



## Solar Decathlon

- Collegiate Competition
- 10 Contests
- Design & build solar-powered home
- Blend design and solar production with:
  - Innovation
  - Market potential
  - Water/energy efficiency
- Public tours

## 16 Teams Chosen in 2015 11 Teams Competed in Denver 2017

**Team Alabama:** University of Alabama at Birmingham (Birmingham, Alabama)

**Las Vegas:** University of Nevada, Las Vegas (Las Vegas, Nevada) □

**Maryland:** University of Maryland (College Park, Maryland) □

**Missouri S&T:** Missouri University of Science and Technology (Rolla, Missouri)

**Netherlands:** HU University of Applied Science Utrecht (Utrecht, Netherlands)

**Northwestern:** Northwestern University (Evanston, Illinois)

**Swiss Team:** École Polytechnique Fédérale de Lausanne, School of Engineering and Architecture Fribourg, Geneva University of Art and Design, and the University of Fribourg (Lausanne, Switzerland)

**Team Daytona Beach:** Embry-Riddle Aeronautical University and Daytona State College (Daytona Beach, Florida)

**UC Berkeley/U of Denver:** University of California at Berkeley and University of Denver (Berkeley, California)

**UC Davis:** University of California, Davis (Davis, California)

**Wash U St. Louis:** Washington University (St. Louis, Missouri)

## Decathlon Competition Goals

- Showcase energy-efficient systems
  - Improve comfort
  - Reduce costs
- Demonstrate benefits of off-the-shelf and innovative clean energy solutions
- Workforce development



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## Impact and Visibility

- 90,000 visitors
- 300,000 house tours over 8 days
- 3,000 middle-school and high-school students and teachers
- Millions of readers & viewers in markets across the globe
  - Newspapers
  - Radio
  - TV
  - Web,
  - Social media channels
  - Competition



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## Project Partners

- UAB Facilities
- UAB Academic Programs
  - Engineering
  - Business
- External Sponsors
- UAB University Relations
  - Communications
  - Development
- Volunteers

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## Connections: Facilities, Faculty, and Students

- Engineering Department & Sustainability Program:
  - DOE Application
  - DOE Deliverables
  - Design
  - Fundraising
- Students:
  - Design
  - \*Competition\*
- Facilities:
  - Construction
  - Scheduling
  - Procurement
  - Tradespeople
  - Reassembly

MNL1  
MNL2



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MNL1  
MNL2



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## Slide 11

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**MNL1** Julie, you should be able to replace this video with one that works using the code below. You should have an option to insert video from web function in your PPT version. You'll be using an embed code:  
Merrill, Natalie L, 7/5/2018

**MNL2** EMBED CODE: `<iframe width="560" height="315" src="https://www.youtube.com/embed/3kQeSp7kdFM" frameborder="0" allow="autoplay; encrypted-media" allowfullscreen></iframe>`  
Merrill, Natalie L, 7/5/2018

## Slide 12

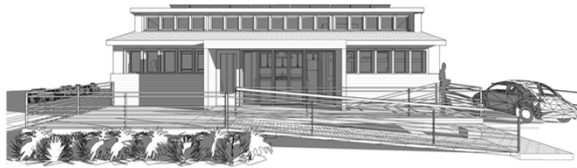
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Merrill, Natalie L, 7/5/2018

## surviv(AL) House: Idea, Design, and Construction

Students and faculty worked to prioritize design elements in collaboration with local architects.



### Traditional Design that Beats the Heat

- Pre-air conditioning design
- Cross ventilation
- Shade/canopies
- Site orientation

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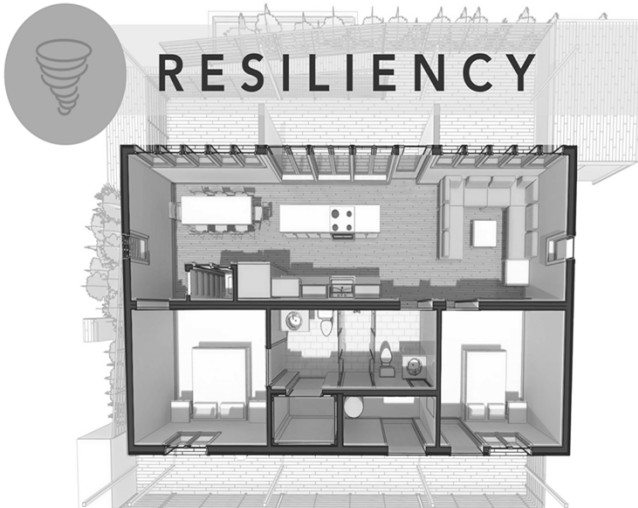
## surviv(AL) House: Idea, Design, and Construction

