

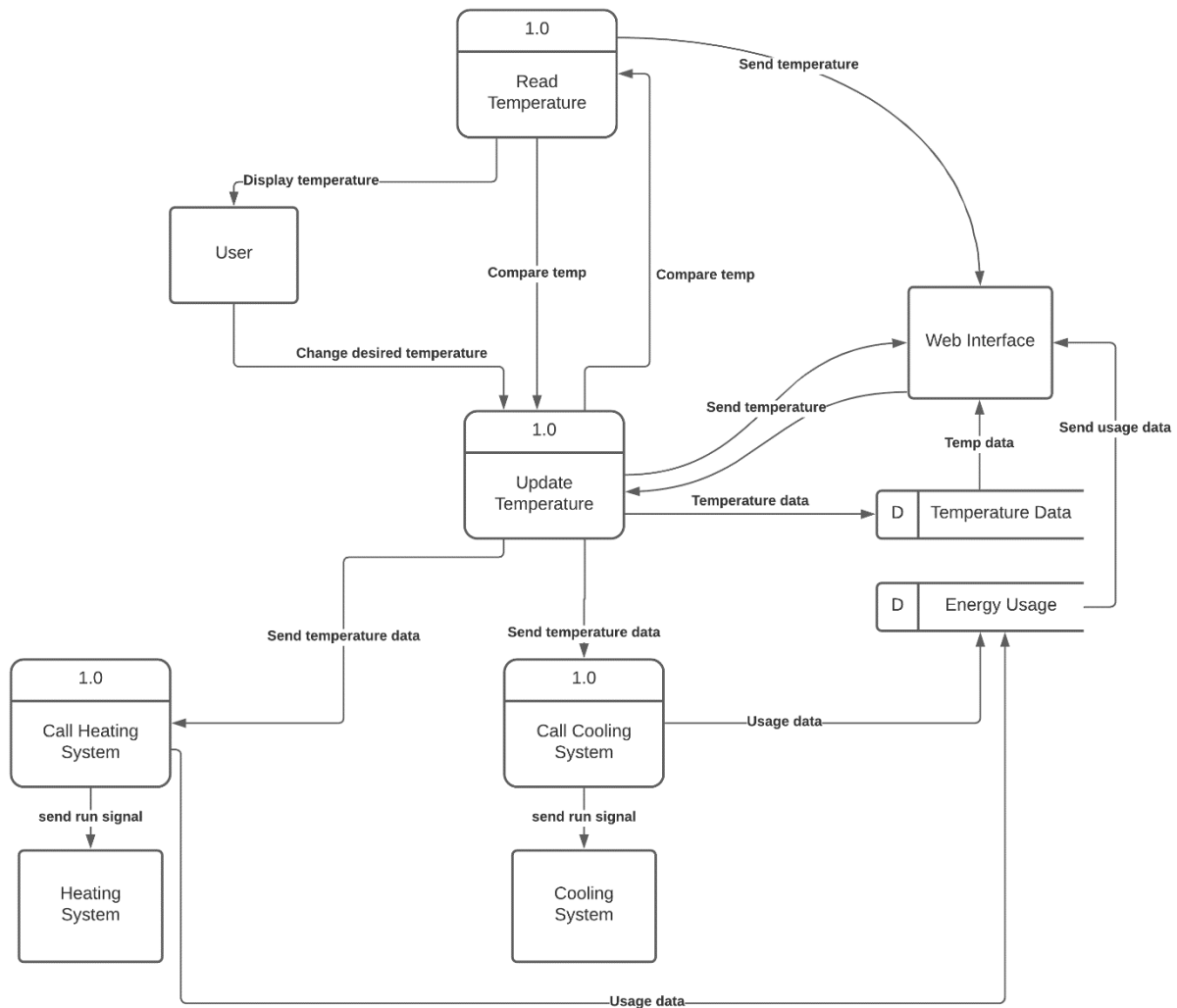
Assignment 3:

