UCI SMART ITAC Updates

Chelsea Choudhary
ccchoudh@uci.edu

CalPlug/ITAC Workshop
10/21/2024

Industrial Training and Assessment Centers
U.S. DEPARTMENT OF ENERGY

UCI SMART Industrial Assessment Center

CSUN CALIFORNIA STATE UNIVERSITY NORTHRIDGE

Cypress College

UCI SMART ITAC

Sustainable Manufacturing Alliance for Research and Training

Industrial Training and Assessment Center

IAC → ITAC

Industrial Assessment Centers are now the
Industrial **Training** and Assessment Centers

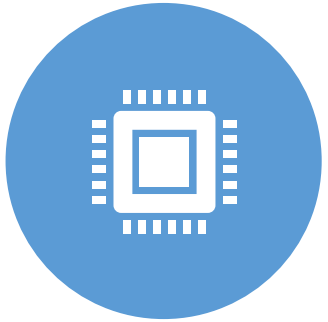
Industrial Training and Assessment Centers
U.S. DEPARTMENT OF ENERGY

UCI SMART ITAC Energy Assessments

Tour facility, brainstorm ideas, collect data → develop report

Energy efficiency, waste reduction, and productivity enhancements

Energy efficiency techniques: lighting, air compressors, motors, furnaces, ovens, boilers, HVAC, chillers, water treatment systems, renewables, and much more!



Bringing **SMART** into our ITAC: smart manufacturing, cybersecurity, life-cycle analysis, fuel switching, etc.

UCI SMART Industrial Assessment Center

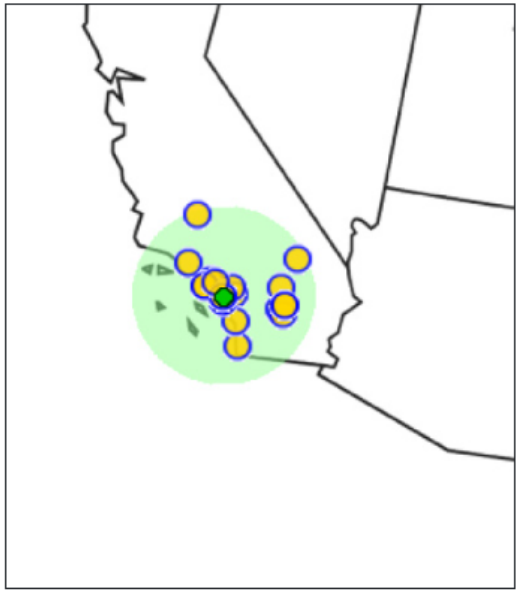
ITAC Website Snapshot

UCI University of California, Irvine

University of California, Irvine

Student Research Award Winner: 2022

The University of California, Irvine Industrial Assessment Center (CI-IAC) provides **free energy, productivity, and waste assessments** to small and medium-sized industrial facilities through funding provided by the US Department of Energy.