- Team Alabama's s u r v i v ( A L ) House embodies the irrepressible spirit of Southern communities that have pioneered, adapted, survived and rebuilt.
- Inspired by the devastating impact of the 2011 tornado super outbreak on the region, s u r v i v ( A L ) house serves as a model for sustainable, resilient housing for severe weather prone communities.
- Our house offers "Quick Permanence," a term we use to describe a home that can be quickly rebuilt and assembled to provide comfort, security, and energy independence in the aftermath of a disaster.

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## Extreme Weather

- Alabama struck by more tornadoes than any other state since 1966; 8 tornadoes were EF5



**RESILIENCY**

safe room.  
UAB developed  
tornado panels.  
withstands  
250 mph wind.

surviv(AL)  
[www.uab.edu/solardecathlon/](http://www.uab.edu/solardecathlon/)

## Quick Permanence

- Any GC can build
- Simple designs
- Low-cost building materials



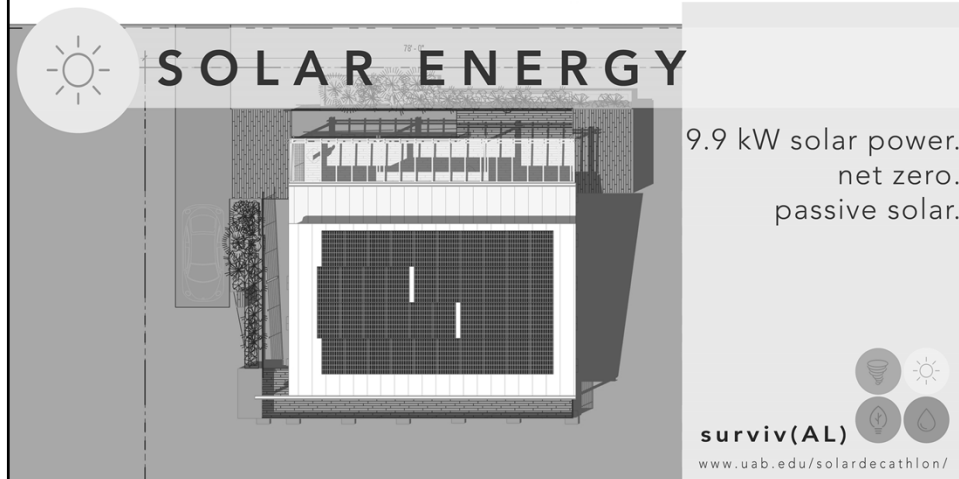
**SUSTAINABILITY**

green materials.  
smart technology.  
efficient spaces.

surviv(AL)  
[www.uab.edu/solardecathlon/](http://www.uab.edu/solardecathlon/)

