

# **IPRO 352**

# **Solar Decathlon 2011**

## **Midterm REPORT**

## **May/Spring 2008**

***Faculty***  
Frank Flury

***Our Team:***  
Laura Mast  
Kaitlin Streyle  
Milagros Calizo  
jamie Amber  
Juan DeMarco  
Nahtnaiel Hollister  
Nikhil Madan  
Matthew Pollina  
Anthony Doellman  
Mohammad Ishaq  
John Ruffolo  
John Carroll  
Daniel Johnson  
Marcin Mejsak  
Trent Steffen

## **INTRODUCTION:**

I PRO 352: Solar Decathlon 2011 lays the starting foundation for a multiple stage project which culminates in IIT's participation in the 2011 Solar Decathlon. Our goal was to lay the groundwork in the areas of research, design, and public relations for creating an IIT team for the 2011 Solar Decathlon.

## **OBJECTIVES**

Our objectives for the semester were:

- Form a network of potential donors and sponsors
- Create a PR campaign including a webpage that provides information to the public and potential sponsors
- Create a conference for fall 2008 at IIT, that will deal with solar building and technology. This will serve to raise campus and city wise awareness and support of this important undertaking.
- Create a database of information related to the building of a solar house – including different technologies, systems, and design concepts
- Come up with a detailed cost estimate based on research of previous participants
- Based on the database of information prepare and deliver a proposal to President John Anderson for IIT's involvement in the 2011 Solar Decathlon

## **BACKGROUND**

This EnPRO project is the first of several designed to position IIT for a competitive proposal entry in 2009 for the Solar Decathlon 2011 competition. The Solar Decathlon is a competition in which 20 teams of college and university students compete to design, build, and operate the most attractive, effective, and energy-efficient solar-powered house. The Solar Decathlon is also an event to which the public is invited to observe the powerful combination of solar energy, energy efficiency, and the best in home design.

This year the event will take place on the National Mall in Washington, D.C. October 12 - 20. The team houses are open for touring everyday except Wednesday, October 17, when they will close for competition purposes. An overall winner is announced on Friday, October 19 at 2 p.m.

Teams of college students design a solar house, knowing from the outset that it must be powered entirely by the sun. In a quest to stretch every last watt of electricity that's generated by the solar panels on their roofs, the students absorb the lesson that energy is a precious commodity. They strive to innovate, using high-tech materials and design elements in ingenious ways. Along the way, the students learn how to raise funds and communicate about team activities. They collect supplies and talk to contractors. They build their solar houses, learning as they go.

The 20 teams transport their solar houses to the competition site on the National Mall and virtually rebuild them in the solar village. Teams assemble their houses, and then the active phase of the Solar Decathlon begins with an opening ceremony for students, media, and invited guests. The teams compete in contests, and even though this part of the Solar Decathlon gets the most attention, the students really win the competition through the many months of fundraising, planning, designing, analyzing, redesigning, and finally building and improving their homes. The public is invited to tour the solar homes and event exhibits during much of the competition.

The Solar Decathletes, i.e., tomorrow's engineers, architects, researchers, and homeowners, are sharing with us a new vision for living under the sun. These solar homes are powerful, comfortable, and stylish. They are relaxed and elegant, wasting neither space nor energy.

Today's solar houses connect with nature to take advantage of heat and light from the sun and cooling breezes and shading. But they crank this natural advantage way up by using the newest products and technologies on the market. The Solar Decathlon solar homes combine the best from the past and the present... and deliver the promise of a brighter future.

Being a large undertaking, participation in a solar decathlon must be preceded by much preparation. This IPRO team will begin laying the foundation for IIT's involvement in the 2011 Solar Decathlon in Washington, DC. This involves getting support not only from the Administration but the larger community as well.

Wider issues are also encountered in this project. This touches on aspects of energy and resource management and stewardship. A solar house is still a progressive design and some aspects of society have not yet orientated themselves to changing climate of resource conservation and sustainable building. To move ahead in the project the team will need to be informed and prepared to address these issues as they come up.

