07 Solar Decathlon

Collaborative Workshop 4.182

SOLAR DECATHLON

”The Solar Decathlon is a competition in which 20 teams of college and university students and faculty compete to design, build, and operate the an effective, and energy-efficient solar-powered house. “

>The project is organized and sponsored by the National Renewable Energy Laboratory

“The Solar Decathlon is an event to which the public is invited to observe the powerful combination of solar energy, energy efficiency, and the best in home design.”

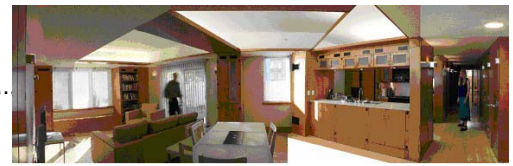
>The houses are to be built and exhibited on the Mall, Washington DC in September 2007.

MIT is a DoE funded participant. It involves us in an 18 month program of design and technological research to further our interests in sustainability for (pre) manufactured housing.

Faculty and Researchers

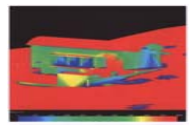
Andrew Scott: department of architecture

sustainable architecture, bio-climatic design……



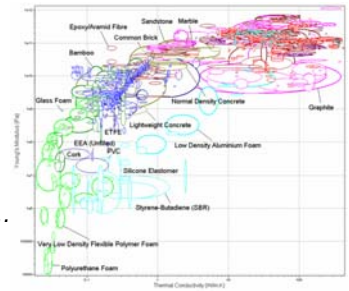
Kent Larson**:** House_ n ……

environmental sensing/ pre-fabricated assemblies



Les Norford**:** Building Technology Group……

energy modeling



John Fernandez: Building Technology group

Materials performance and selection / Life Cycle assessment……

Larry Sass: Computation Group……

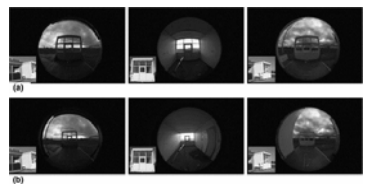
Digital Fabrication

Kurt Keville: Research scientist

Power systems and storage……

Ed Kern: MIT Energy lab/ Irradiance Inc……

Photovoltaic systems



Marilyne Andersen Building Technology Group

Daylighting modeling……

2007 TEAMS

California Polytechnic State University, San Luis Obispo, California
Carnegie Mellon University, Pittsburgh, Pennsylvania
Cornell University, Ithaca, New York
Georgia Institute of Technology, Atlanta, Georgia
Kansas State University, Manhattan, Kansas
Lawrence Technological University, Southfield, Michigan
Massachusetts Institute of Technology, Cambridge, Massachusetts
New York Institute of Technology, Old Westbury, New York
Team Montreal (École de Technologie Supérieure, Université de Montréal, McGill University),
Technische Universität Darmstadt, Darmstadt, Germany
Texas A + M University, College Station, Texas
Pennsylvania State University, University Park, Pennsylvania
Universidad de Puerto Rico, Río Piedras and Mayagüez, Puerto Rico
Universidad Politécnica de Madrid, Madrid, Spain
University of Cincinnati, Cincinnati, Ohio
University of Colorado, Boulder, Colorado (Winner 2005)
University of Illinois at Urbana-Champaign, Urbana, Illinois
University of Maryland, College Park, Maryland
University of Missouri-Rolla, Rolla, Missouri
University of Texas at Austin, Austin, Texas









previous projects Virginia Tech / RISD / Madrid/Maryland/ Colorado/ Michigan/ Virginia Poly / Cornell /Florida


Google
Pointer 38°53'25.13" N 77°01'33.18" W elev 16 ft
Streaming 100%
Eye alt 10425 ft


© 2006 Sanborn
Google
Pointer 38°53'24.82" N 77°01'38.05" W elev 16 ft
Streaming 100%
Eye alt 3414 ft

