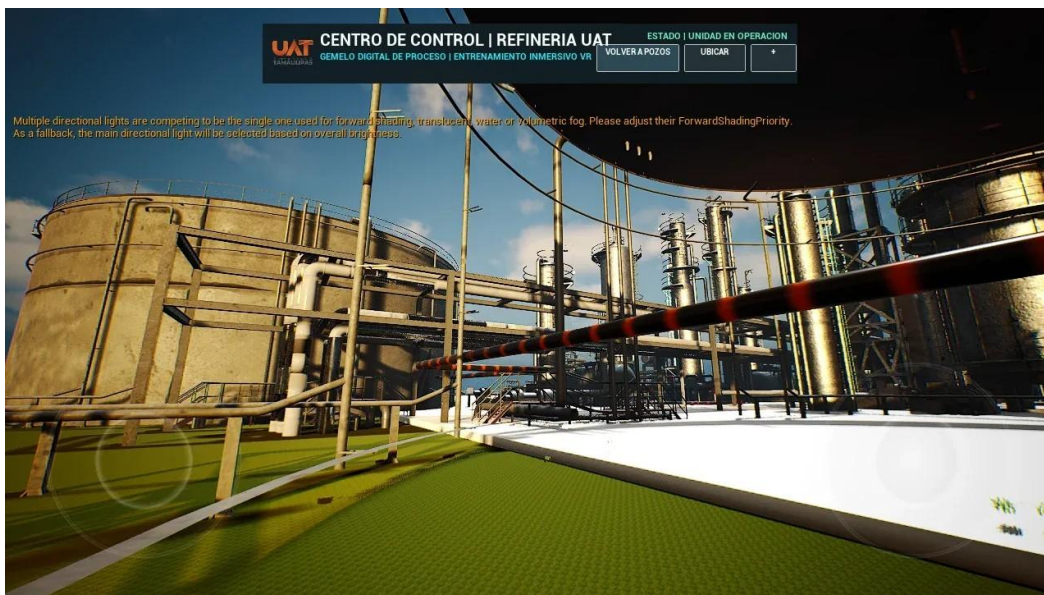


Factory Land / seventh-semester project: 1,429 actors; six designed practice pathways.

PetroLand connects drilling, offshore context and refining



Drilling environment.



Refinery environment.

Timestamped drilling-mechanism sequence



Four frames extracted from the same continuous source video at approximately 00:03:20.4, 00:03:21.8, 00:03:23.4 and 00:03:25.8.

What does this sequence supports?

- The represented top-drive/drill-string assembly changes position and state over the timestamped sequence.
- The operation-centre interface and drilling mechanism appear in the same source sequence.

Technical implementation is visible in the asset and practice structure

Evidence object	Verified function
SM_Pozo_PDCBitPremium	PDC bit representation.
SM_Pozo_DrillStringPremium	Drill string representation.
SM_Pozo_RotaryTablePremium	Rotary table representation.
SM_Pozo_TopDrivePremium	Top-drive representation.
practices.js · Pozo 08	Outcomes, evidence and three phases.
practices.js · Refinería	Five operational/fault cases and assessment evidence.
Septimo_proyectos log	OpenXR, map load and clean MapCheck.

QS 2026 SUPPORTING EVIDENCE

XR-UAT Laboratories, Practices and Derived Outputs

Verified architecture

Layer	Evidence
Experience	UE 5.6, OpenXR, desktop/VR.
Learning	Phases, attempts, safety, score, feedback, export.
Physical/digital	MQTT bridge/interface.
Mobile/AR	SARA 1.0.17, P01–P10.
AI	Offline assistant + optional client.

Processes and Separation Laboratory



2,017 audited actors · 11 equipment families · 34 modelled variables.

Equipment	Evidence/use
Fractional distillation unit	858 actors; stages, variables and flows.
Instrumented reactor	476 actors; control/instrumentation.
Polymerisation reactor	565 actors; reaction/control.
Bioreactor	74 actors; bioprocess/control lineage.
Other equipment	Stations, didactic distiller, bath, balance, centrifuge, vortex and pump.

Seventh-semester project / Factory Land



Laboratorio_Mecatronica map loaded with OpenXR; MapCheck 0 errors / 0 warnings in the reviewed session.