36	Assessments
284	Recommendations
0.44	Tbtu Energy Saving*
$6.88	million Cost Savings*
40	Students Trained

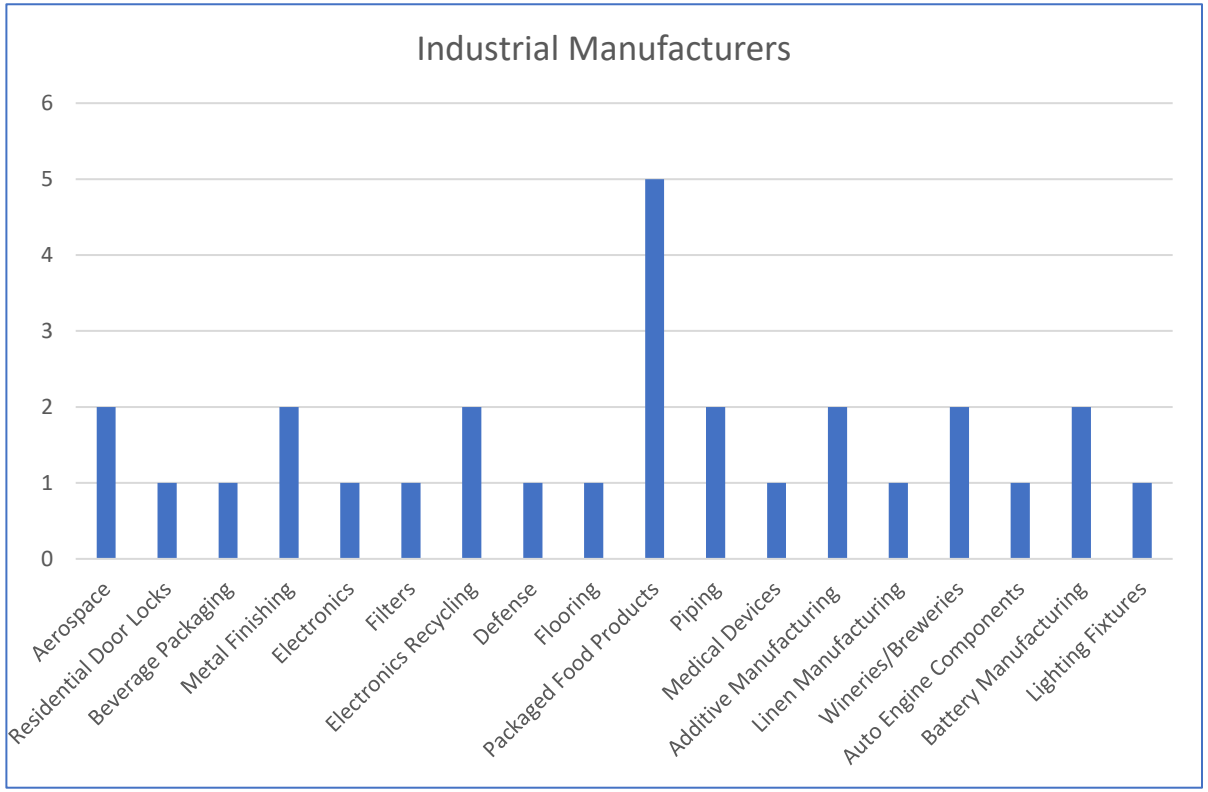
*Recommended Savings

- *as of 10/18/2024
- https://iac.university/center/CI

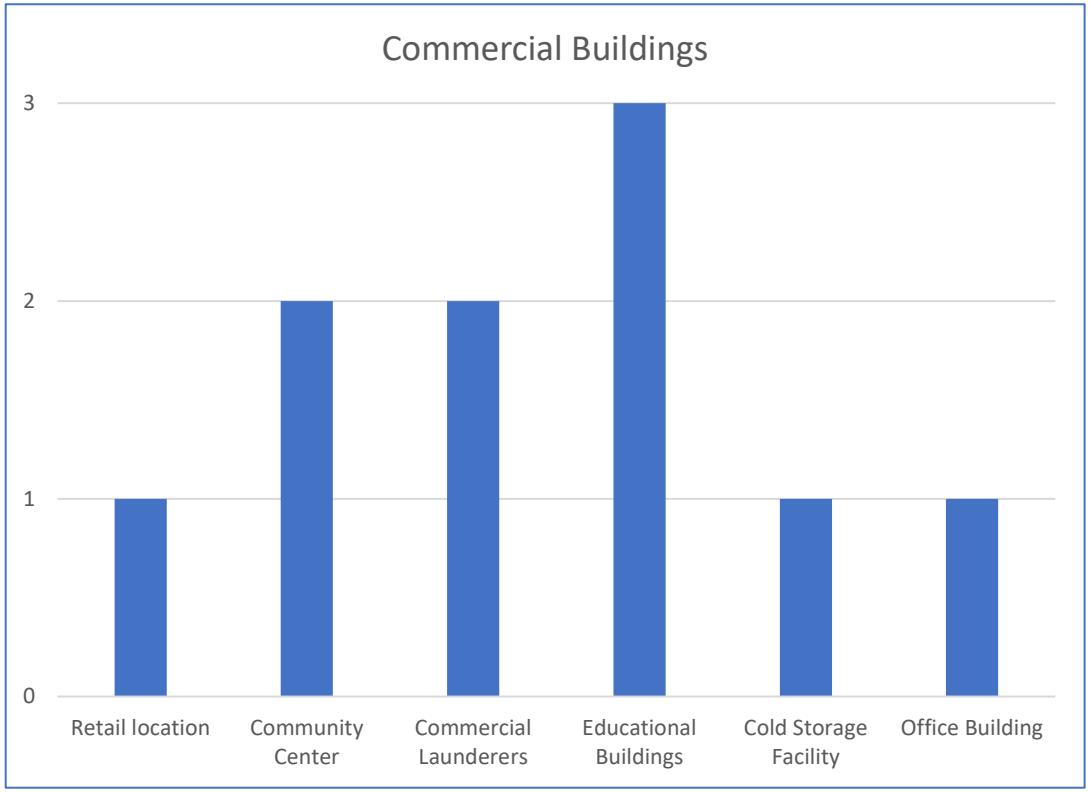
UCI SMART Industrial Assessment Center

Energy Assessments Performed

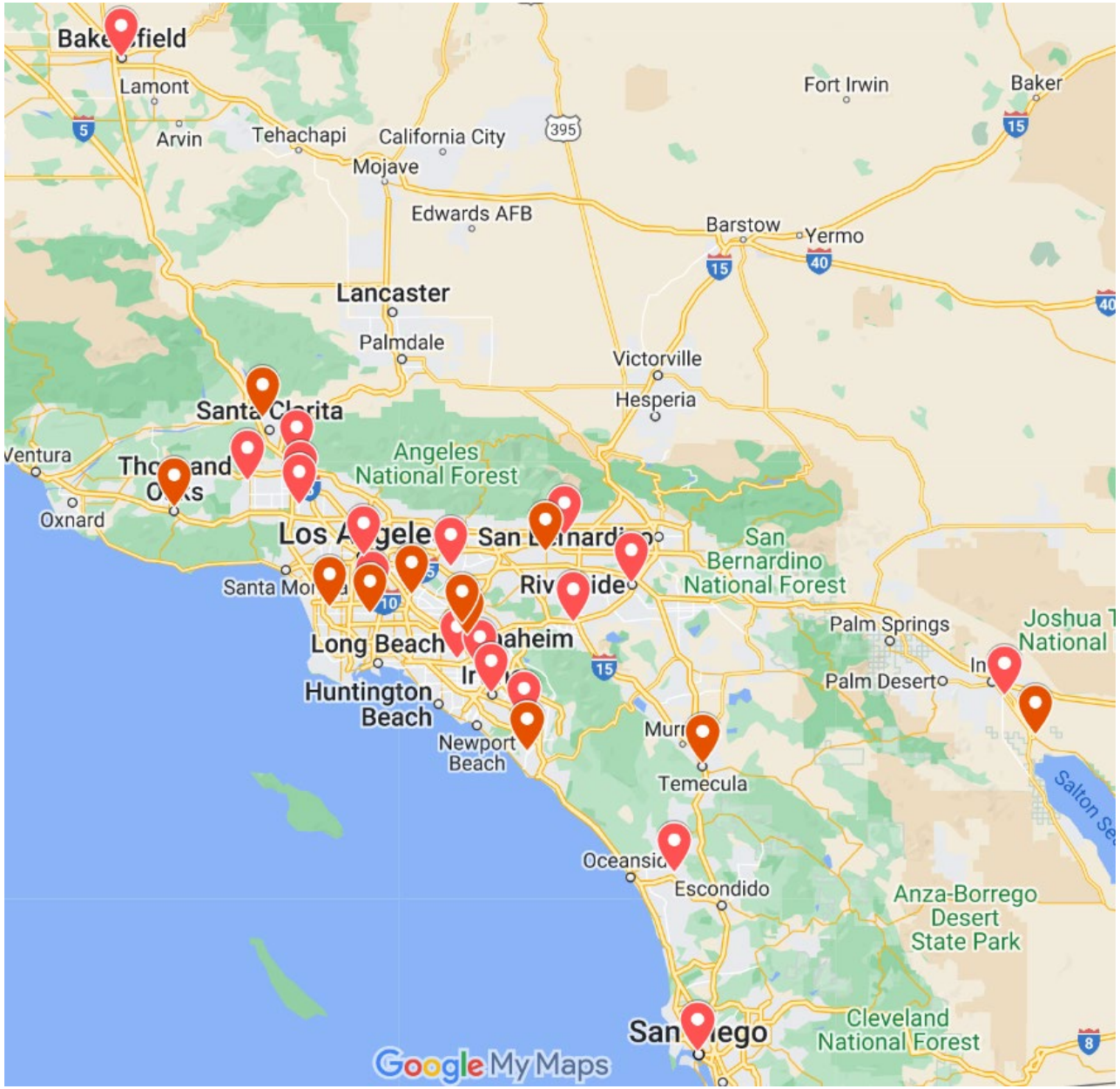
29 industrial energy assessments



10 commercial energy assessments



Energy Assessments Performed



DOE Implementation Grant Program