S

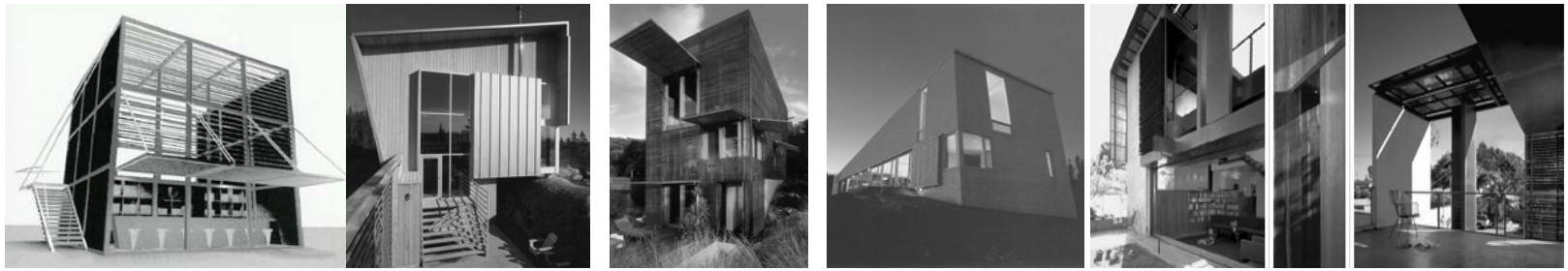

American History Museum
Natural History Museum
Madison Drive
Madison Drive
7th Street
Instrumentation
HQ
80ft
119 NYIT
117 Madrid
115 VTech
113 U Mass Dartmouth
111 Cornell
109 UMR RTI
107 UPR
105 WSU
103 Concordia
101 CalPoly SLO
Decathlete Way
120 Maryland
118
116 FIU
114 Carnegie Mellon
112 Crowder
50ft
110 Michigan
106 Colorado
104 UT Austin
102 RISD
Decathlete Way
Gateway
metro
Jefferson Drive
Smithsonian "Castle"
Jefferson Drive
Dept of Agriculture
Independence Avenue

Ten Solar DECATHLON Contests: 7 days in september 2007

Architecture	200 points
	firmness/ commodity / delight
	design/ materials/ integration /space / detail
Dwelling	100 points
	livability/ build-ability/ marketability/
Documentation	100 points
	drawings/ submittals/ construction documents/ energy analysis
Communications	100 points
	web site / tours/ 'branding'
Comfort Zone	100 points
	temperature/ indoor air quality
Appliances	100 points
	appliance demonstration, control and operations
Hot Water	100 points
	collection, storage, operations
Lighting	100 points
	integration and effectiveness of natural and artificial lighting
Energy Balance	100 points
	producing a net amount of energy of zero or more …battery storage
Getting Around	100 points
	mileage credit for running a electric car off excess stored battery power

What will the MIT group bring to the project?

1. Innovation- integrating bio-climatic design and new technologies for manufactured housing with sustainability
2. Collaborations: across boundaries and departments at MIT – and with industrial partners.
3. “Mens and Manus”- enabling students to engage in thinking and making in one project
4. Energy and sustainability- responding to recent initiatives for MIT leadership in energy research



MIT project principles and priorities:

1. Integrated architecture with solar

   bio-climatic; designing a house for living where the spaces and elements intgrated and coordinated

2. Integrated assemblies

   Dry assembly / industrial components and composites/ low skilled site labor/ capable of disassembly