## Solar Energy plus Tech to Fight Humidity

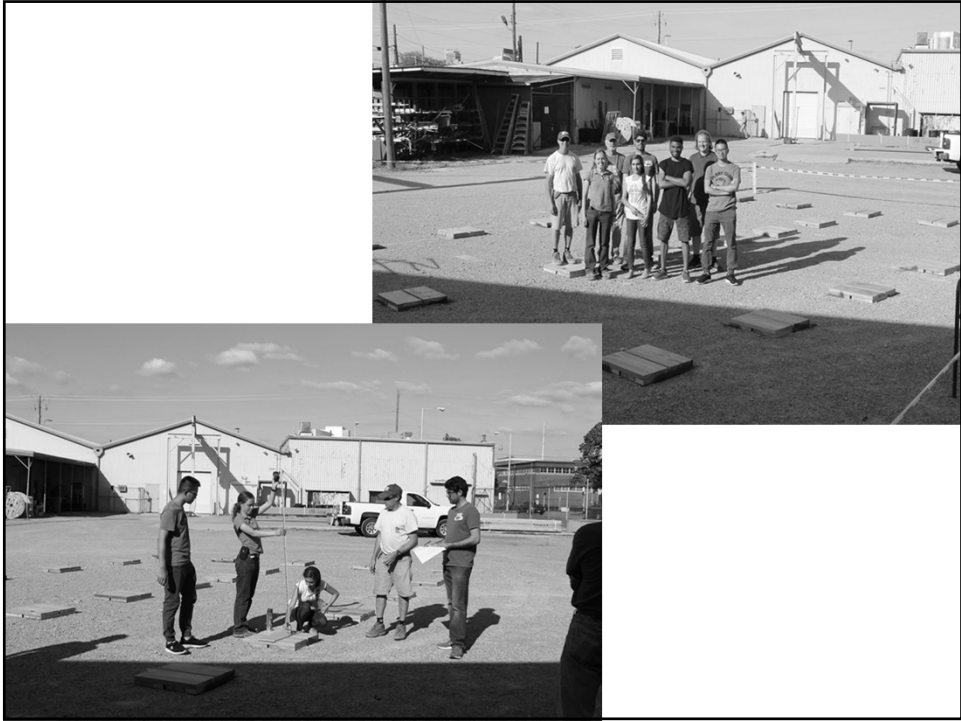
- Liquid desiccant system with solar collector
- Dehumidifies air inside at night
- Recharges material during the day

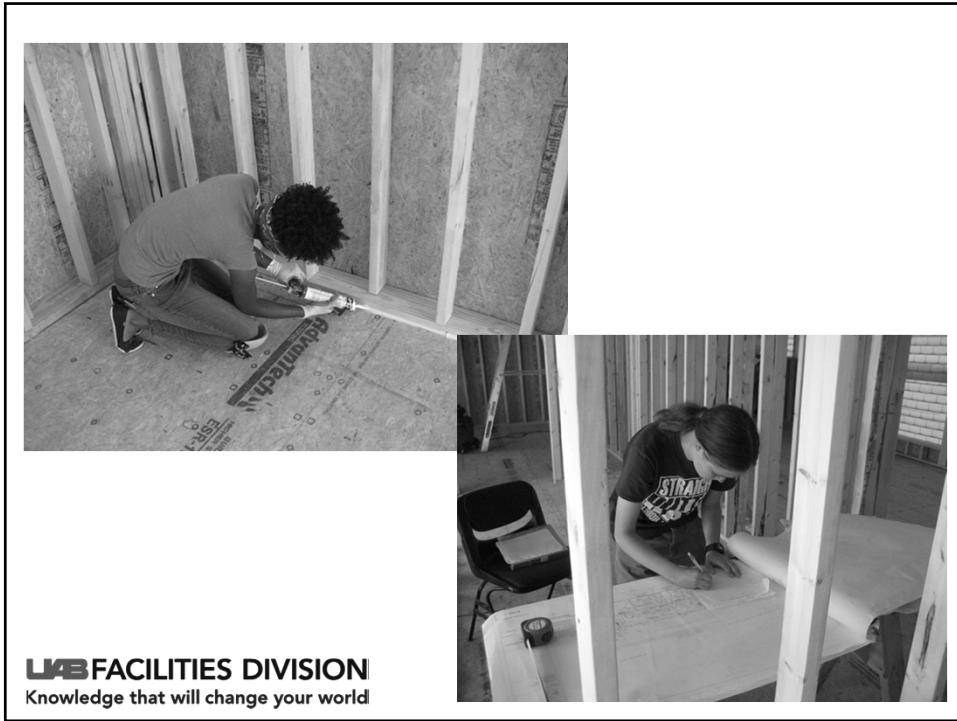


## Breaking Ground



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## Work Break: Eclipse



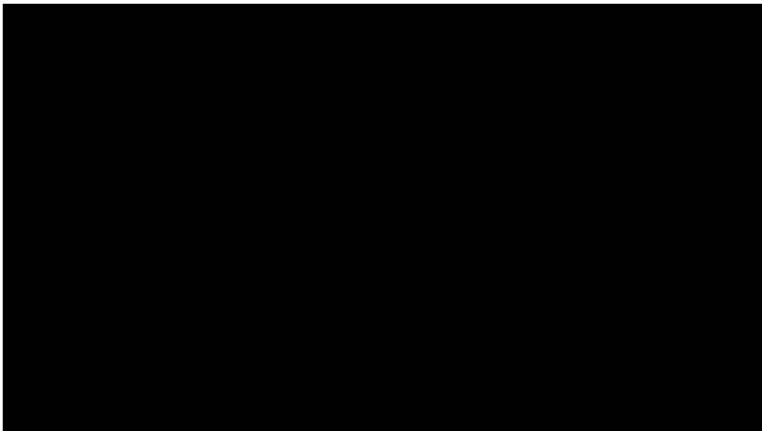




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# Denver or Bust: When the Budget Goes Over