DOE is offering **grants of up to $300,000** with one-to-one matching from the client to help implement recommendations from ITAC assessments **(90% acceptance rate!)**

Supporting projects that are meant **to improve energy and material efficiency**, enhance cybersecurity, increase productivity, deploy smart and advanced manufacturing technologies, and reduce waste and pollution at SMM facilities

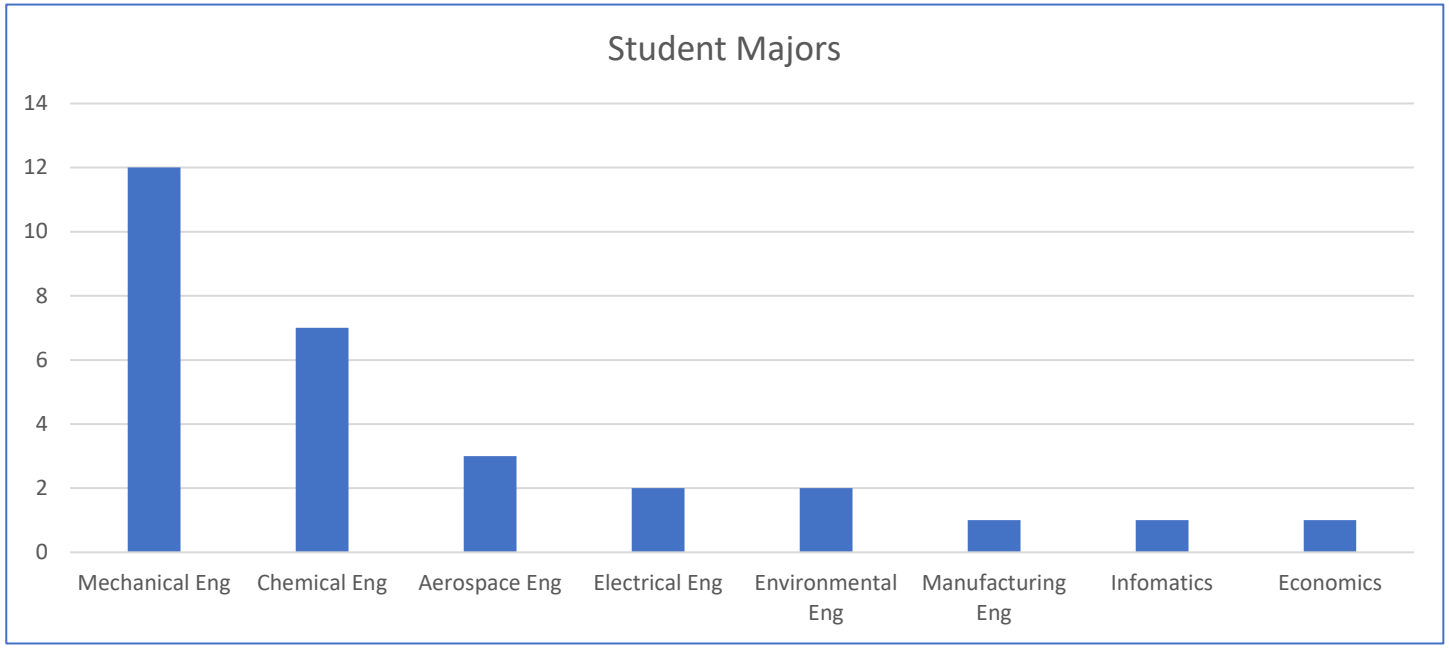
Encouraging our clients to apply, giving grant program updates to eligible clients, and **providing technical assistance** with application submissions