Designing and building a solar house incorporates the entire range of academic disciplines. Architecture and civil engineering knowledge and skills for the design and construction of the house along with chemical, electrical and mechanical engineering to design and set up the technological aspects of a solar powered house. That only accounts for the main features of the house. Students with majors from business to psychology will be needed in different aspects of the project. The time required is immense! Because of this, full cooperation of the administration is needed. This includes help with technical issues from the respective departments as well as academic credit for students who devote their time to this undertaking.

## **METHODOLOGY/BRAINSTORM/WORK BREAKDOWN STRUCTURE**

### **Team Divisions**

Webpage: John Ruffolo, Juan DeMarco, Marcin Mejsak

Public Relations and Business: Nikhil Madan, Mohammad Ishaq, Daniel Johnson

Engineering: Jamie Amber, Milagros Calizo, John Carroll, Anthony Doellman, Trent Steffen

Design: Marcin Mejsak, Juan DeMarco, Nathaniel Hollsiter, Laura Mast, Matthew Pollina, Kaitlin Streyle

The semester's task are divided into these major sections

- Researched Past Solar Decathlon teams – All team members participated
  1. Interview past team members to gain a broad understanding of what this project will take
  2. Gleaned the past team websites to see what worked and what didn't
- Built a database to house research and information gained during the semester
- Use the information gained from interview and research to determine what will be needed financially as well as cooperation from the School
  1. Determine the required resources
    1. Workspace
    2. Students
    3. Materials
    4. Technical Consultation
  2. Determine the how interface will be needed with the academic departments
  3. Come up with a financial estimate
- Build a backbone for future Sponsors and Allies and Raise Awareness
  1. Designed and Published a Website
  2. Began a PR campaign
  3. Approached Architectural Organizations in Chicago to introduce IIT's plans for participation in the Solar Decathlon
  4. Created individual brochures for IIT students/faculty, and a separate brochure for possible sponsors

### **Obstacles**

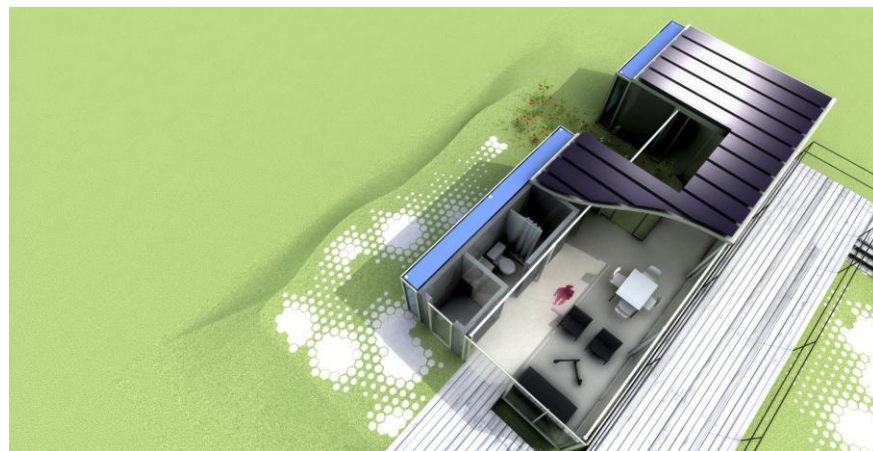
#### Assessment of Team

We came to the table with very different skills and strengths. It was important to tap into the talents while also allowing each person to grow in the areas they were enthusiastic.

Each person was given the opportunity to join whichever group fit their individual interests within the project. It was crucial for all team members to work together, because any individual could not complete this project on their own. Our team had members involved in many other activities, volunteer, school-related projects, and professional jobs, which always made it a challenge to set up meetings and create a common day and time from which individuals could collaborate. The advantages of having a multidisciplinary team was innovative ideas and concepts, as well as multiple perspectives and expertise.