3. New materials and systems

   New and emerging materials with environmental profile/ life cycle assessment

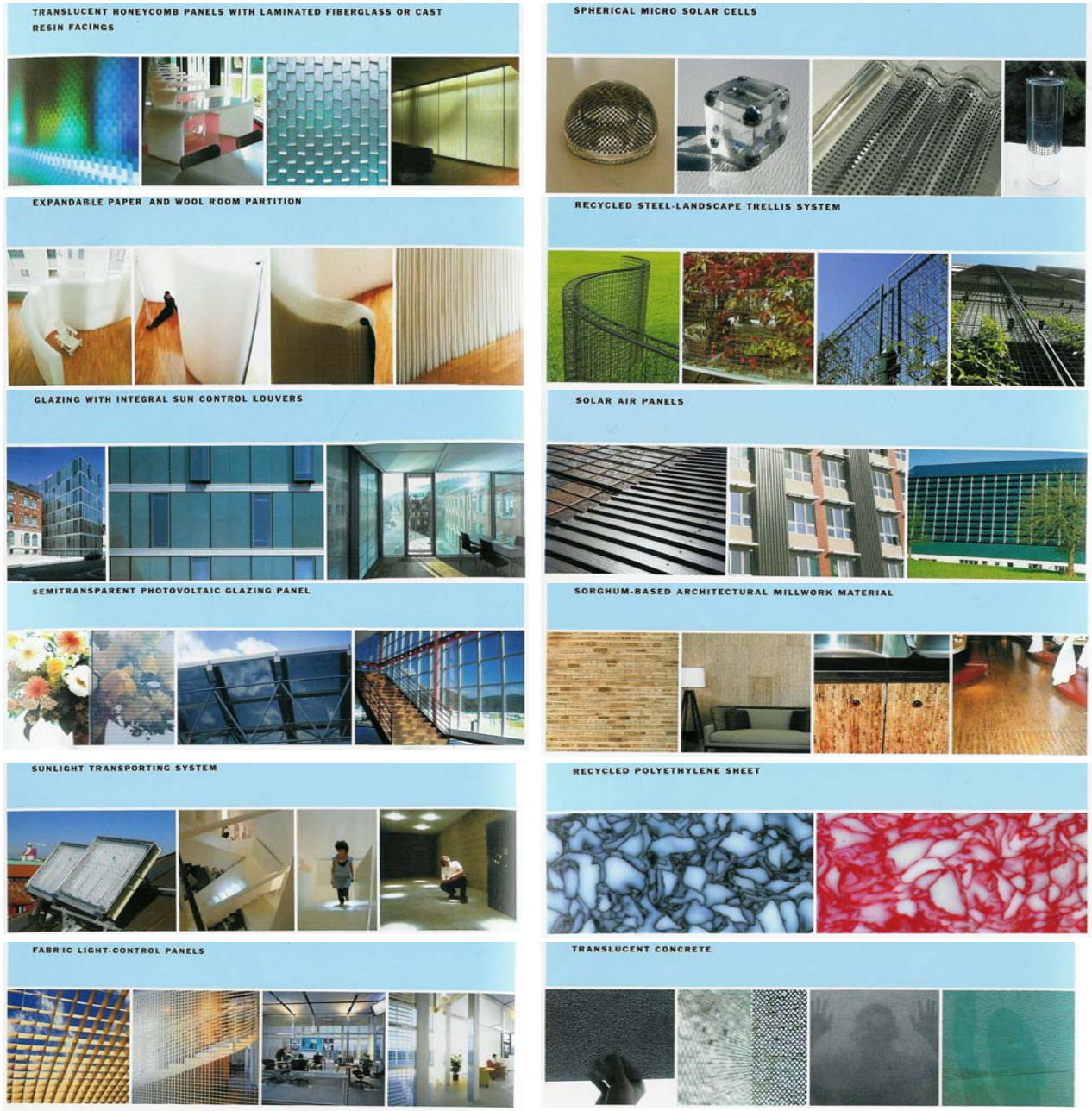
4. Scalability and Adaptability

   Design from single house to community scale / adaptable to multiple climates and contexts

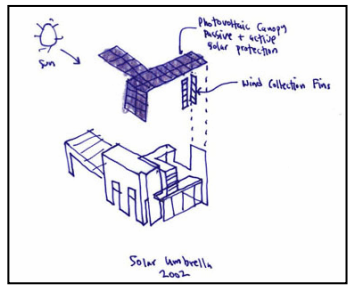
Materials

Products

Industrial Collaborations



Schedule

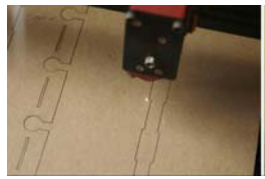


Spring 2006

Research / brainstorm / concept design / model/ analysis/ sponsorship……..

Fall 2006

Prototype and test systems, materials and components……..