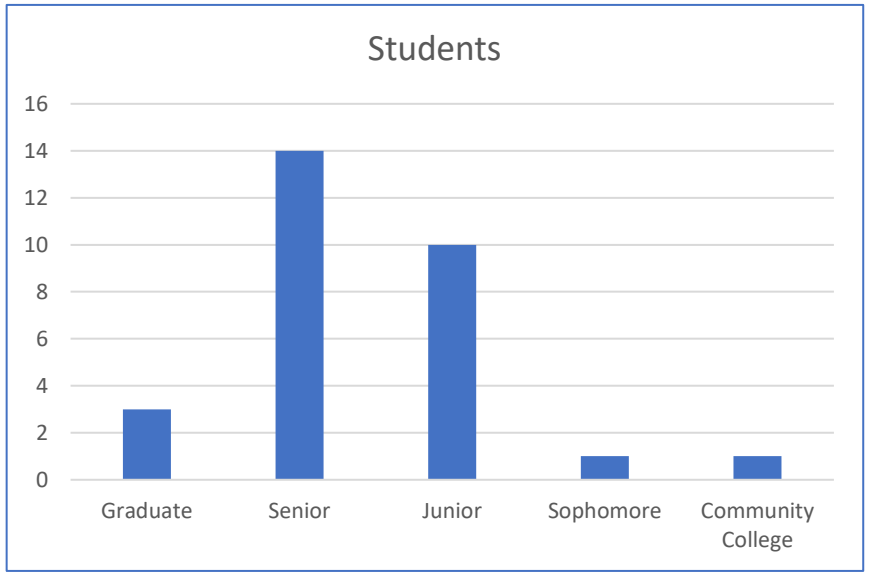
To learn more about the ITAC Implementation Grant program – including FAQs – and to apply, visit: https://www.energywerx.org/opportunities/iacimplementationgrants

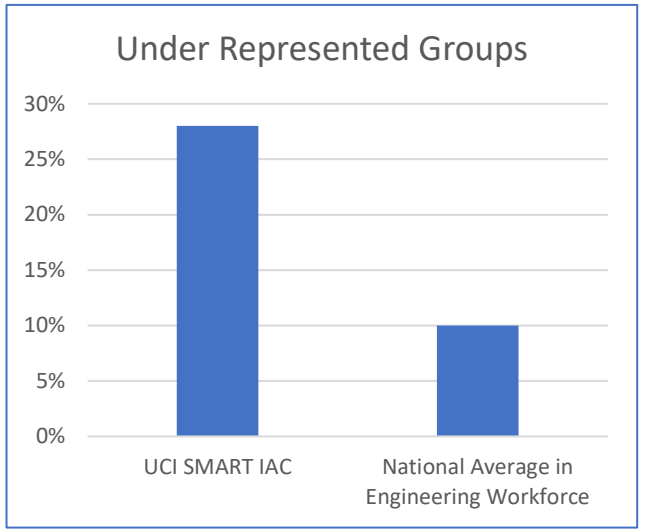
UCI SMART Industrial Assessment Center

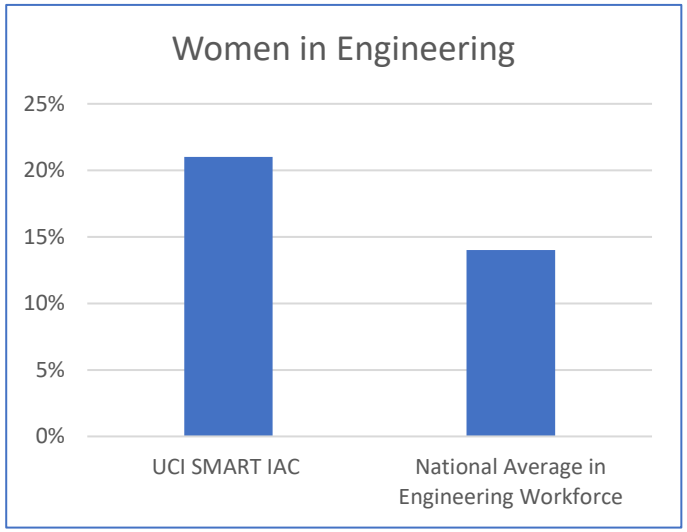
Student Team

- UCI: 26 Students
- CSUN: 2 Students
- Cypress: 1 Student









Enhanced Student Training

- New training topics on decarbonization, resiliency, Energy Star
- Expanded “mock assessment” on campus
- Conference and travel training opportunities
- IAC Chats speaker series January – May 2025