## Results

Design Team:


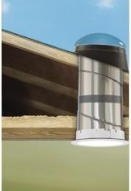



# Engineering:

Zoho Creator - Technology Form - Internet Explorer provided by Dell  
 http://creator.zoho.com/paridigm/technology/view/3/

ID	URL	Company	Product/Service	Image	Description	Cost	Notes
24	<a href="http://www.nudura.com/Content/C-019&amp;SC=1&amp;SCM=0&amp;M=46&amp;">http://www.nudura.com/Content/C-019&amp;SC=1&amp;SCM=0&amp;M=46&amp;</a>	Nudura - Insulated Concrete Forms	Insulated concrete forms		energy efficiency - high insulation creates lower heating and cooling load	not listed	The Standard is or form unit. 8 measu and provides an r sq. ft. of wall area. Standards easily use. are fully reve, are available with 4/6/8/10/12 core
25	<a href="http://www.rociromero.com/">http://www.rociromero.com/</a>	Rocio Romero - modern design and prefab architecture	customizable prefab homes		affordable, easily built, and highly customizable	\$ 19,992 - \$ 45,225	standard LV serie designed to meet stringent earthqua regulations and m seismic. LV 150 complies with the stringent hurricane energy efficient b: deeper wall and n which allow us to insulate and achie remarkable R-value home has (2) 6" v if batt insulation is can achieve R-38
	<a href="http://www.mtd-arc.com/">http://www.mtd-arc.com/</a>	Michele Kaufmann	pre-fab houses		eco-friendly, beautiful and cost effective. The homes materials systems and design can achieve LEED gold or platinum	MXK predesigned homes: \$250 to \$275 per square foot MXK custom designed homes: \$400 and up per square foot	Renewable materi because it grows easily, is a wonde renewable materi

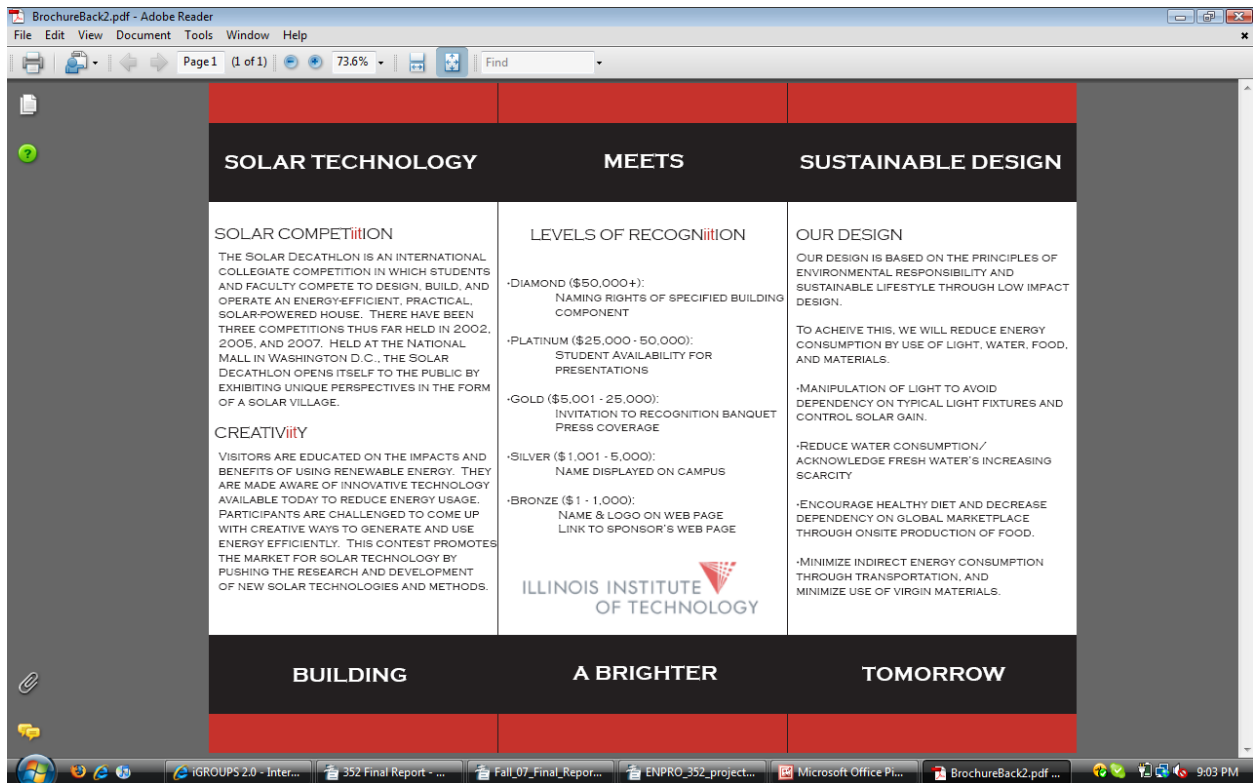
Zoho Creator - Technology Form - Internet Explorer provided by Dell  
 http://creator.zoho.com/paridigm/technology/view/3/

