An Online Learning Community to Conduct Collaborative Education and Innovation in Renewable Energy, Environment, and Manufacturing

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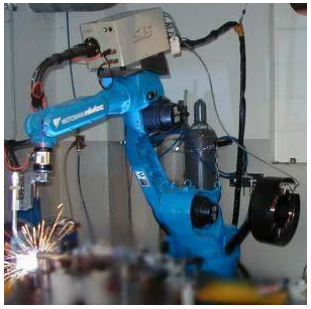
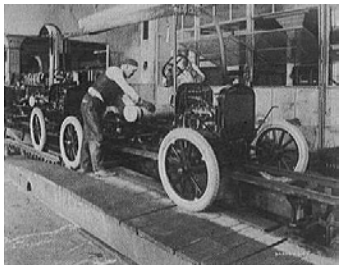
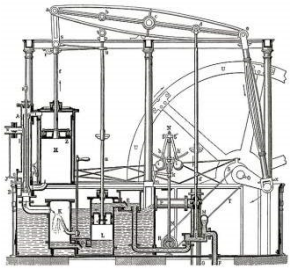
Introduction

- An online learning community for education research within the green energy manufacturing with the topics on virtual reality modeling related to energy and environment.
- An innovative solution for optimizing learning effectiveness and improving educational outcomes through the development of virtual models that can be used and integrated into the existing renewable energy laboratory.
- Project-based learning result of green energy manufacturing integrated with virtual reality (VR).
- Train undergraduate engineering students in renewable energy education and offer experiential learning opportunities in 3D modeling, simulation, and visualization.
- Interactive project-based learning gives students an incentive to seek creative solutions to accomplishing project goals.

Industrial Evolution







4. Industrial revolution
Based on cyber-physical-systems

3. Industrial revolution
Through the use of electronics and IT further progression in autonomous production

1. Industrial revolution
Introducing mechanical production machines powered by water and steam

Level of complexity

Industry 1.0	Industry 2.0	Industry 3.0	Industry 4.0
End of the 18th century.	Beginning of the 20th century	Beginning of the 70th	Today