MNL2  
MNL4



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## Slide 26

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**MNL3** AGAIN, you should be able to embed the video with an embed code:

Merrill, Natalie L, 7/5/2018

**MNL4** EMBED CODE: `<iframe width="560" height="315" src="https://www.youtube.com/embed/Bo2c8NiM8T0" frameborder="0" allow="autoplay; encrypted-media" allowfullscreen> </iframe>`

Merrill, Natalie L, 7/5/2018

# Getting There



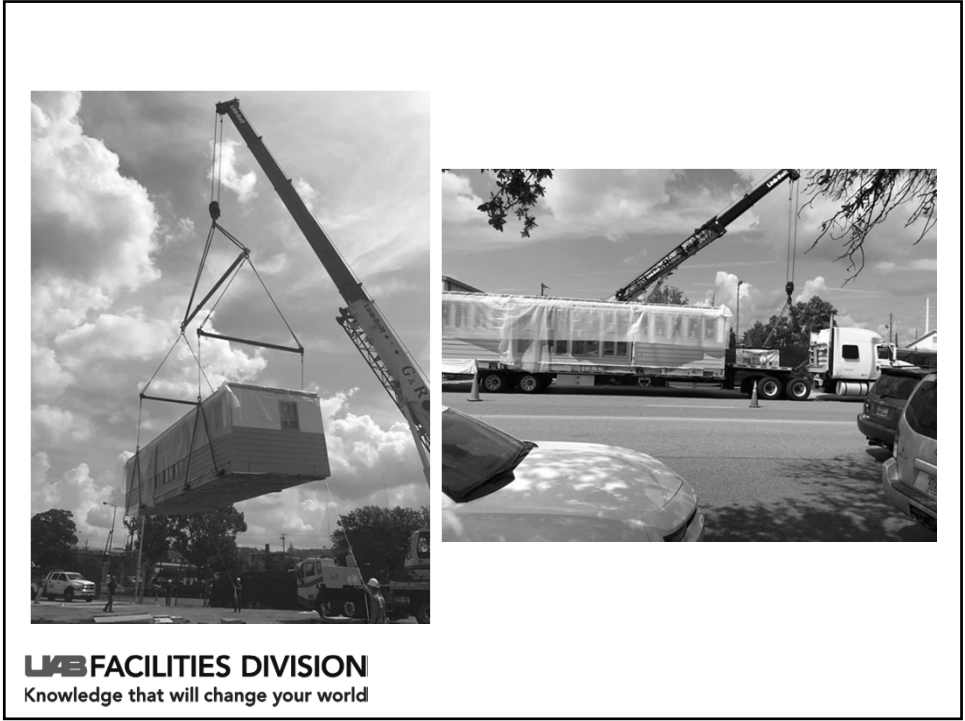
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# Rebuild in Denver: Facilities and Students



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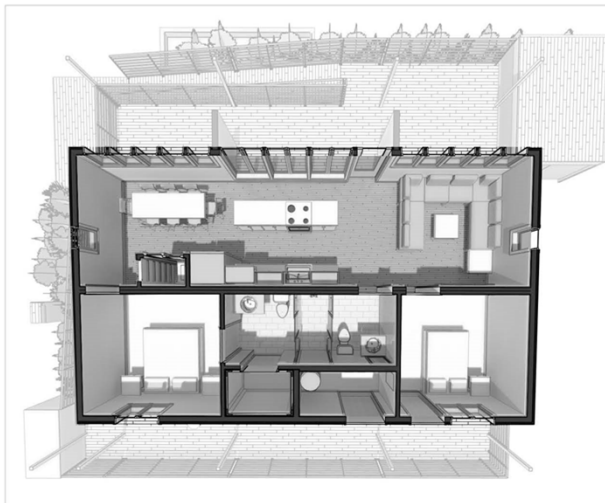
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## Nuts and Bolts: surviv(AL) House Systems