Family	Actors	Practice status
Complete laboratory	1,429	Implemented asset inventory.
Lathe	97	Designed; ready to prototype.
Handling/loading	269	Designed; ready to prototype.
Riveting/brushing	898	Designed; ready to prototype.
Screen-printing	162	Designed; ready to prototype.
Pelletiser / press	Export groups	Designed; ready to prototype.

Petroleum practice / Práctica petrolera



Direct video frame, approx. 00:03:20: drilling mechanism and operation centre.

Subsystem / case	Evidence
Drill train	PDC bit, drill string, rotary table and top drive assets.
Safety/process	BOP, pumps, mud circuit; pressure, RPM, torque, flow, pit level and alarms.
Refinery	PFD, pump, exchanger, valves, sensors, lines, HMI and X-Ray flow.
Cases	Safe startup, cavitation, thermal control, overfill and leak.

Academic outputs and lineage

Output	Relationship
Muñoz Cel thesis, Mar 2026	Direct
AIPM 2025 petroleum work	Direct dissemination
Nayeli protocol	Direct development
REACPY-AIR	Module lineage
FECIT/FEMECI bioreactor	Module lineage
UAM Río Bravo 2024	External dissemination

ANUIES 2025 Award — direct recognition of the VR UAT ecosystem

UNOFFICIAL ENGLISH TRANSLATION

Original Spanish document follows

ORIGINAL SOURCE ANUIES_AWARD_2025.pdf · page 1 (embedded on Innovation annex page 7)

ISSUER / DATE National Association of Universities and Higher Education Institutions (ANUIES) · 12 November 2025

STATUS ANUIES 2025 Award · Higher Education Prototypes · Northeast Region

FULL ENGLISH TRANSLATION

The National Association of Universities and Higher Education Institutions has the honour to grant the ANUIES 2025 AWARD — HIGHER EDUCATION PROTOTYPES, NORTHEAST REGION — to Mtro Juan Roberto de la Torre Escareño.

The award recognises the development of the prototype entitled “VIRTUAL REALITY ECOSYSTEM FOR TEACHING CHEMISTRY AND CHEMICAL ENGINEERING (VR UAT),” because the project presents an innovative vision that promotes the improvement of educational processes in the country; a model developed at the Autonomous University of Tamaulipas.

Dr Luis Armando González Placencia · Executive Secretary General

Manzanillo, Colima, 12 November 2025.

Independent recognition



La Asociación Nacional de Universidades
e Instituciones de Educación Superior

Tiene el honor de otorgar el

Premio ANUIES 2025

Prototipos en educación superior
Región Noreste

Al: Mtro. Juan Roberto De la Torre Escareño

En reconocimiento al desarrollo del Prototipo denominado: *Ecosistema de Realidad Virtual para la Enseñanza de Química e Ingeniería Química (VR UAT)*; debido a que su proyecto presenta una visión innovadora que impulsa la mejora de los procesos educativos del país; modelo desarrollado en la Universidad Autónoma de Tamaulipas.

Atentamente


Doctor Luis Armando González Placencia
Secretario General Ejecutivo

Manzanillo, Colima a 12 de noviembre de 2025.

ANUIES 2025 certificate — direct recognition of the VR UAT ecosystem

FECIT Tamaulipas 2023 highest-scoring-project recognition

UNOFFICIAL ENGLISH TRANSLATION

Original Spanish document follows

ORIGINAL SOURCE FECIT_TAMAULIPAS_2023_FIRST_PLACE.pdf · page 1 (Innovation annex page 15)

ISSUER / DATE Government of Tamaulipas · Secretariat of Education · COTACYT · 23-24 November 2023

STATUS Highest-scoring project · Higher Education category · Computing and Software area

FULL ENGLISH TRANSLATION

The Government of the State of Tamaulipas and the Secretariat of Education, through the Tamaulipas Council for Science and Technology, grant this RECOGNITION to the HIGHEST-SCORING PROJECT in the HIGHER EDUCATION CATEGORY:

“DESIGN AND DEVELOPMENT OF A ROBUST CONTROL SYSTEM FOR A BIOREACTOR FOR THE PRODUCTION OF BIOFUELS FROM BIOMASS.”

Participants: Erick Iván Lara Carrillo, Maximiliano Ortega Ramírez and Natalia Pérez Montelongo. Adviser: Juan Roberto de la Torre Escareño. Institution: Multidisciplinary Academic Unit Reynosa-Aztlán, UAT.

