Solar Decathlon Smart Home Control

User Manual

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App Information

Summary

The Solar Decathlon Smart Home Control app provides a monitoring and control system for Clemson's entry into the U.S. Department of Energy's Solar Decathlon for 2015. The home is equipped with multiple sensors that have access to a computer within the house. The computer stores information about the house for users of the home control app.

The app allows for two kinds of users: standard viewers and administrators. The user experience of these two kinds of users is similar with a couple differences. When either user opens the app, he is displayed a dashboard-style overview of the current status of the house. This view is able to show statistics at glance as well as the preferred value for that data type. For example, if the preferred temperature in the house is 70, and the current temperature is 75, the dashboard shows the user that the temperature is in excess of the preferred.

The dashboard is structured in a tiled format. When any kind of user taps on a tile for a specific kind of statistic, the app displays a detailed view of that statistic. This view includes a larger display of current status alongside the preferred status of the specific sensor. Also, on this screen will be the chart view of the statistic. This is where the summarized statistics will become useful. The user will be able to chart trends over the past few hours, days, weeks, or months.

The usefulness of these kinds of trends is endless. In a world where energy consumption has been becoming a larger concern by the year, it is important for people to know where they are overconsuming, and where they can cut back. It is very exciting to think of the possibilities of this.

Not just any user could modify the house. This would be a detrimental thing in the case of a temporary home for a contest or a permanent home. In a contest home, if any user touring the house could modify the optimal temperature, lighting controls, or other critical systems in the house, it could become complicated with multiple users. In a permanent home setting, this would be more of a security concern than anything. If someone from outside the home could turn off lights, motion sensors, or other security devices, it would open the home up for crime. This kind of modification has been limited to logged-in admins.

Types of information supported

This app hosts a lot of different information, and can be confusing to some. This section intends on explaining some of these in more detail, to alleviate any confusion!

Temperature: This app measures temperature in degrees fahrenheit.

Humidity: This is the water content in the air, or how "damp" the air feels. In humid environments, you're likely to sweat or feel warmer. This is measured by what percentage of the air is water vapor. 0% means there is no water vapor in the room. 80% means there is a lot.

Energy consumption: kWh stands for Kilowatt-Hours. This is a measure for how much power is consumed. The average American household consumes 903 kWh of energy per month.

Water consumption: The Gallon is the imperial measure of liquids. The Gallon is just over 1.75 Liters.

CO2: This is the chemical symbol for Carbon Dioxide, which is very dangerous in high amounts.

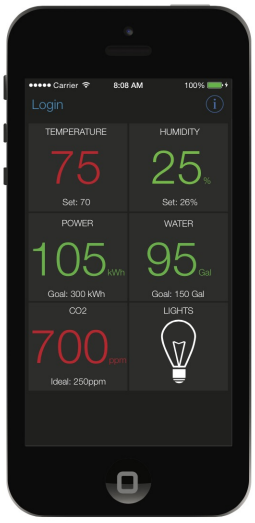
CO2 content: ppm stands for parts per million. This is the amount of CO2 particles there are in a total of 1 million particles. Outside, the CO2 content is generally 350-400ppm. This can be higher in urban areas. The accepted safe level for an 8-hour period is 10,000ppm and 30,000ppm for a 15-minute period.

Light intensity: This ranges from 0-100%. 0% means a light is off, and 100% means the light is as bright as it can get. 50% is half brightness of a light, etc.

Navigating The App

The Dashboard

The dashboard is the first thing shown when the app loads. This view displays information about the current state of the house.



Tapping “Login” will open the login page for admins.
Tapping the info button will show more info about the project.

Tapping a number block will show more details about whatever kind of block you tap.

Tapping the light block, will show more information about which lights are on and off

The Detailed View

This view shows the current and optimal levels of a specific statistic, along with trends of it. Users are brought here when tapping a number block on the dashboard.

Tapping the info button shows more about what the stat means.

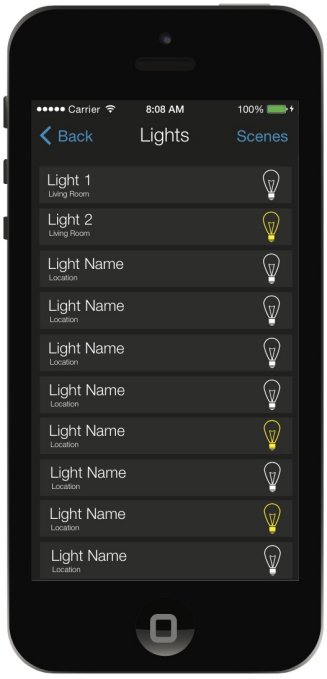
The large number is the current state inside the house.

The small number is the optimal or desired “set” value.

This chart shows the change over time. Swipe left or right to change time periods the statistic is charted over.

