Solar Design Contest –
Solarize UARK Campus

Design Contest Kick-off

Department of Mechanical Engineering
The University of Arkansas

Design Contest Kick-off Agenda

Agenda

- Introduction
- Participation
- Rules and Instructions
- Evaluation and Awarding

Introduction

Who We Are

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The Concord Consortium

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Introduction

Why We Are Hosting This Contest

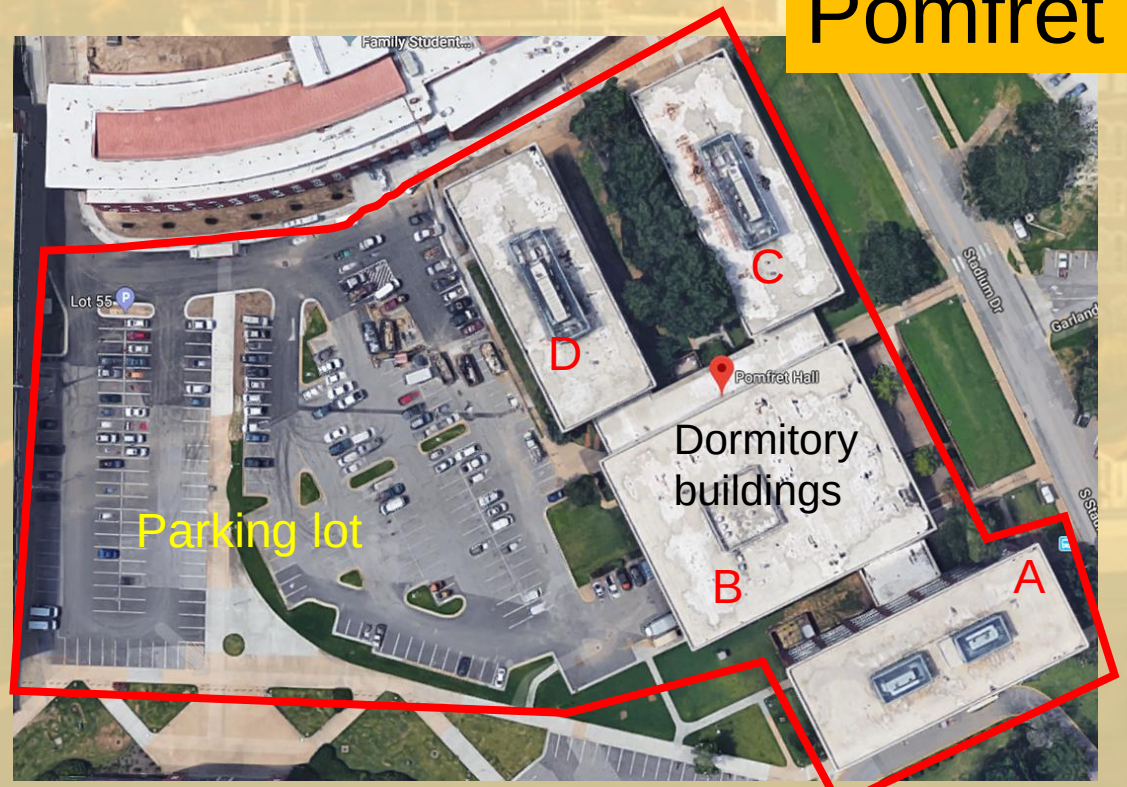
- **Motivate** more students to learn energy systems design in their future careers
- **Develop** forward-thinking designs for solar energy systems
- **Help** students understand how solar energy is generated and used
- **Draw** public attention toward sustainable energy

Introduction

About The Design Challenge

The design challenge: Deliver a solar energy system solution for an on-campus apartment complex.