Hydrogen Blending Project

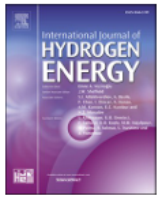
- Analyzing hydrogen blending with natural gas to reduce CO2 emissions, including economic feasibility study
- Published September 2024 in the Int'l Journal of Hydrogen Energy
- https://authors.elsevier.com/c/1jqyQ1HxM54~ax

International Journal of Hydrogen Energy 88 (2024) 1422–1435

Contents lists available at ScienceDirect

International Journal of Hydrogen Energy

journal homepage: www.elsevier.com/locate/he



Check for updates

Mathematical modeling for hydrogen blending in natural gas pipelines moving towards industrial decarbonization: Economic feasibility and CO_2 reduction analysis

Daniela Fernanda Ruiz Diaz [a], Jiadong Zhao [a], John Minh Quang Pham [a], Christopher Ramirez [a], Huiting Qin [a], Adrian Jose Jimenez [a], Akhil Muthappa Pulianda [a], Chelsea Choudhary [a], Vince McDonell [b], G.P. Li [a,*]

[a] California Institute for Telecommunications and Information Technology (Calit2), The University of California, Irvine, CA, 92697-3975, USA
[b] Advanced Power and Energy Program (APEP), The University of California, Irvine, CA, 92697-3975, USA

ARTICLE INFO

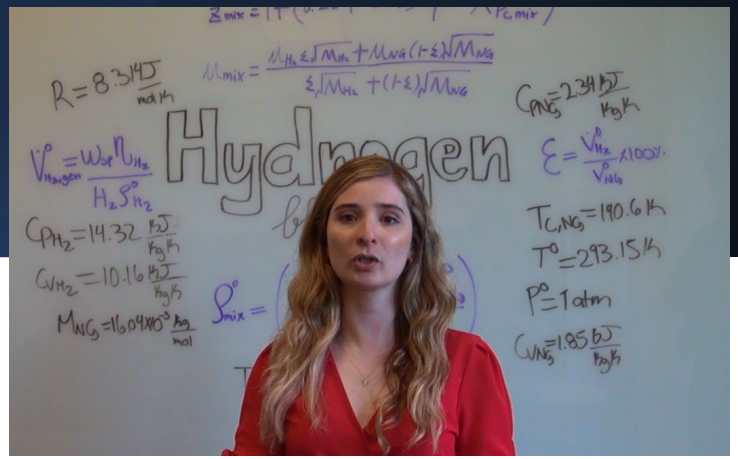
Handling Editor: Prof. J. W. Sheffield

Keywords:
Fuel flexibility
Hydrogen-natural gas blending
CO_2 reduction
Economic analysis
Pipeline network

ABSTRACT

Hydrogen blending has proved to be a promising alternative to reduce CO_2 emissions in current applications such as the industrial sector in which natural gas is the fuel source since it can mitigate GHG emissions and help to reach nation's goal of decarbonization. This study explored the feasibility of different hydrogen blend compositions going from 1% to 30% hydrogen content (by volume) by computational simulations to determine the best performance of the system considering real operating conditions from Central Plant at UC Irvine. This work also performed an economic analysis as part of the implementation plan. It was determined that a blend of 19% H_2 content could be implemented without any major renovation of utility infrastructure based on the operating conditions and change in the properties of the mixture. An addition of 30% H_2 can reduce around 11% of the emissions produced by pure natural gas. This is equivalent to 1422 kg of CO_2 in 1 h. It is evident that the higher the H_2 content, the better the CO_2 benefits that would be produced, but for the actual application of higher

Hydrogen Blending Project



- Created MATLAB model, multiple videos, presented a webinar, and created a poster

- Article: https://calit2.shorthandstories.com/hydrogen-blending/index.html
- Webinar: https://iac.university/webinars#webinar_8
- MATLAB Model: contact ccchoudh@uci.edu for more information!