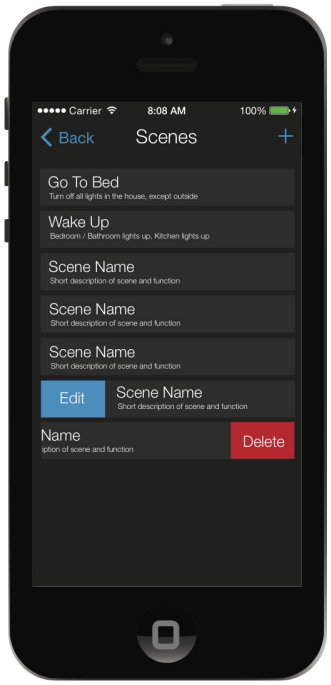
The Lighting View

This view shows the status of each individual light in the house. The user gets here by tapping the light block in the dashboard.



Tapping the scenes button will show a list of preset lighting scenes that can be toggled.

Tapping on a light will toggle its state. If it is off, it will turn on, and vise versa.



Tapping the + will create a new scene.

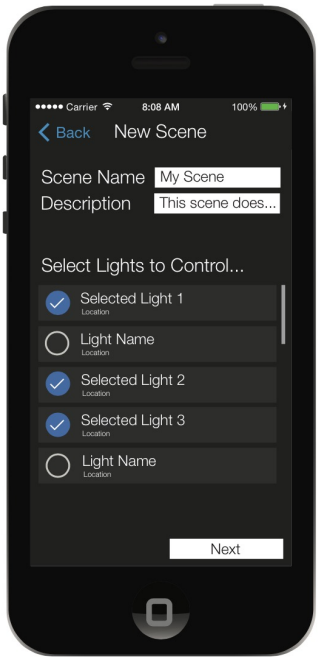
Tapping an individual scene will toggle it on/off.

Swipe right on a scene to edit it. Swipe left to delete it.

Using The App

Creating a New Scene

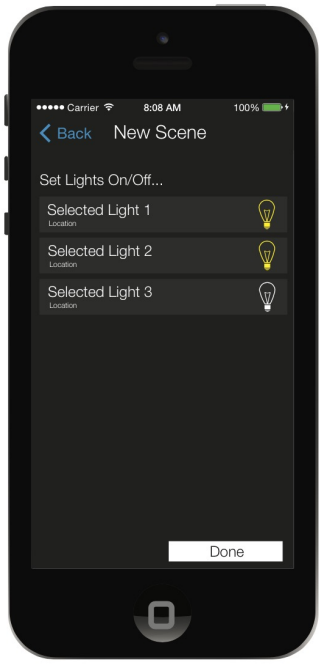
Creating a new scene is a two step process. First, you much choose which lights to control. Then you must select how you want that light to act when the scene is toggled.



The scene name and description can be anything you want, however the name cannot be blank.

Check the lights that you want the scene to affect by checking them

Go to the next step in creating the scene



This is the value that the light will be set to when the scene is toggled. Tap to toggle. The default is off.

Logging In

By default, a user does not have the ability to change things about the house, including changing lighting, thermostat, etc. Logging in as an admin is the only way this is possible.

From the dashboard, click the “Login” button at the top.

You will be taken to the login page where, if you already have an account, you can login. If you do not have an account already, you must choose the new user option after entering a username and password*.

*Note: This does not automatically make you an admin. You must be approved first.

Changing Optimal Values

When a you want to change the optimal value of a value, you must go to the dashboard and tap the value you want to change. The detailed view of that statistic will then be shown.

If the view does not look like the image to the left, you are not logged in with admin privileges (see “Logging In” above).

Use the + and - buttons to change the optimal temperature.

Warning: This will change the optimal value for all users of the app and in the home itself.

FAQ (Frequently Asked Questions)

Q: I cannot change anything within the home.
A: You must be logged in with admin rights to change optimal values of the home.

Q: I have logged in, but cannot change anything within the home.
A: Logging in does not automatically give you admin rights. You must be approved first.

Q: The app is not displaying up to date information.
A: Make sure you have a connection to the internet. Without a valid internet connection the app will only display the last known state of the sensors and back.

Q: I cannot create light scenes or add light bulbs.
A: You need admin capabilities.

Q: My CO_2 ppm number is showing red, what should I do?
A: A pop up message should have gave you instructions to prevent injury to you or your family. If you cannot see those tips now, we recommend that you:

1. Open windows and doors to air out the building.
2. Turn AC on to create air flow in the building
3. If the CO_2 number turns back to red after the building has been successfully aired out, call emergency services to help find the leak.
   Do not re-enter the building until the number returns green.

Q: I have changed a value for the home and shortly after it changed to something else.
A: Another admin is controlling the house after you.