Where to begin

What is the Solar Decathlon?

The U.S. Department of Energy Solar Decathlon is an international competition that challenges 16 collegiate teams to design, build, and operate the most attractive, effective, and energy-efficient solar-powered house.

Project Details

- **Project Background**
  - Team Las Vegas project proposal summary

- **Project Goals**
  - What we wish to accomplish

- **Client Profile**
  - Target market for independent living

- **Design Methods**
  - How we will accomplish our design

- **Future of the Home**
  - Potentialities for continuing research
Who is involved?

Solar Decathlon is an interdisciplinary effort

Three areas of expertise are joining to design a smart-home for active aging.

- **Interior Architecture + Design**
  Architecture
  School of Architecture

- **Computer Science, Electrical, Mechanical, Civil**
  College of Engineering

- **Physical therapy, Nutrition, Diagnostic Sciences**
  Division of Health Sciences
Project process

How does it all come together?

There are often many communication challenges that must be considered.....

To accelerate the delivery of a design-build project, the team must maximize collaboration and minimize coordination time. Key decision-makers across design and construction teams need to be involved in key project design decisions from the beginning of the design development and construction document phases.
Projected schedule

1. Predesign
2. Schematic Design
3. Design Development
4. Construction Documentation
5. Bidding/Negotiation
6. Construction Administration
7. Project Closeout/Future of the home
The objective for the home refocuses on an individual. Quality of life is at the forefront of its concept. Through the use of home automation and informed design strategies, the future begins with caring now.
Design methods
How we will accomplish our design?

1 facilitating orientation Priming the user with appropriate visibility through fenestrations of the building is a primary component to facilitate orientation.

2 autonomy The project allows for autonomy in spaces where mobility may be most difficult for an older person, such as the kitchen, bath, and living space.

3 intellectual + sensory-stimulation The design provides spaces for multipurpose activities and consequently a sense of novelty and variety throughout the day. It is a high priority to create variety in multipurpose spaces, as it is a form of intellectual and sensory stimulation.

4 providing a safe and secure environment The interior environment is nestled within a sequence of transparent and opaque partitions to create a comfortable enclosure for privacy and security. These partitions are rhythmic in material to allow for transparency and privacy in

5 balance between private and social spaces The home is divided into social and private modules. Both modules allow for generous outdoor exposure and semi-visibility to the adjacent spaces to retain way-finding abilities.

Principles of aging-in-place design
The design of the interior environment and architecture consists of several principles in which evidence-based design research comes to fruition. Environments which integrate proper orientation for the user, behave autonomously in daily activities, provide intellectual and sensory stimulation, security, and balance private and social spaces are ideal for the aging individual. These principles create interior environments for true independent living and successful aging.
Design methods

Circulation + Integrated systems

Circulation
- primary
- secondary
- tertiary

Integrated Systems

01 Automated drip irrigation
- maximizes water efficiency
- ease of plant care

02 Master security system
- centralized hub for smart lock control

03 Automated smart locks
- added security
- ease of nightly lock up

04 Learning thermostat
- central location
- adjusts to user patterns

05 Floor & roof sensors
- sense activity & heart rate
- Fall detection

06 Health monitoring systems
- additional devices as required

07 Smart TV
- displays collected data

08 Smart appliances
- increased level of efficiency

09 Biometric sample analysis
- health monitored by retrieval of samples

10 Sleep monitoring sensor
- track respiration & sleep cycle
Design methods

Floor Plan

Project Program

01............................entry  61 SF
02............................living  154 SF
03............................dining  176 SF
04..........................kitchen  154 SF
05...............................hall  141 SF
06............................bath  82 SF
07.............................bed  167 SF
08............................mech  29 SF

= 964 SF
Client profile

How do we define our target market?
Due to home-automation, we must define the exact role of the care giver

**Care Giver:** An individual whose assistance complements the tasks accomplished through the use of the suggested home automation to aide in potential levels of necessary care.

**Care Recipient**
- **Level 1:** No Assistant
- **Level 2:** Low Level assistance (Cleaning)
- **Level 3:** Medium Level Assistance (Food and Hygiene)
- **Level 4:** High Level of Assistance (Constant Monitoring and Care)

Environmental/Behavioral Intent

Physical health - facilitating food preparation to allow for better eating habits
Social health - facilitate an opportunity to entertain and communicate freely with others in adjacent spaces
Intellectual health - Aide cognition in processing spatial information by providing spatial/visual cues

Design Response

- Contrast between horizontal and vertical planes
- Open and close storage/storage solutions
- Natural materials
- Appropriate lighting conditions
- Avoiding reflective surfaces to reduce possible glare situations

Activities

Primary: Food prep
Secondary: Entertainment

Ambient Environment

- Air quality
- Light quality
- Acoustical quality

Code and Agency Requirements

- Fair Housing Act
- American with Disabilities Act
- International Building Code
- International Residential Code
- Solar Decathlon regulations

Safety and Security

- Integrated home-automation to detect falls
- Fire protection

Users

- Residents
- Care giver

Surfaces

- Stone counter-tops
- Least reflective surfaces as possible

Furnishings

- Seating selection must accommodate ADA
- Wide seating (21”)
- Arm chairs are preferred for ease of movement

Special Requirements & Equipment

- Induction cook top
- Side swing wall mounted oven
- Motion sensor kitchen faucet
- Apron sink
- Standalone fridge w/ bottom freezer
- Dishwasher (must hold set for 8 dinner ware)

Adjacencies

Must be near mechanical/plumbing component
Major: Dining
Minor: Living, Bathroom

Potential Design Configurations

Location
Q + A