Component & User Interface Design

Aaron Kephart

Task 1: Diagrams

Data Flow Diagram

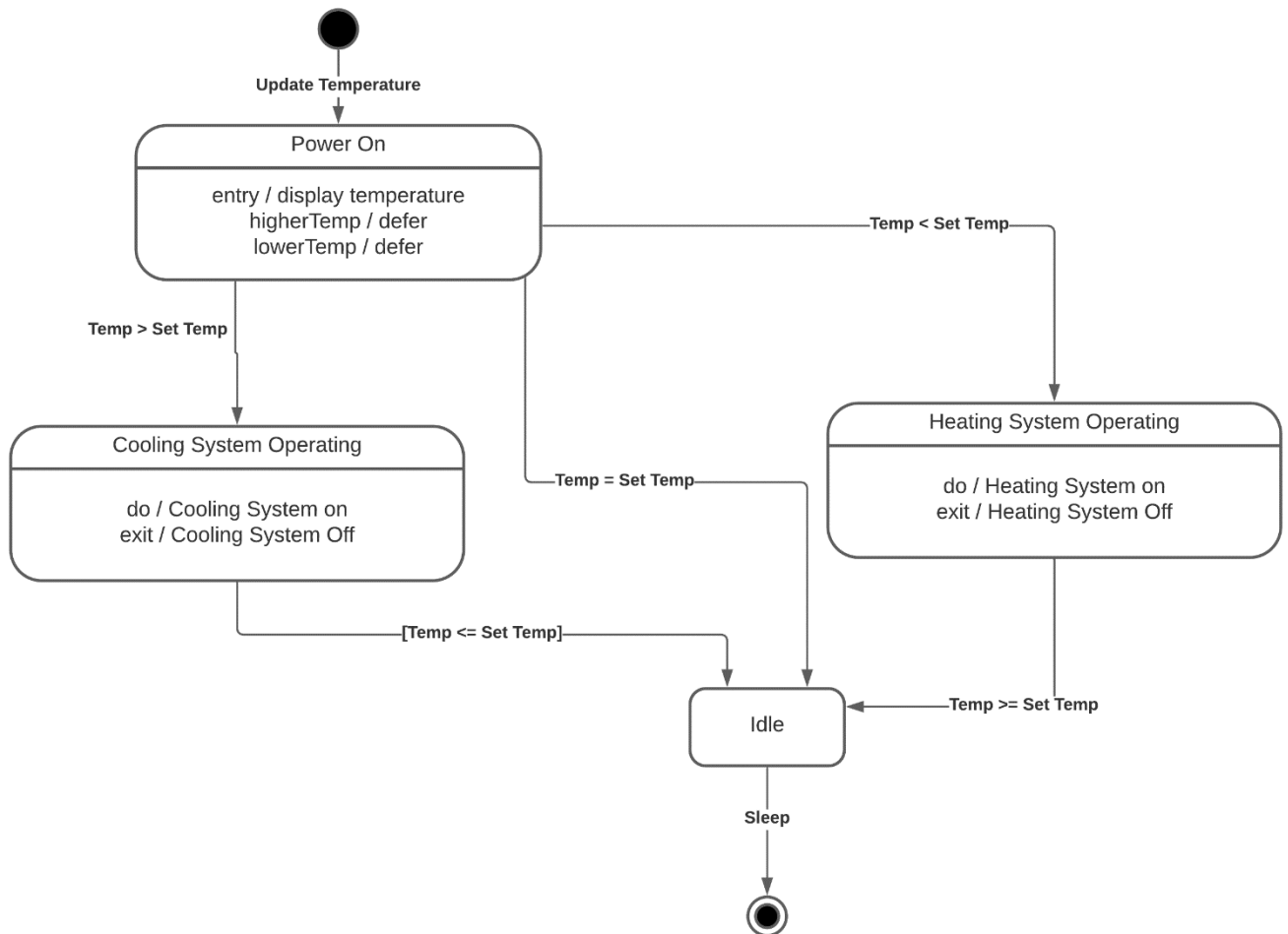


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State Chart

