# GUI & mServer

Updated Oct. 12th, 2009

Description of Operation

The GUI is divided into two main components: the Controls interfaces which run on the integrated touch panels located in the Kitchen backsplash and at the North and East entries, and the web application that is accessible via any internet-connected computer or mobile device (with a tailored version for the iPhone/iPod Touch).

The Controls interfaces allow control of the following house subsystems:
- Lights
  - All interior and exterior house lighting can be controlled.
    - An exception is the Bathroom lighting, which is controlled by physical switches and a motion sensor in the Bathroom.
  - Lights can either be toggled ON/OFF or dimmed at 5% increments, depending on physical hardware.
  - Ambient Canvas can be turned ON or OFF.
- Exterior Shades
  - Extension of all exterior shades can be controlled.
    - Can be done on an ALL, façade (W, SW, SE, E), or individual shade basis.
  - Tilt of all exterior shades can be controlled.
    - Tilt presets are at 55°, 90°, 125°, and 160° for the lower section and 55°, 90°, 125°, and 140° for the upper section (see diagram below).

Exterior Shade Tilt Angles
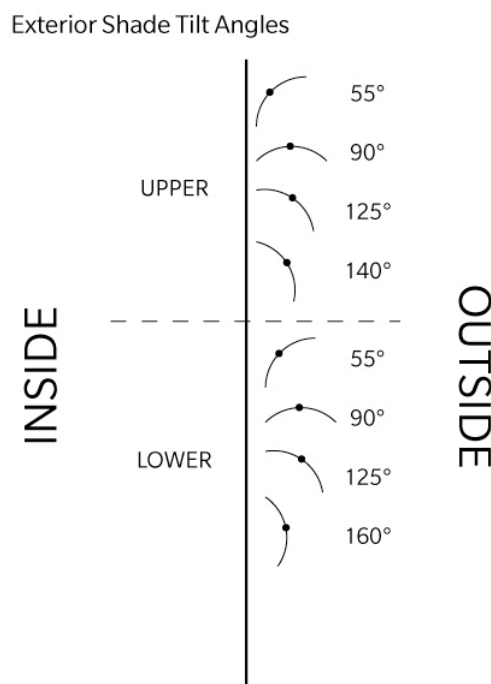
- Can be set independently for upper and lower stages of each shade.
- Can be done on an ALL, façade (W, SW, SE, E), or individual shade basis.
- Interior Blinds
  - Extension of all interior blinds can be controlled.
    - Can be done on an ALL, façade (W, S, E), or individual shade basis.
- HVAC
  - Temperature setpoint can be set at 0.5º C increments. Setting a temperature assigns the heat and cool setpoints to 1º C below and above the setpoint, respectively.
  - Relative humidity setpoint can be set at 0.5% increments. Setting a relative humidity assigns the high and low setpoints to 7.5% above and below the setpoint, respectively.
  - Ventilation Boost can be turned ON or OFF.
- Bed
  - Can be raised or lowered. Requires anchors be removed for operation.
- Modes
  - Modes are sets of house settings that can be triggered simultaneously as a 'preset.'
  - Triggering a mode assigns values for each control and triggers commands for all subsystems.
- Optimization
  - The house can be set to Optimized to return control over house subsystems to CHAS (for HVAC and exterior shading).

The web application provides the following sections:
- Overview
  - Landing page.
  - Today's electrical and water use.
  - Progress toward monthly challenge.
- Resource Use
  - Provides access to house data through a graphing interface (Pulse Energy client).
- House Settings
  - Preset configuration.
  - Mode scheduling.
- Community Network
  - Compare performance with other households.
  - Monitor progress toward goals.
  - Join challenges.
  - Read and share tips.
- Application Preferences
  - Set Units and other application preferences.
- Notifications (alerts), Weather Forecast, and System Details can be accessed from any page of the GUI through the overlay window links in the Menu bar.

Hardware Installation and Setup

The touch panels in the house need to be installed as follows:
- IEI 17" Touch Panel embedded in Kitchen backsplash, to left of Ambient Canvas.

- Borg 8" Touch Panel embedded at North Entry.
- Borg 8" Touch Panel embedded at East Entry.

Each panel requires power and an Ethernet connection. All panels will need to be left on continuously, though monitors can be set to Energy Saver mode. If energy conservation is a concern, the 8" panels at the entries can be powered off. However, the 17" panel is running mControl, mServer, and the web application, and so will need to be running continuously. For power use specifications for the 17" panel, see http://www.logicsupply.com/products/sysafl17atom. Available data shows the central panel consuming about 74 W and the Borg displays about 5 W each during use, for a combined baseline of approximately 84W.

Auxiliary Devices Installation and Setup

All house subsystems (lighting, shades, blinds, HVAC, bed) must be installed and powered for the Controls GUI to be able to successfully send commands to them.

mControl and mServer must be installed and running on the 17" Touch Panel for the Controls GUI to interface with the hardware, and to request data from dataloggers and sensors to display in the web application.