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## Power

- 30 Panasonic panels
- 9.9kW
- High efficiency at high temps
- Solaredge inverter rated at 97.5% efficiency

## Air Conditioning

- Ductless variable refrigerant flow (VRF)
- Heat pump
- Carrier ductless (mini-split) system
- Good zone control & energy efficiency

## ERV

- Panasonic Energy Recovery Ventilator
- Flow based on CO<sub>2</sub> levels

## Controls

- Siemens controls
- LCD monitor
- Lighting
- CO<sub>2</sub>
- Temp/humidity
- Occupancy sensors

## Water Monitoring

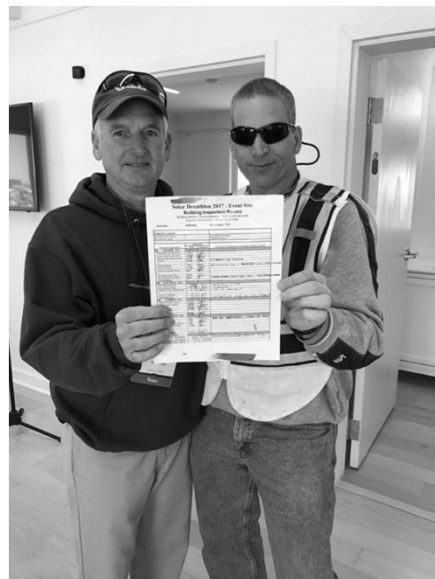
- DriY system from Ark Labs
- Smart water monitoring
- Remote shut off
- Usage data with analytics to alert for anomalies
- App

## Water Reuse

- HVAC condensate to cistern
- Rainwater to cistern
- Both for irrigation

## Inspections

- Foundation
- Ramps & rails
- Finishes & flammability
- Accessibility
- Safety Glazing
- Fire protection
- Electrical
- Utility Connection
- Plumbing
- Mechanical
- Solar



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Competition! Students are all alone....





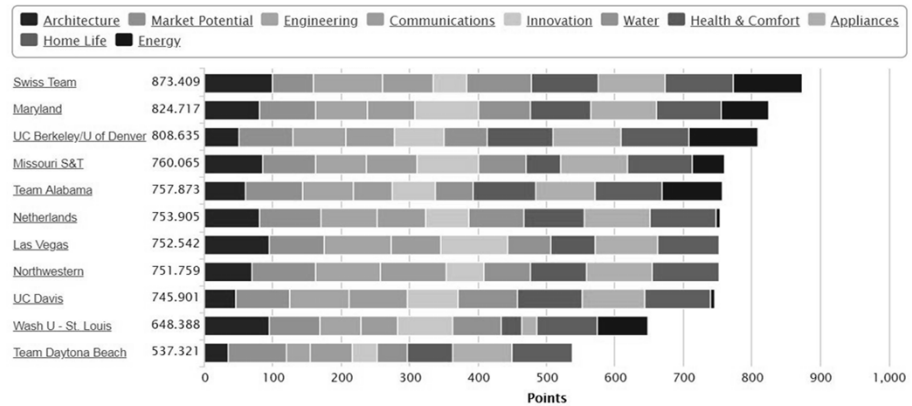
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# Final Score: We Coulda Been a Contender



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## Measured Contests: Third Place



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## Collaboration

- 2 years of consistent partnership between Facilities and academic units
- Community support & education from sponsors and partner firms
- More than 35 Facilities staff and students traveled together to reassemble the house, compete, and disassemble
  - Offered insight into what each group faces in their daily work
- All skills were incorporated to produce a prize-winning project!



## Learning Outcomes

- Students connected academic learning to real-world applications
- Facilities staff learned about new tech and how to use their knowledge to implement
- Students gained workforce development skills in construction, energy mgmt., and project mgmt.
- Both academic and Facilities leadership gained experience in funding and effort reporting for shared projects in the future

## What's Next: Urban Multisource Microgrid

- Decathlon house with 3 microhomes in remote microgrid with energy storage
- Research, teaching, community education
- Students: Facilities Decathlon Fellows



**FAN THE FLAME**

**I ♥ UAB**  
#heartuab

**THANK YOU!**



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