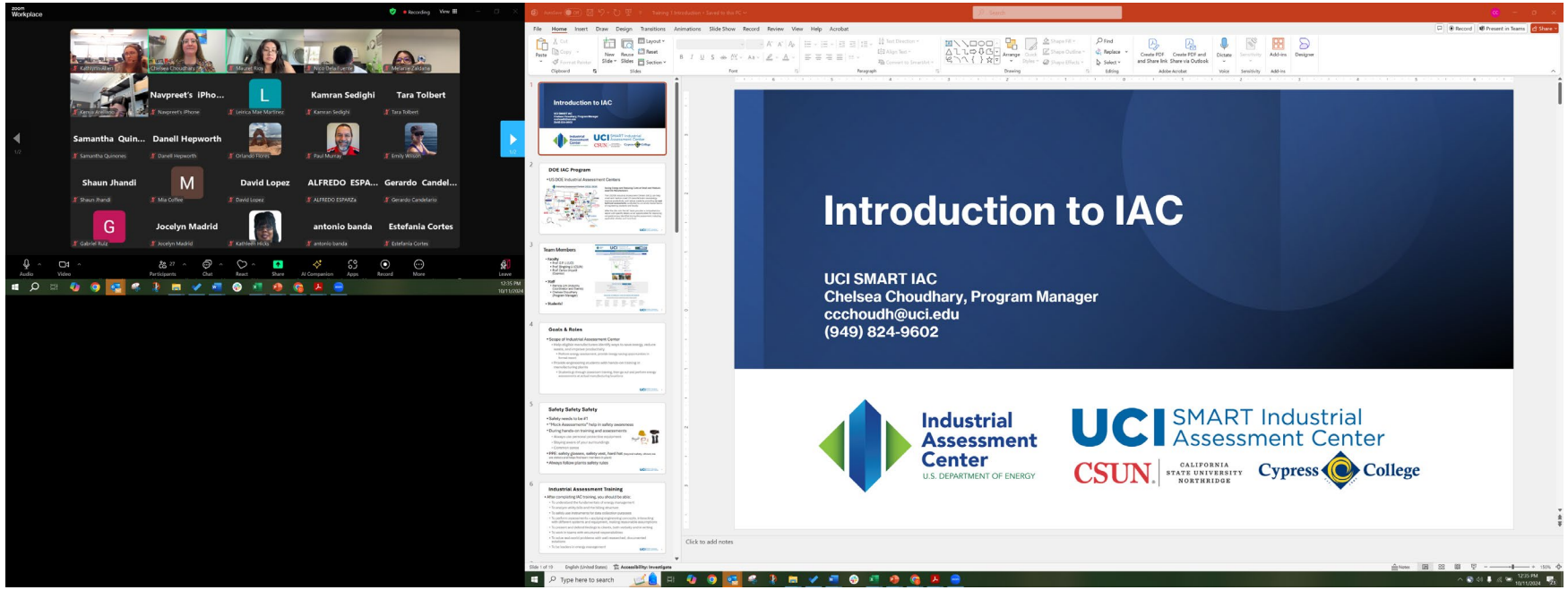
UCI SMART ITAC and Kern Community College District

- The ITAC program is expanding!
- Kern Community College District – new Central California ITAC
- This project will contribute to America's manufacturing and clean energy competitiveness in a high-unemployment, highly agricultural, oil-and-gas-transitioning, and largely underserved part of California
- UCI SMART ITAC has partnered with KCCD to help establish their new ITAC and train their staff to support the mission of the ITAC program

UCI SMART Industrial Assessment Center

KCCD
KERN COMMUNITY COLLEGE DISTRICT

UCI SMART ITAC and Kern Community College District



- Zoom trainings – basic ITAC concepts
- In-person hands-on training – equipment training, mock assessment, tour of UCI Central Plant

UCI SMART Industrial Assessment Center

UCI SMART IAC Hands-On Training Day

	1/11/2025	*Calit2 Room 4500*
Time	**Topic**	
8:30 AM	**Welcome**	*G.P. Li, Director*
8:40 AM	**Equipment Training**	*Chelsea Choudhary, Program Manager*
10:10 AM	**Break**	
10:25 AM	**Mock Assessment**	*Calit2 Building* *(roof, air compressor room, pump room, Cyber Maker Space, IAC lab space)*
12:25 PM	**Lunch**	
1:20 PM	**Travel to Central Plant**	*Central Plant, 902 W Peltason Drive*
1:30 PM	**Tour of UCI Central Plant**	*Central Plant Staff*
2:25 PM	**Closing Remarks**	*G.P. Li, Director* *Chelsea Choudhary, Program Manager*

MESC
OFFICE OF MANUFACTURING AND ENERGY SUPPLY CHAINS

Industrial Assessment Center
U.S. DEPARTMENT OF ENERGY

UCI SMART ITAC and Fullerton College

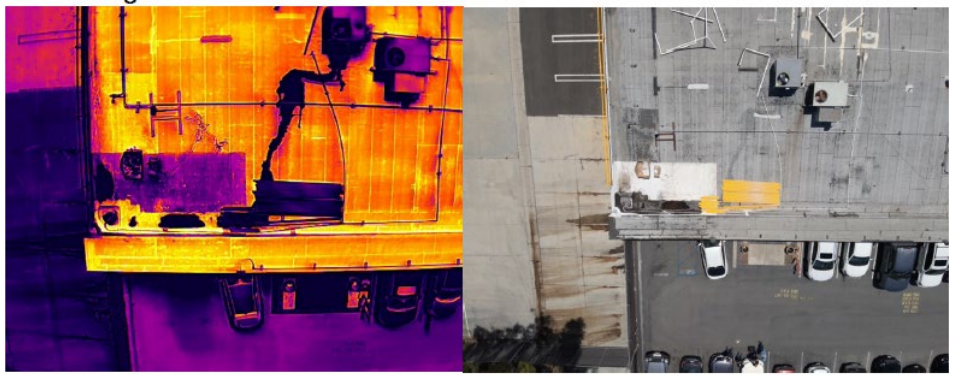
- Collaborating with the Fullerton College Drone Lab to provide drone roof thermal mapping inspections to our clients