An active internet connection is needed for the following:
- enable remote access to the web application
- provide weather forecast information to residents through the web application GUI
- update the local copy of the application from the remote SVN repository
- read/write to Pulse Energy server

A local network is needed to enable communication between the three touch panels. This requires a router be configured to allow connections from each.
- see Rob MacKenzie or Chris Brandson for details on this.
- Current configuration of IP addresses on the local network is as follows:

Central Panel: 192.168.1.50
North Panel: 192.168.1.51
East Panel: 192.168.1.52

Software Installation and Setup

The web application and Controls GUI are implemented with the following technologies:
- Ruby (programming language)
- Ruby on Rails (web development framework)
- XHTML (markup language)
- CSS (styling language)
- JavaScript (scripting language)
- Prototype / Scriptaculous (JavaScript libraries)
- JQuery (JavaScript library)
- Pulse Energy (Flex client)
- SOAP (web services)

- Mongrel (Rails server)
- Juggernaut (Flash/Ruby push server)
- Subversion (version control system)

All software is installed on the touch panel. Setup , updates, and launch should be done in the following order:

0. Hardware Initialization

All hardware should be set to the following initialization configuration:
- All lights turned to OFF / 0%.
- All Interior Blinds fully retracted.
- All Exterior Shades fully retracted.
- All Exterior Shades set to 90° tilt.
- HVAC set to 23.0° C, 47.5% humidity, and Ventilation OFF.

This initialization sequence needs to be discussed further amongst the GUI, Engineering, and CHAS teams, including planning of when it will be run (once, daily, on crash, etc). This is just a first pass.

1. mServer
- Double-click mControl Service Manager (on Desktop, or Start > All Programs > mControl > mControl Service Manager)
- If not already running, click the Start button in the top left of the interface
- See **Troubleshooting** for information on restarting mServer in the event of a crash.

2. Device ID Configuration

Device IDs are assigned dynamically on server start in config/initializers/load_device_ids.rb, and do not need to be configured manually. If Devices are added, removed, or reconfigured in mControl, a Rails server restart will retrieve the new/changed IDs automatically (see step 4 below for how to restart server).

However, this process relies on the following Names being assigned to Devices in mControl. These must not be changed in order for the GUI to work, as these names are hardcoded (CASE SENSITIVE):

- interior_blinds
- exterior_shades
- ambient_canvas
- lights_dining
- lights_lounge
- lights_sleeping
- lights_kitchen
- lights_counter
- lights_entry
- lights_ext_entry
- lights_landscape
- T_HEAT_SETPOINT
- T_COOL_SETPOINT
- RH_HIGH_SETPOINT

- RH_LOW_SETPOINT
- VENT_REQUESTED
- BED

3. Version Control (SVN)

To update the local copy of the web application and controls GUI to the most up-to-date version in the repository, do the following:
- Double-click the solarGUI shortcut (on Desktop, or navigate to C:\Documents and Settings\Administrator\solarGUI\trunk\GUI)
- Right-click the "app" folder
- Select SVN Update
- Press OK on the resulting dialogue
- Right-click the "public" folder
- Select SVN Update
- Press OK on the resulting dialogue
- Note that the Rails Server may need to be restarted after some SVN Update operations are made in order to make the changes active (see below).

Some folders contain files that are unique to the local environment, and should not be updated with SVN update unless you know what you are doing. These include:
- All contents of the config directory (for example, config/environment.rb and config/database.yml).
- Logs do not need to be versioned.
- As outlined above, the 'app' and 'public' folders of the GUI directory are generally all that need to be updated from SVN.

4. Rails Server (Mongrel)

Mongrel is configured as a Windows Service, and should start automatically on system boot. To start or stop the service:
- Click Start > Run…
- Type services.msc
- Find the solarGuiProduction service
- Use the Services panel controls (Start, Stop, Restart), as necessary
- Note that the Rails Server may need to be restarted after some SVN Update operations are made in order to make the changes active. For example, changes to config/devices.yml wil not take effect until the server is restarted.

If the Mongrel Windows Service does not automatically start, Mongrel can be booted manually as follows:
- Open command prompt (Start > Run… > cmd)
- `cd C:\Documents and Settings\Administrator\solarGUI\trunk\GUI`
- `mongrel_rails start –p 80 –e production`
- Command prompt should write out the following:

```
** Starting Mongrel listening at 0.0.0.0:80:
** Starting Rails with production environment...
** Rails loaded.
** Loading and Rails specific GemPlugins
```

```
** Signals ready.  Int => stop <no restart>
** Mongrel 1.1.5 available at 0.0.0.0:80:
** Use CTRL-C to stop
```

- Use CTRL-C to stop (if necessary)
- Terminate batch job (Y/N)? Y

5. Push Server (Juggernaut)

Juggernaut is configured to launch with the Rails Server (step 4 above). It will start and stop with Mongrel, but may disconnect and restart independently. If an Exception is raised and it is disconnected, each client will attempt to reconnect 90 times, at 10 second intervals, and the Rails Server will attempt to relaunch Juggernaut.

To provide connection access to the Borg entry panels, the following may need to be set in config/juggernaut_hosts.yml, where 192.168.1.50 is the IP address of the central panel:

```
:public_host: 192.168.1.50
```

Changing this value will require a server restart (step 4 above).