Spring 2007

Fabricate full scale……

Summer 2007

Transport……

Sept 2007

Assemble……

Sept 2007

Exhibit……

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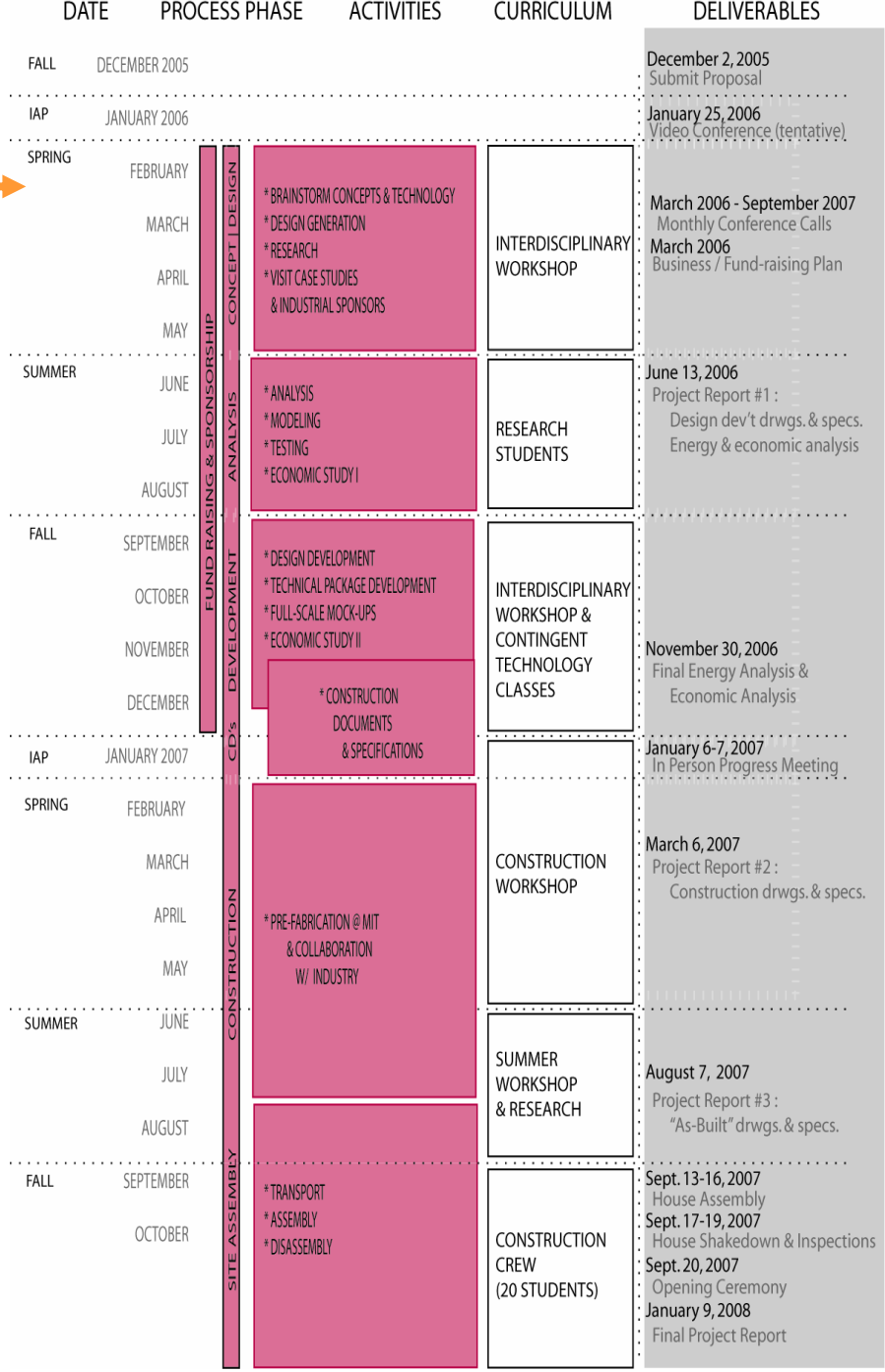
Oct 2007