15	<a href="http://www.renewedmaterials.com/alkemi">http://www.renewedmaterials.com/alkemi</a>	alkemi - recycled surface material	recycled aluminum milling scrap		SCS certified, LEED credits receiving, recycled surface material composed of post-industrial scrap waste (35% by weight—as certified—or 60% by volume).	not listed	
16	<a href="http://www.veluxusa.com/prod/">http://www.veluxusa.com/prod/</a>	Velux America	energy efficient skylight		daylighting, reduce use of electricity	not listed	
17	<a href="http://www.discoverylighting.com/">http://www.discoverylighting.com/</a>	Discovery Lighting	12 watt retrofit downlight recessed light LED bulb		50% more efficient than fluorescent and 90% more efficient than incandescent lighting, 50,000 hour life span	\$120.00	

# Website:

[www.iitsolardecathlon.com](http://www.iitsolardecathlon.com)

## Public Relations:



The above are screen shots of different areas covered within our individual teams. The design team produced a digital model of our initial conceptual design for IIT's entry for the 2011 Solar Decathlon, incorporating some of the technologies researched and collected in the database shown under the Engineering team. The final image is the brochure designed for IIT faculty and students, as well as potential sponsors.

## SUMMARY

Over the semester we learned about team cohesiveness and accountability through our participation in both group and individual projects. We achieved all of our objectives, except for creating a conference for Fall '08. Individuals learned that the problems they encountered were more easily solved with the help of others. The multidisciplinary aspect of our IPRO helped expose individuals to multiple unique majors, as well as mimicked the types of interactions team members will encounter in real world situations. Individuals came away with many experiences that better prepare them as they embark on their professional careers in various professions.

## RECOMMENDATIONS

The Spring 2008 IPRO 352 is the first in a series of three more IPROs to continue the IIT 2011 solar decathlon program. During the following IPROs our main goals are to plan and host a symposium showcasing several solar technologies and to submit a final proposal for consideration in the 2011 Solar Decathlon.

Fall 2008:

- IPRO (not EnPRO) with 2 faculty (1 architecture, 1 engineering)
- Selective admittance into IPRO so only students truly interested sign up; faculty recommendation required
- TO DO in IPRO:
  1. Continue very specific research of technologies
  2. Develop internal contacts based on specific technologies
  3. Plan and host a symposium
- BY END of IPRO:
  1. Must have IIT devotion (both student, faculty, and administrative) to Solar Decathlon with a deliberate proposal

Spring 2009:

- Independent study involving small groups of architecture , engineering , and business/psychology students headed by team leaders of either Masters degree students, PhD candidates, or professors and overseen by head faculty member for Solar Decathlon proposal
- Faculty should already be involved, but continue/develop ties
- Develop schematic design for official proposal
- Continue building student interest
- Solidify sponsorship

Fall 2009:

- Compile final official proposal for Solar Decathlon
- RFP due in December of 2009
  1. School support / devoted faculty and admin named
  2. Proof of financial backing
  3. Business and financing plan
  4. Schematic design
  5. Strong student interest