Pomfret Hall



01 WHO

02 WHY

03 WHAT CHALLENGE

04 HOW TO WIN

05 WHAT YOU WIN

Introduction

How To Win

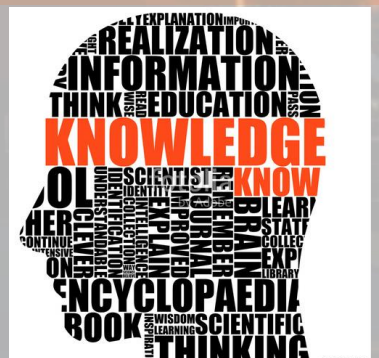
Produce a computer-aided design (CAD) solution to construct a solar energy system for Pomfret Hall at UARK.

- Understand basic solar science knowledge
- Learn how to design a solar energy system using Energy3D (CAD software)
- Analyze the design problem and identify the key design variables
- Produce conceptual design solutions
- Design a detailed scheme of rooftop solar panels and a layout of ground solar canopies on the parking lot with the objective of maximizing annual yield energy under a certain budget
- Submit your solution to us for judging

Introduction

What You Will Win

- Prize amount
  - 1st place **$500**
  - 2nd place **$250**
  - 3rd place **$100**
  - **$5** participation award for finishing the design
- Gain valuable knowledge about solar energy system design
- Build up practical engineering design experience



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Participation

Who Can Participate: Eligibility

Who can participate

Why participate

Where to engage

When to engage

No Experience Required!

Anyone affiliated with UARK can participate.