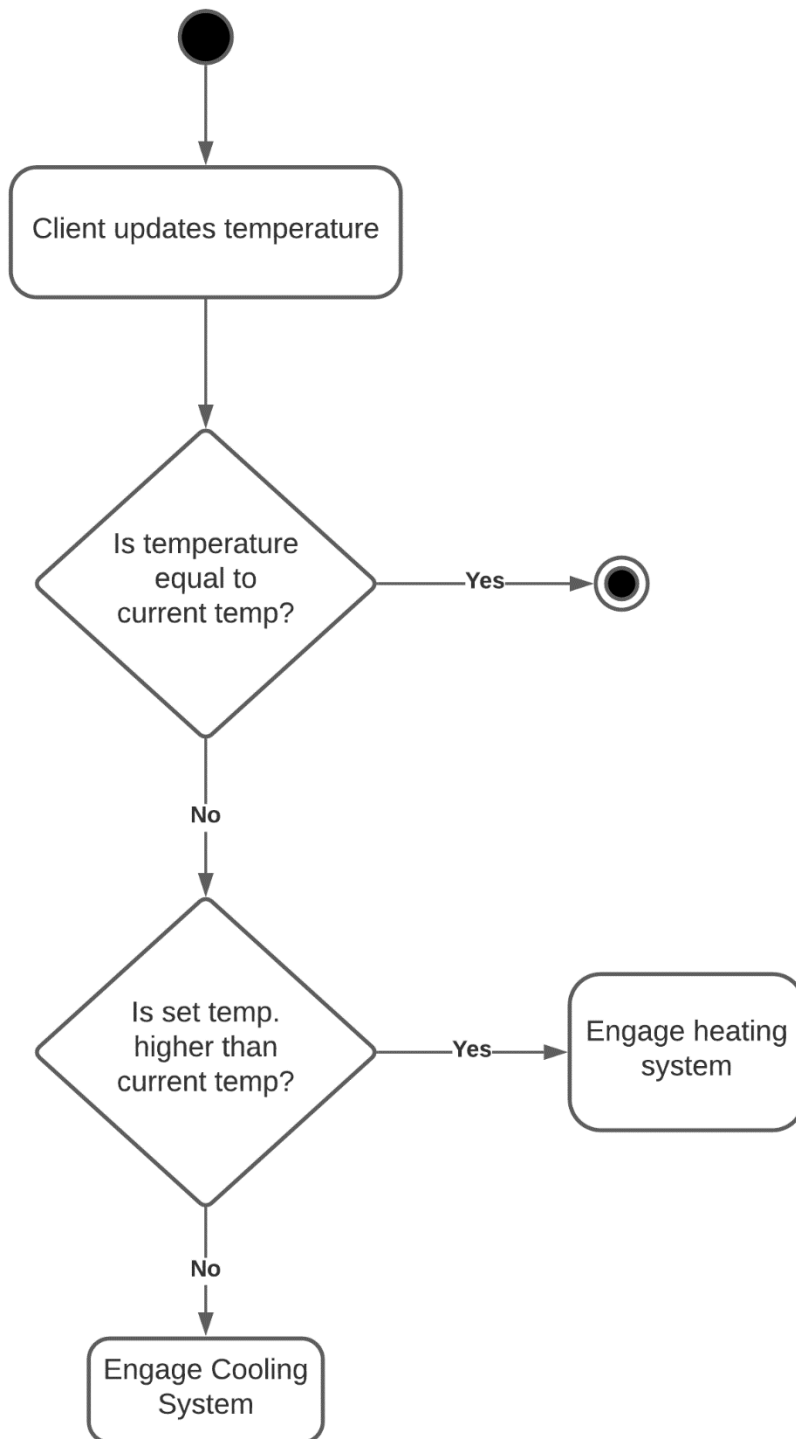


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Activity Diagram



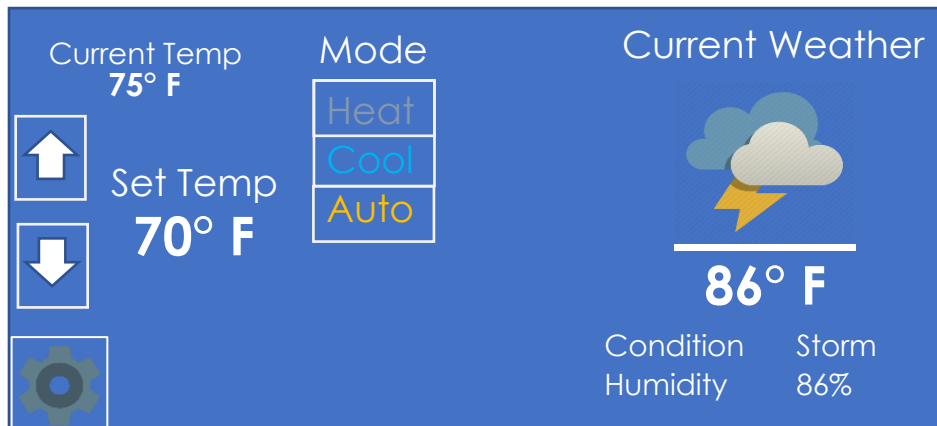
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User Interface