FULLERTON DRONE LAB AND PILOT TRAINING

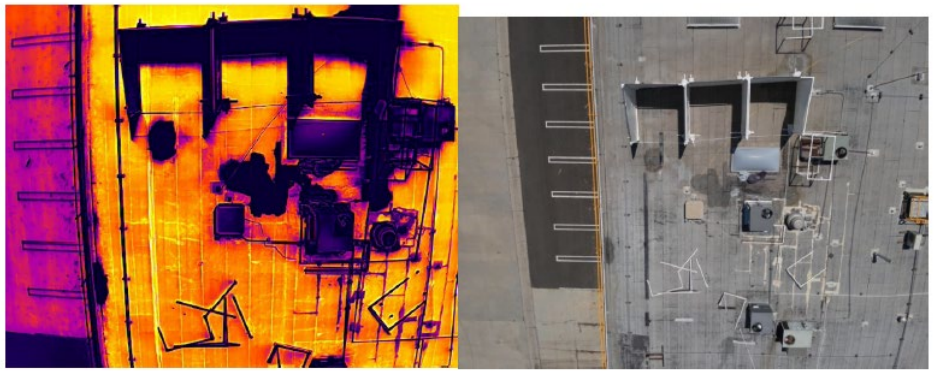
Fullerton College
Excellence. Elevated.

THERMAL ROOF INSPECTION

8. Images



The roof near the AC unit has evidence of water incursion. Roof area is comprised of mixed material due to past patch repairs. The need for past repairs may have been caused from AC unit.



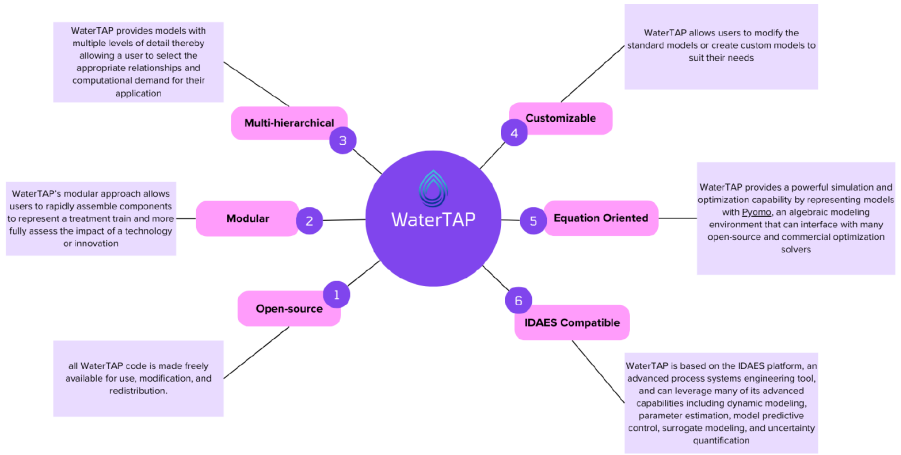
The roof near the AC unit has evidence of water incursion as well as evidence of water that pooled in a slight depression on the roof.