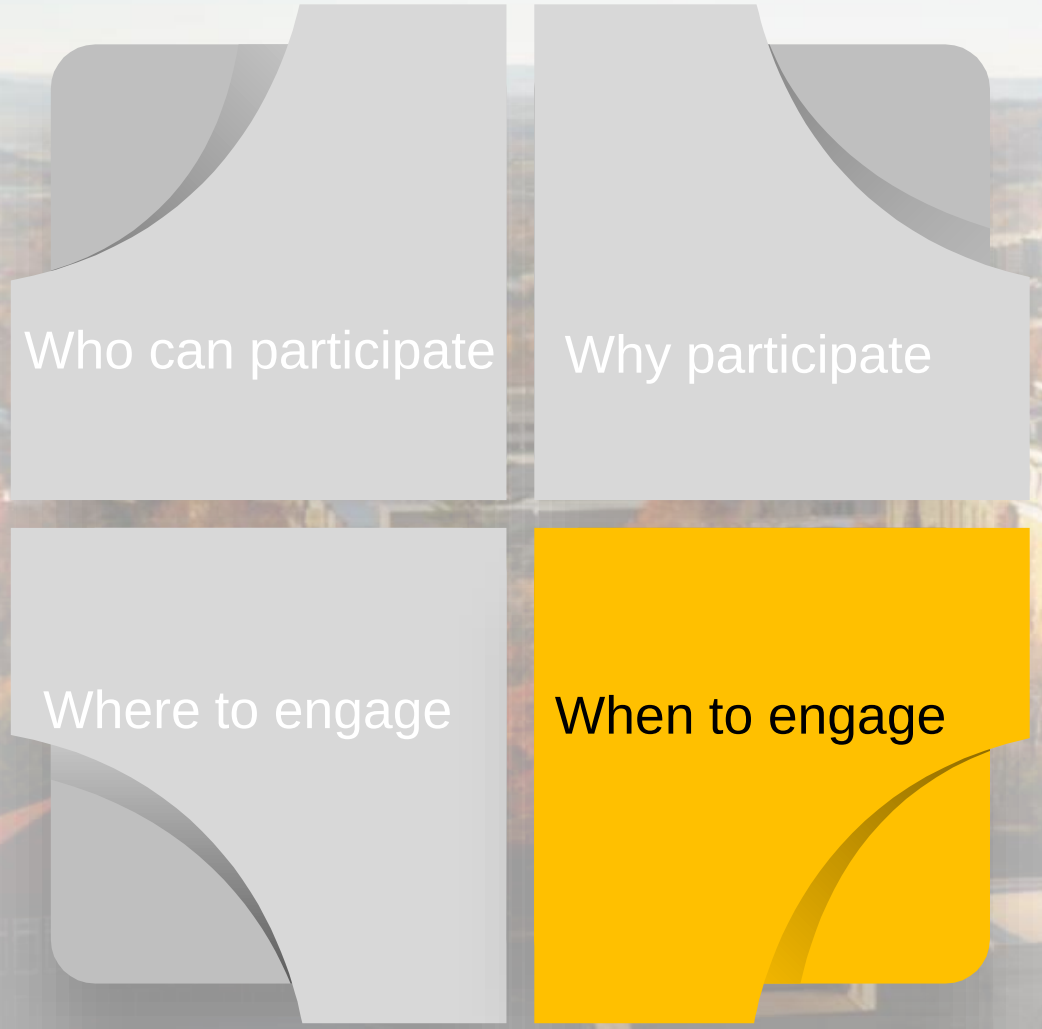
Participation

Why Participate

- Gain knowledge and experience about solar energy system design
- Obtain experience in solving real-world design problems
- Build your resume
- Win prize money

Participation

When to Engage: Timeline



Day 0: Design Challenge
Kick-off; Receive all needed documents

Day 1: Design challenge officially begins

Day 3, Day 4, and Day 7 at 4-5 pm: Knowledge Support Sessions

Day 8: Submissions Due

Day 11 – 15: At your leisure, complete the Psychological tests

TBD: Virtual Award Ceremony

Participation

Where to Engage

The comfort of your own room!

All tasks required to complete the Design Challenge are to be completed on your own devices, wherever you see fit.

Design Contest Kick-off Agenda

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Rules and Instructions

Rules of Competition

1. All participants must complete their design independently.
2. Do not cheat and maintain your highest integrity.
3. Sign the Integrity Agreement and Consent Form.
4. You have one week, i.e., 7 days, to complete your design.
5. Deliverable packages submitted after the deadline are ineligible to compete.
6. Judges may not participate in the contest.
7. Complete ALL psychological tasks to be eligible for consideration of judgement.

Rules and Instructions

Resources

The following resources can be found on our website:
https://sidilab.net/sidi-resources/cad-based-solar-design-contest/

Documents on how to complete the design
- “Design Challenge Flowsheet”
- “The Design Problem”
- “Energy3D Download Instructions”
- “Energy3D Tutorial”
- "Solar Science Information”
- “Data Submission Instructions”

The model where the design must be done
- “Design Contest.ng3”

Documents to submit after completing the design
- “Design Answer Sheet”
- “Design Report”
- “Parking Lot 2D Sketch”
- A .zip file of your log data from the “Design Contest.ng3” file
- The “Design Contest.ng3” file