Default display screen (touch screen)



The default display screen displays the current weather outside, which in this instance is displaying that the outside weather is storming, and the current temperature outside is 86 degrees Fahrenheit. In addition, this interface displays the weather condition in written format, as well as the current humidity.

Furthermore, on the left side, there is a simplistic way to change the mode to heating or cooling by touching either “HEAT” or “COOL”. When either mode is selected, it illuminates and the alternative unselected menu goes gray. In this case, auto mode is selected meaning it will automatically heat or cool depending on the temperature conditions.

Finally, on the upper left corner, the current indoor temperature is displayed.

In the middle, the “SET TEMP” label defines the currently set temperature. In this case, it is set to 70 degrees Fahrenheit, and the current temp is 75, so the cooling system is running. Arrows on the left allow the user to increase or decrease the set temperature.

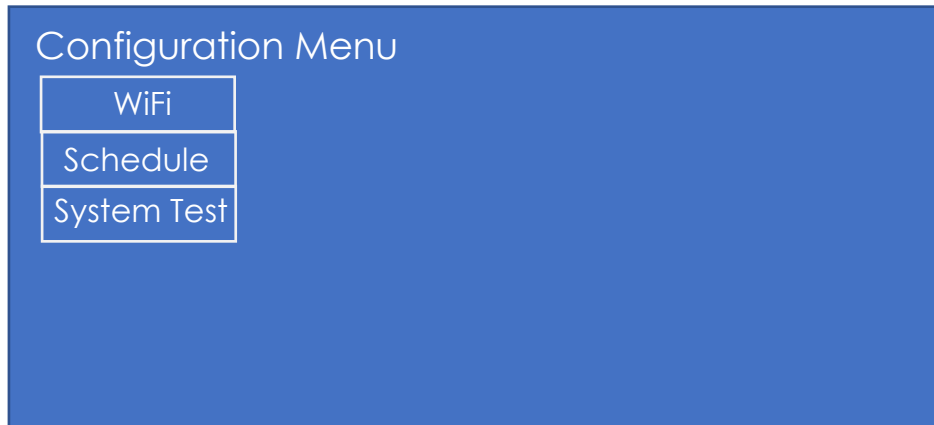
On the bottom left of the screen, there is a configuration menu in which the user can select to enter into the configuration menu for the device.

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Configuration Menu



This is a standard configuration menu with simplicity in mind. The end user will select WiFi to connect to a WiFi network.

The user can select Schedule to update the schedule, or see usage

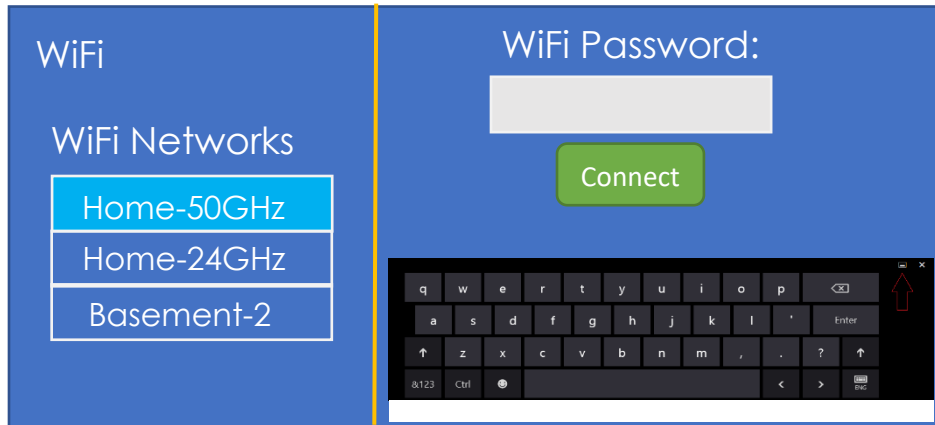
The user can also do a system test to see if the thermostat is functioning properly.