Source: DFKI/Bauer IAO

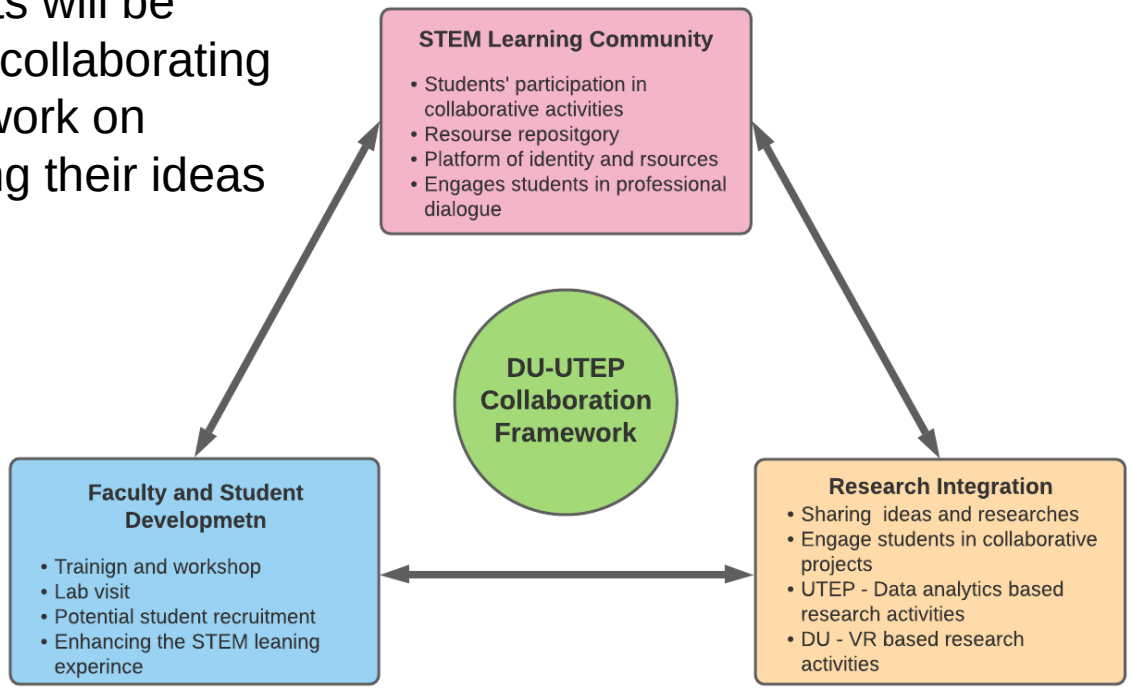
DU-UTEP Collaboration Framework

STEM learning community, research integration, and faculty and student development.

STEM learning community: Student participation in collaborative activities from both universities. Platform of resource repository. Engage student in professional dialogues.

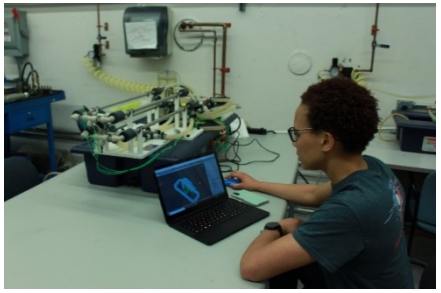
Research integration: Students will be mentored from the experts of collaborating institutions and students will work on collaborative project by sharing their ideas and institutional resources.

Faculty and Student Development: Workshop and lab visit program with the purpose of enhancing students learning experience in STEM education.

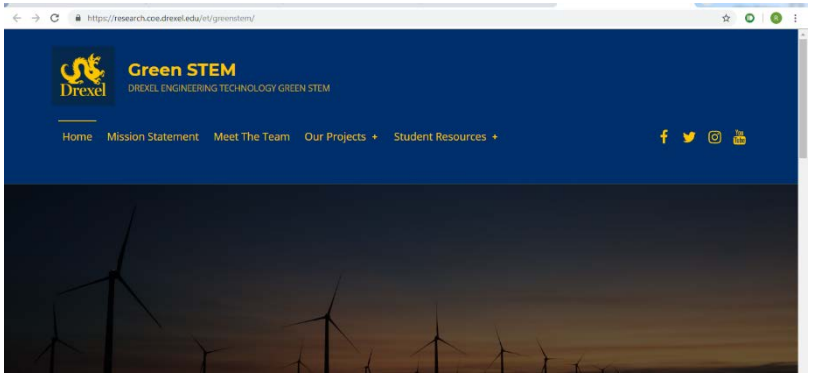


DU-UTEP Collaboration Framework

Develop and Implement Online Learning Community and Repository for Students

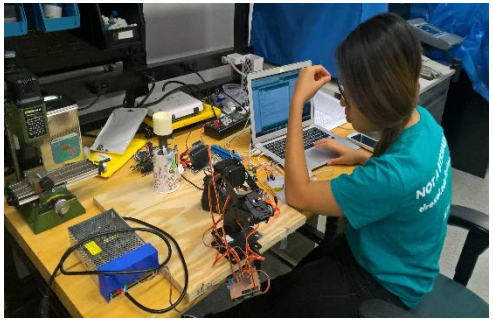


Development of Online VR Learning Materials



DU Project Website: https://research.coe.drexel.edu/et/greenstem

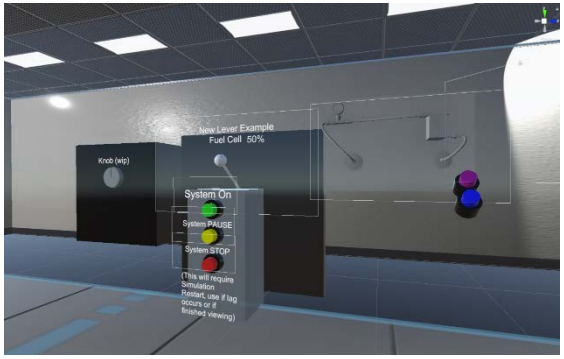
Green Welding Research in the Student Conference on Global Challenges