Computing and Software Area, Science and Engineering Fair Tamaulipas 2023, held on 23 and 24 November 2023 in Ciudad Victoria, Tamaulipas.

Signed by Mtra Lucía Aimé Castillo Pastor, Secretary of Education of Tamaulipas, and Dr Julio Martínez Burnes, Director General, COTACYT.



El Gobierno del Estado de Tamaulipas y la Secretaría de Educación
a través del Consejo Tamaulipeco de Ciencia y Tecnología
otorgan el presente

RECONOCIMIENTO

al

PROYECTO CON MAYOR PUNTAJE CATEGORÍA SUPERIOR

Diseño y desarrollo de un sistema de control robusto de un biorreactor
para la producción de biocombustibles a partir de biomasa

Participantes:

Erick Iván Lara Carrillo; Maximiliano Ortega Ramírez; Natalia Pérez Montelongo

Asesor(a):

Juan Roberto De la Torre Escareño

Institución:

Unidad Académica Multidisciplinaria Reynosa-Aztlan, UAT

En el **Área de Computación y Software** en la **FERIA DE CIENCIAS E INGENIERÍAS
TAMAULIPAS 2023** efectuada los días 23 y 24 de noviembre de 2023
en Cd. Victoria, Tamaulipas.



MTRA. LUCÍA AIMÉ CASTILLO PASTOR
SECRETARIA DE EDUCACIÓN DE TAMAULIPAS



DR. JULIO MARTÍNEZ BURNES
DIRECTOR GENERAL DEL COTACYT



FECIT Tamaulipas 2023 first-place diploma

UNOFFICIAL ENGLISH TRANSLATION

Original Spanish document follows

ORIGINAL SOURCE FECIT_TAMAULIPAS_2023_FIRST_PLACE.pdf · page 2 (Innovation annex page 16)

ISSUER / DATE Government of Tamaulipas · Secretariat of Education · COTACYT · 23-24 November 2023

STATUS First place · Tamaulipas Science and Engineering Fair 2023 · Higher Education category

FULL ENGLISH TRANSLATION

The Government of the State of Tamaulipas and the Secretariat of Education, through the Tamaulipas Council for Science and Technology, grant this DIPLOMA to the project:

“DESIGN AND DEVELOPMENT OF A ROBUST CONTROL SYSTEM FOR A BIOREACTOR FOR THE PRODUCTION OF BIOFUELS FROM BIOMASS.”

Participants: Erick Iván Lara Carrillo, Maximiliano Ortega Ramírez and Natalia Pérez Montelongo. Adviser: Juan Roberto de la Torre Escareño. Institution: Multidisciplinary Academic Unit Reynosa-Aztlán, UAT.

For having obtained FIRST PLACE in the TAMAULIPAS SCIENCE AND ENGINEERING FAIR 2023, HIGHER EDUCATION CATEGORY, held on 23 and 24 November 2023 in Ciudad Victoria, Tamaulipas.

Signed by Mtra Lucía Aimé Castillo Pastor, Secretary of Education of Tamaulipas, and Dr Julio Martínez Burnes, Director General, COTACYT.



El Gobierno del Estado de Tamaulipas y la Secretaría de Educación
a través del Consejo Tamaulipeco de Ciencia y Tecnología
otorgan el presente

DIPLOMA

al

Proyecto:

**Diseño y desarrollo de un sistema de control robusto de un biorreactor para la
producción de biocombustibles a partir de biomasa**

Participantes:

Erick Iván Lara Carrillo; Maximiliano Ortega Ramírez; Natalia Pérez Montelongo

Asesor(a):

Juan Roberto De la Torre Escareño

Institución:

Unidad Académica Multidisciplinaria Reynosa-Aztlán, UAT

Por haber obtenido el **PRIMER LUGAR** en la **FERIA DE CIENCIAS E INGENIERÍAS
TAMAULIPAS 2023** en la **Categoría Superior**, la cual se llevó a cabo
los días 23 y 24 de noviembre de 2023 en Cd. Victoria, Tamaulipas.



MTRA. LUCÍA AIMÉ CASTILLO PASTOR
SECRETARIA DE EDUCACIÓN DE TAMAULIPAS



DR. JULIO MARTÍNEZ BURNES
DIRECTOR GENERAL DEL COTACYT