Rules and Instructions

Energy3D Overview

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Engineering Analysis

Tutorials for design and experiment

Analysis result

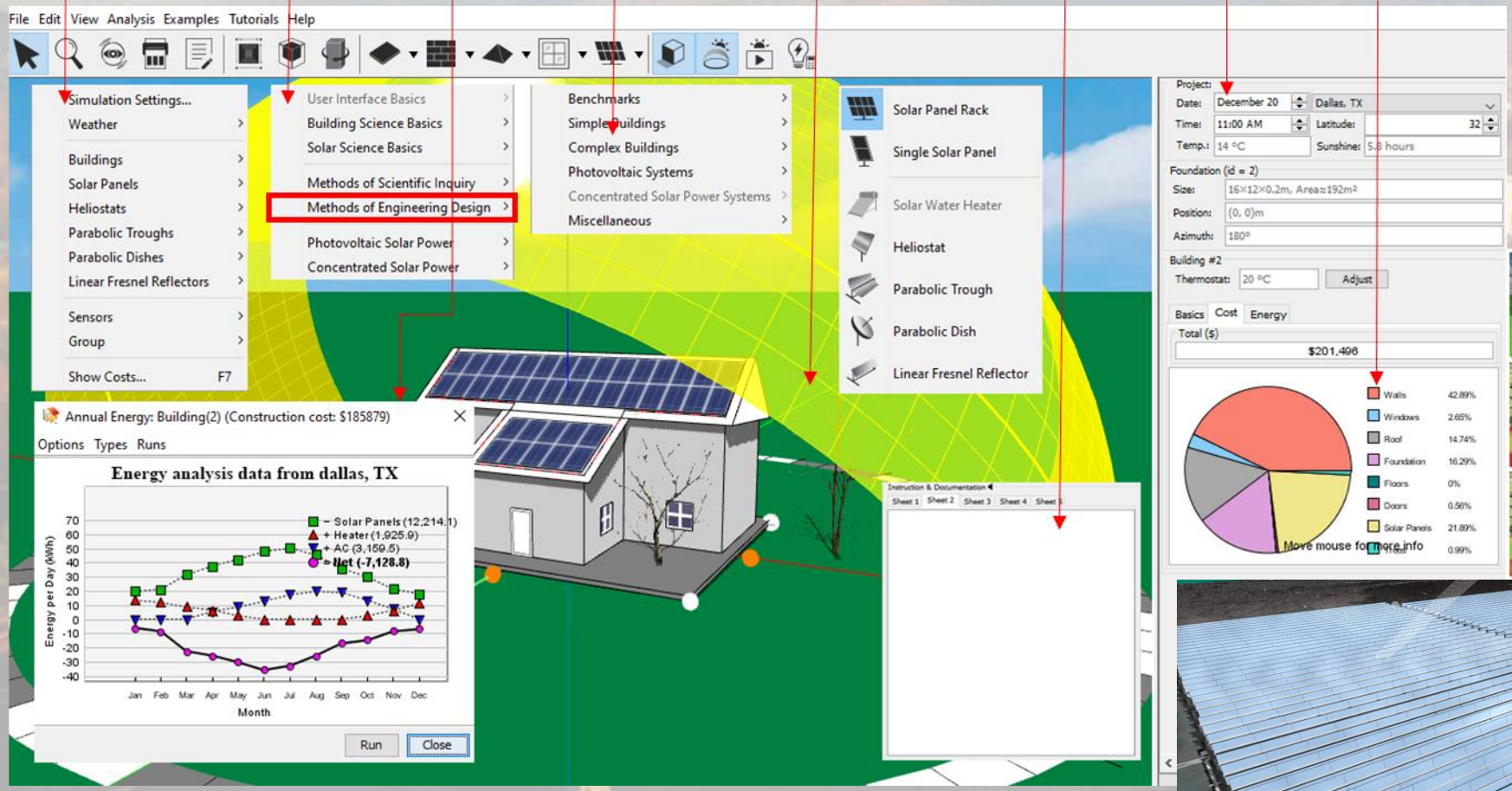
Example of solar system design

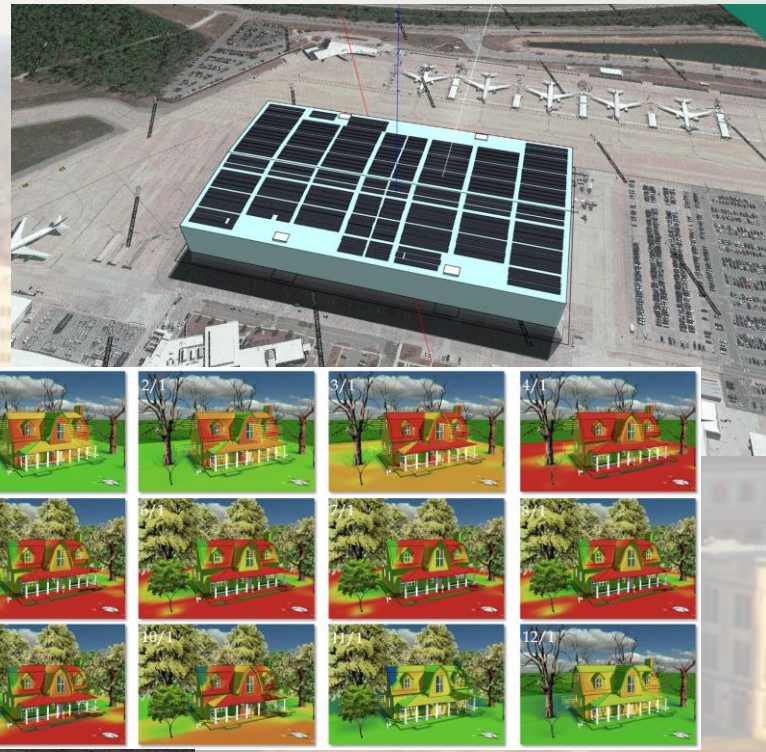
Workspace

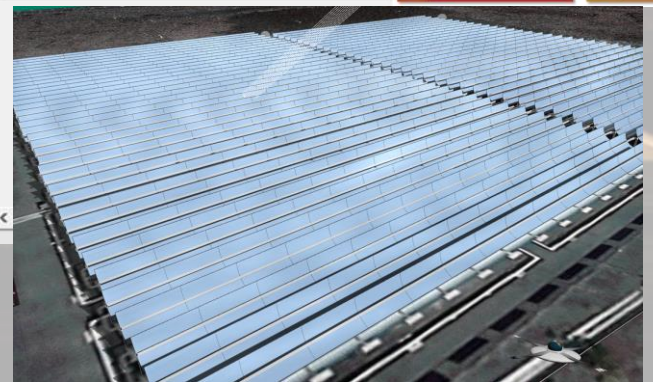
Notepad

Project detail

Cost analysis







Rules and Instructions

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Setup

- To download and set the design environment, follow the instructions found in the, “Energy3D Download Instructions” document

Notice:

- If you have ever installed Energy3D on your computer. Please uninstall it first.

Rules and Instructions

Design Process

The Design Problem

1. Learn the Design Problem

Energy3D Tutorial

2. Learn How to Use Energy3D

Solar Science Info

3. Learn Solar Knowledge

Energy3D Download Instructions

4. Set up the design environment

2D Sketch

5. Sketch up Your Design

Design_Contest.ng3

6. Start to Design

Design Answer Sheet

7. Iterate to achieve the design objectives and optimize your design

Rules and Instructions

Submission and Deliverables

Deliverable Packages

- Energy3D model
- The model log data – see the, “Data Submission Instructions” file for information on how to extract the needed data
- Design Answer Sheet
- Design Report
- 2D Sketch

Notes

- Continue your design in one file,
- If you would like to try out other designs, save as and RENAME the file before doing so
- For instruction on how to extract the needed data, see the “Data Submission Instruction” file on our website

Rules and Instructions

Psychological Tasks

Once you have completed the design challenge, we require that you complete six additional psychological tasks.