Disassemble/ transport and re-assemble


DATE
PROCESS PHASE
ACTIVITIES
CURRICULUM
DELIVERABLES
FALL
DECEMBER 2005
December 2, 2005
Submit Proposal
IAP
JANUARY 2006
January 25, 2006
Video Conference (tentative)
SPRING
FEBRUARY
MARCH
APRIL
MAY
FUND RAISING & SPONSORSHIP
CONCEPT | DESIGN
* BRAINSTORM CONCEPTS & TECHNOLOGY
* DESIGN GENERATION
* RESEARCH
* VISIT CASE STUDIES
& INDUSTRIAL SPONSORS
INTERDISCIPLINARY WORKSHOP
March 2006 - September 2007
Monthly Conference Calls
March 2006
Business / Fund-raising Plan
SUMMER
JUNE
JULY
AUGUST
ANALYSIS
* ANALYSIS
* MODELING
* TESTING
* ECONOMIC STUDY I
RESEARCH STUDENTS
June 13, 2006
Project Report #1 :
Design dev't drwgs. & specs.
Energy & economic analysis
FALL
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
DEVELOPMENT
* DESIGN DEVELOPMENT
* TECHNICAL PACKAGE DEVELOPMENT
* FULL-SCALE MOCK-UPS
* ECONOMIC STUDY II
INTERDISCIPLINARY WORKSHOP & CONTINGENT TECHNOLOGY CLASSES
November 30, 2006
Final Energy Analysis &
Economic Analysis
CD's
* CONSTRUCTION DOCUMENTS & SPECIFICATIONS
IAP
JANUARY 2007
January 6-7, 2007
In Person Progress Meeting
SPRING
FEBRUARY
MARCH
APRIL
MAY
CONSTRUCTION
* PRE-FABRICATION @ MIT & COLLABORATION W/ INDUSTRY
CONSTRUCTION WORKSHOP
March 6, 2007
Project Report #2 :
Construction drwgs. & specs.
SUMMER
JUNE
JULY
AUGUST
SUMMER WORKSHOP & RESEARCH
August 7, 2007
Project Report #3 :
"As-Built" drwgs. & specs.
FALL
SEPTEMBER
OCTOBER
SITE ASSEMBLY
* TRANSPORT
* ASSEMBLY
* DISASSEMBLY
CONSTRUCTION CREW (20 STUDENTS)
Sept. 13-16, 2007
House Assembly
Sept. 17-19, 2007
House Shakedown & Inspections
Sept. 20, 2007
Opening Ceremony
January 9, 2008
Final Project Report

> DoE Solar Decathlon site: for all details of past and present Decathlons

http://www.eere.energy.gov/solar_decathlon/

> Yahoo! Group site: for all team communications with the organizers:

MIT team members to sign up individually:

http://groups.yahoo.com/group/SD2007/

Web site development- our portal for the project to the outside world

MIT team site for ongoing graphic and analytical material

COMMUNICATIONS

Funding from DoE ….$100K

workshops / research positions/ travel/ equipment/ materials and prototyping

Additional funding and sponsorship…….$300 – 500K ???

effective organization required

cash works best?

industrial collaborators for materials, products and composite constructions

primary/ secondary/ tertiary/ friends and alumni

SPONSORSHIP + $$$$$

Impossible to satisfy everyone ! But try and be flexible

Signup for preference- we will communicate what works best for the majority of students and the faculty

MEETING TIME

This week:

Register for the class! 4.162

- Familiarize yourself with the Solar Decathlon web site
- Read the Rules and regulations (at least the major elements)
- Read our initial proposal for Solar D. to NREL
- Sign-up for the Yahoo! Group site
- we will email details of Yahoo! and the original MIT proposal
- Show up next week – be ready to work collaboratively

Next week: get started with

>researching past projects- the ins and outs of what happened. Critiquing design and technology integration….including video

>researching the implications, needs and balances of the 10 decathlon criteria

>Energy strategies-

>materials, products and assemblies researching

>house studies: design and research

ASSIGNMENT

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