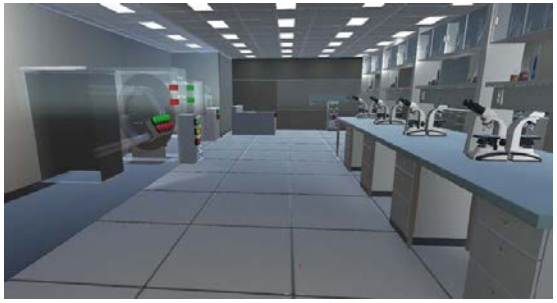


Building a Robotic 3D Scanner and Sortation System

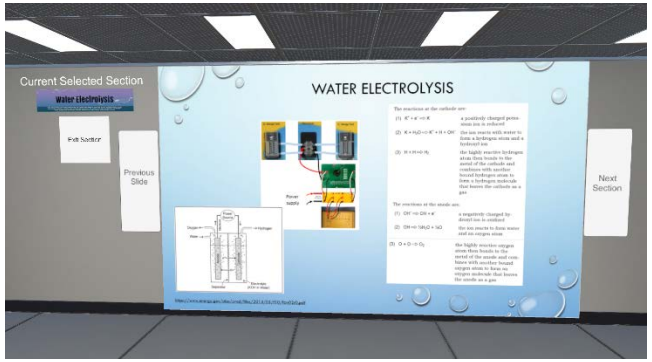
Monthly Online Video Conference Meeting Between DU and UTEP

Development of a Virtual Reality Learning Platform for Green Energy: VR Learning Modules of PEM Fuel Cell and Solar Cell





Overview of the Laboratory	Learning Modules:	Module's Learning Objectives
Theory	Experimental Module: Description Procedure Measurements/ Parameters	Self-Assessment



Overview

- Role of Multisensory Teaching
- Developing the Virtual Reality Learning Environment
- VR Renewable Energy lab description
- PEM Fuel Cell and Solar Cell VR Learning Module – VR module:
  - Immersive learning of theoretical aspects
  - Laboratory activity
  - Numerical simulation for live data feed
- Learning Assessment protocol

Social Network for Online Learning (DU-UTEP)

Free group messaging
that works on every phone.

groupme

Green Energy Manufacturing Online Learning Community

Join Group

Topic Prompt	Due Date
Introductions- Introduce yourself to the group stating your name, major, and year. Then, explain if and why you believe green energy manufacturing is important. What is the most surprising fact or aspect of green energy manufacturing that you have learned about so far in your overview of the industry?	Wednesday, October 25th, 2017
Wind Power- By now you have all learned about wind power systems. What do you see as the biggest hurdle in implementing wind power on a large scale? How have areas that have implemented it worked around these challenges?	Wednesday, November 2st, 2017
Solar Power- By now you have all learned about solar energy. What is the difference between solar photo voltaic power and solar thermal power? What are the pros and cons to trying to implement each?	Wednesday, November 8th, 2017
Green Energy Systems- Do you see any potential implementation of green energy systems? What are the benefits of green energy systems? Please cite examples of impact you have seen as a result of green energy systems.	Wednesday, November 15th, 2017
Life Cycle Assessment (Part One)- What is a product life cycle and what are its main phases? Describe the four steps in performing life cycle assessment (LCA). How do you achieve the life cycle simulation in goal and scope, life cycle inventory, life cycle impact assessment, and interpretation?	Wednesday, November 22nd, 2017

ACKNOWLEDGEMENT

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