Each of the tasks will be completed online; after you have submitted your design, we will send you an instructional document on how to complete the tasks.

NOTE: You must complete **ALL** of the tasks in order for your design to be considered in the contest.

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Evaluation and Awarding

How Entries Are Evaluated

Content		Judging Criteria
Energy3D model 30%	1. Layout	Rooftops and parking lots solar energy system are complete.
	2. Objectives and budget	The overall annual energy output, budget, and payback period requirements are satisfied.
	3. Practical design	The design is feasible and practical which has no violations of constraints and rules.
	4. Aesthetics	Appearance of the solar energy system meet public aesthetics.
2D Sketch 15%		Turn in every sketch you have drawn.
Answer sheet 30%	1.1 Number of solar panels	All of the design variables are recorded completely and correctly for both rooftops and parking lots solar energy system.
	1.2 Solar panel model	
	1.3 Tilt angle	
	1.4 Pole height	
	1.5 Solar panel azimuth angle	
	1.6 Annual generated electricity	
	1.7 Payback period	
	2. Your design rationale	The design rationale of each iteration is complete.
	3. Learning from each iteration	What you have learned are considered during following iterations.
Design report 25%	Overall design philosophy and rationale	The design report is complete and organized.

Evaluation and Awarding

Scoring and Awarding Ceremony

- Judges review final deliverable packages.
- Each content receives a preliminary score from each judge.
- Scores are averaged and the averages are summed.
- Judging panel convenes to determine winners.
- 1st-, 2nd-, and 3rd-place winners are identified and announced.
- The winners will be announced through a virtual award ceremony; conducted through Microsoft Team.