If Juggernaut does not start automatically, it can be booted manually as follows:

- Open command prompt
- `cd C:\Documents and Settings\Administrator\solarGUI\trunk\GUI`
- `juggernaut -c config\juggernaut.yml`
- Command prompt should write out the following:

```
Starting Juggernaut server 0.5.8 on port: 5001...
```

- Use CTRL-C to stop (if necessary)
- Terminate batch job (Y/N)? Y

6. Web Browser (Firefox)

- Double-click the Central Panel shortcut (on Desktop, or Start > Firefox)
- Addresses are as follows, where 192.168.1.50 is the IP address of the Central Panel on the local network:

- Central Panel (IEI 17")   http://localhost/controls
- North Entry (Borg 8")   http://192.168.1.51/controls/north_entry
- East Entry (Borg 8")   http:// 192.168.1.52/controls/east_entry

- Load North and East Entry panels on the appropriate Borg displays in Kiosk Mode (this should happen automatically on startup of the Borg displays).
- To monitor AJAX calls (to the Push server, for example), and to inspect DOM elements, use Firebug (Firefox plugin):
    o   Click the small Firebug icon in the bottom right of the browser window (on the status bar), or select Tools > Firebug > Open Firebug

- Addresses for the web application are as follows, where 192.168.1.50 is the IP address of the Central Panel on the local network:

- Central Panel (IEI 17")   http://localhost/
- Remote Computer   http://192.168.1.50/
- Mobile (iPhone)   http://192.168.1.50/mobile

7. Monitoring the Logs
To monitor the web application logs in real time, use TailForWin:
- Start > Tail.exe (or shortcut on Desktop)
- File > Open > C:\Documents and Settings\Administrator\solarGUI\trunk\GUI\log\development.log (or production.log if in Production mode).

Troubleshooting

mServer crashes
If mServer crashes, it will pop up a Windows alert that "mserver.exe has crashed." In this situation, no house subsystems are controllable until mServer is relaunched. This can be done with the following steps:

- **RELAUNCH mSERVER:**
- Switch to the mControl Service Manager. If not running, double-click mControl Service Manager (on Desktop, or Start > All Programs > mControl > mControl Service Manager).
- Click Stop if it is already running.
- Click Start to restart (upper left corner, green triangle button). This will trigger a sequence of communication between mServer and the connected hardware devices (exterior shades, lights, etc).
- Wait for 1 ½ to 2 minutes. To monitor communications, view the Server Log tab in mControl Service Manager. It will show a rapid series of exchanges between the hardware devices and the server.
- **TEST mCONTROL EDITOR:**
- Switch to mControl Editor.
- If not connected, click Connect (upper left corner, circular green button).
- Test a light by selecting the Lights section under Zones, then applying "Instant On "to a visible light fixture (such as the Interior Entry or Kitchen lights). If the light comes on, mServer has successfully relaunched.
- **RELAUNCH RAILS SERVICE**
- Switch to the Windows Service Manager. This can be accessed by clicking Start > Run and typing "services.msc".
- In the resulting window, find the service titled solarGuiProduction, and click the Restart button (black square and triangle button in toolbar of Windows Service Manager). A dialog indicating the service is restarting will then be displayed.
- **TEST GUI**
- Switch to Firefox and refresh or load http://localhost/controls (the primary controls view). This will take up to a minute.
- Test a control in the GUI to ensure all systems are communicating successfully.

Pages will not load
Make sure the Mongrel Rails service is running (step 4 above).

Control updates made on one panel are not reflected on the others
Make sure the Juggernaut server is running (step 5 above). You can see if a given client (browser) is connected to the Push server by Refreshing the page, opening Firebug (step 6 above), and waiting for the following message (should appear within 5 seconds) (where 192.168.1.50 is the IP of the central control panel):

`Juggernaut: Connected on 192.168.1.50:5001`

If this fails to appear, restart the Mongrel Rails service (step 2 above), and refresh all connected clients (browsers).

Controls updates are not being sent to hardware
If the UI widgets are working, but commands are not reaching the hardware (shades, for example), make sure the mServer is running (step 1 above) and that the devices are configured correctly (step 2 above).

If these both appear to be working, the commands being sent to the mServer can be monitored in two places: via Firebug (step 4 above) and via the mServer Log (available in the mControl Service Manager). If a command is being sent successfully from the web client to the server, the AJAX calls logged in Firebug will return successfully (200 OK code). If they are being received successfully by mServer, they will appear in the mServer Log within milliseconds of being sent. If this is the case, then the problem exists further down the line (between mServer and the hardware).

If the calls are not being received, the Rails service needs to be restarted. See Step 4 above.

500 error in web browser
These indicate an application error (Ruby on Rails). These can be caused by a syntax/logic error or other application-level exception, or a socket/timeout error caused by the unavailability of a connection (to the Push server or mServer, for example). Try restarting the Mongrel Rails service (step 4 above) and reloading all connected clients. If this fails to address the error, use step 7 above to diagnose the error. Then call Johnny.

404 error in web browser
Make sure the URL you are trying to reach is typed correctly.