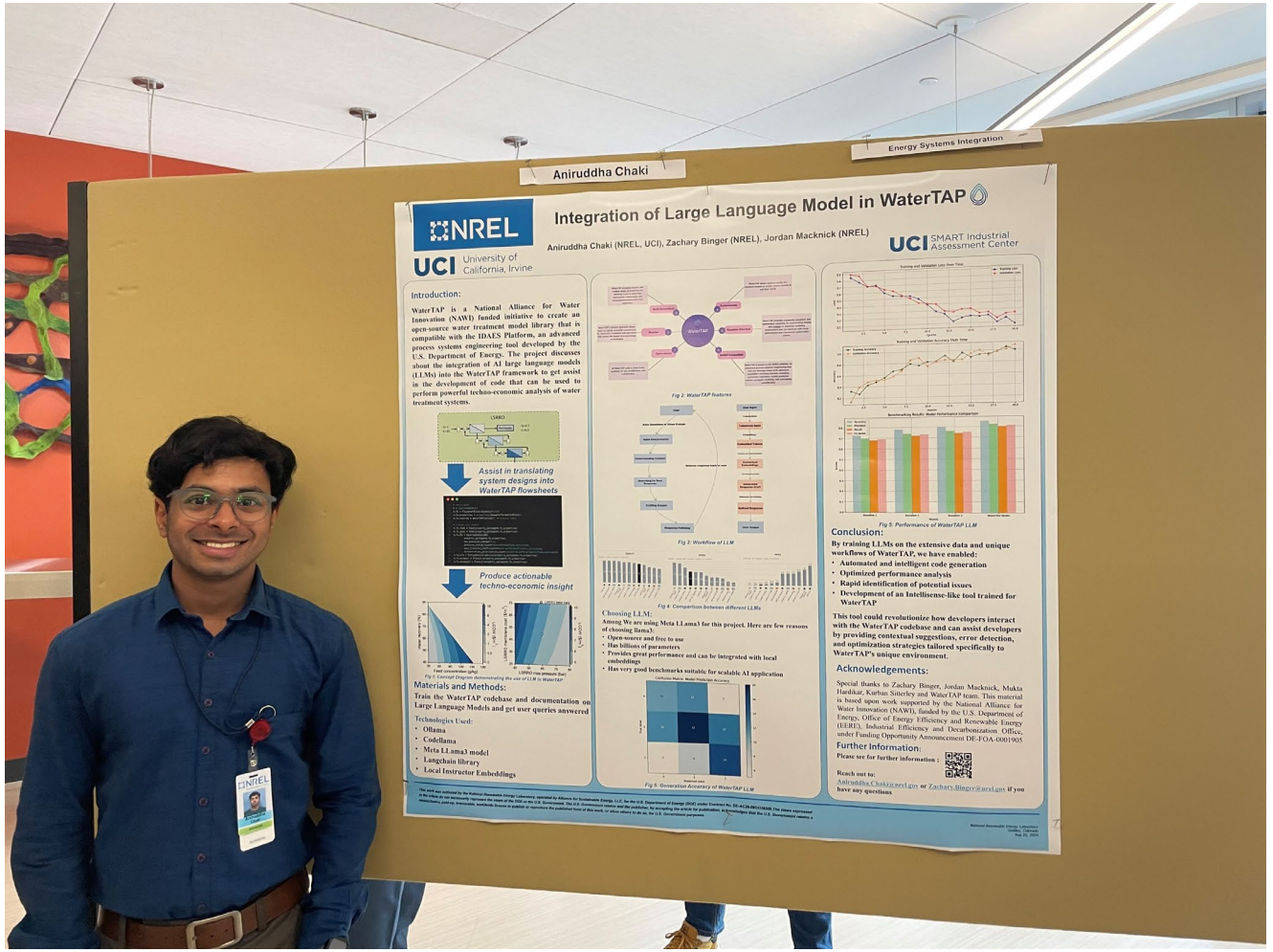
Student Testimonial

Aniruddha (Rick) Chaki

- Graduate Student
- Computer Engineering
- NREL Summer Intern

- Project: Integration of Large Language Model in WaterTAP





Student Testimonial

Abdulrahman Taha

- Senior
- Aerospace Engineering
- Safety Lead

Student Testimonial

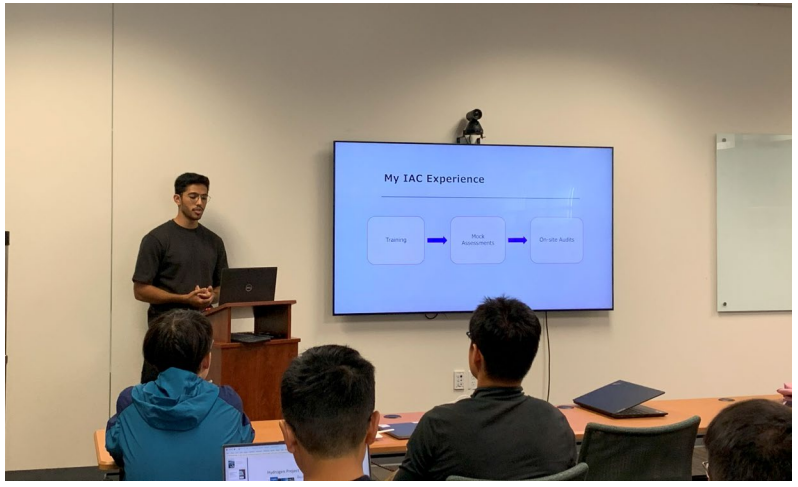
Pablo Diaz

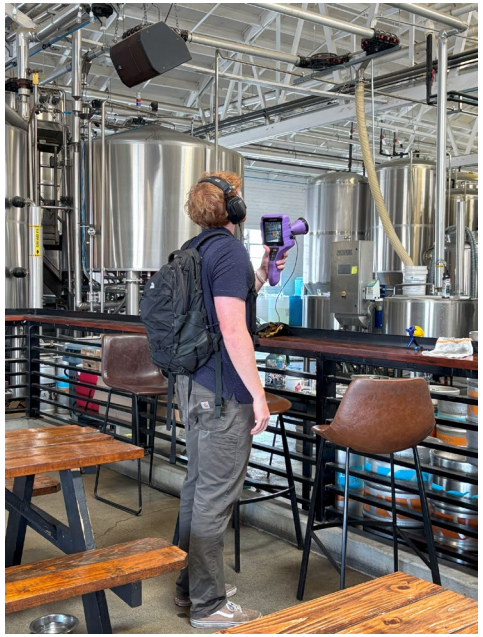
- Senior
- Chemical Engineering
- Equipment Lead
- Internship at Honda

Student Testimonial

Abdullah Alhussain

- Senior
- Mechanical Engineering
- Student Lead
- AEE World Conference






UCI SMART Industrial Assessment Center
AROS
AUTONOMY FOR SUSTAINABILITY:
DOE SMART: INDUSTRIAL ASSESSMENT CENTER FOR SOUTHERN CALIFORNIA
CSUN


TROJAN
BATTERY

Questions?