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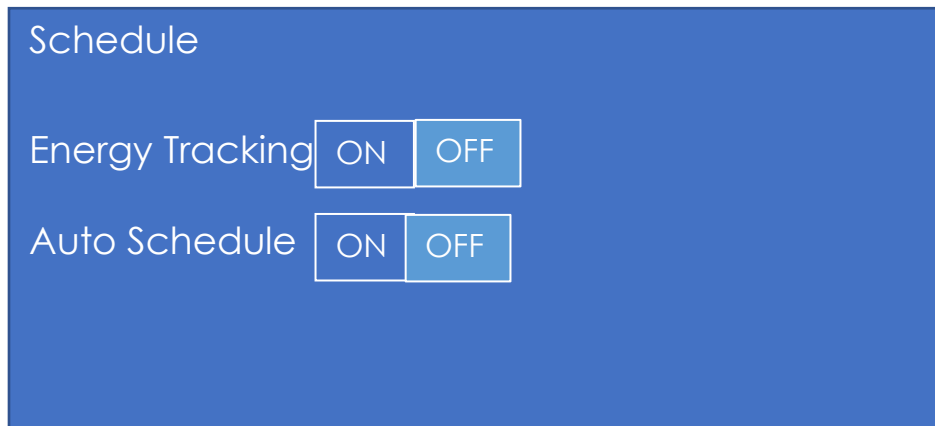
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WiFi Menu



The WiFi menu lists 3 of the closest available WiFi networks on the left portion of the screen. Once the WiFi network is selected, it illuminates to a bright blue color, and the right side of the screen displays the WiFi password input box. A mobile version of a keyboard appears at the bottom in order for the user to type in the WiFi password. Once entered, the user pushes the “connect” button and the system will indicate whether or not it successfully connected to the WiFi network or not.

Schedule Menu



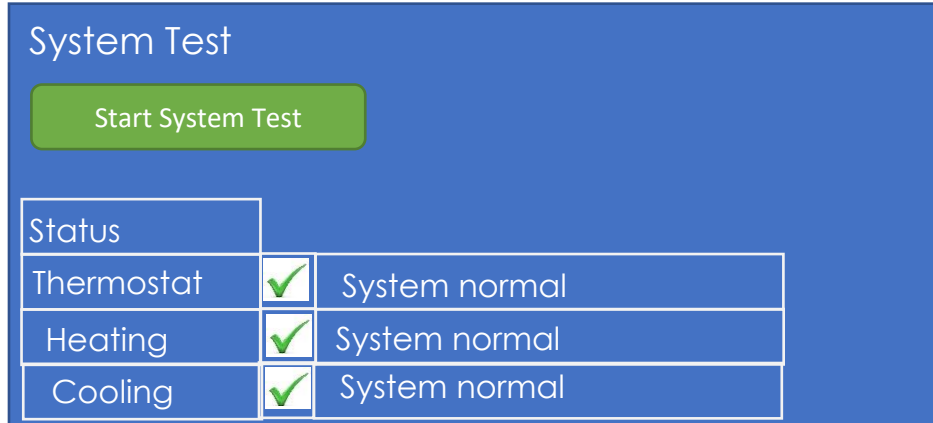
The schedule menu allows the user to select whether they want to track energy usage, or if they want to turn on the auto schedule which will automatically adjust temperature based on what they previously chose on that particular day of the week in the past.

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System Test Menu

A UI mockup for a 'System Test' menu. It features a blue background with the title 'System Test' in white. Below the title is a green button with the text 'Start System Test'. Underneath the button is a table with three rows: 'Thermostat', 'Heating', and 'Cooling'. Each row has a green checkmark icon in a small box, followed by the text 'System normal' in a larger box.

Status		
Thermostat	✓	System normal
Heating	✓	System normal
Cooling	✓	System normal

The system test menu will run system checks on the thermostat, heating, and cooling system when the button “Start System Test” is clicked to ensure the system is properly connected with the associated systems. With this check passing, the system is in a fully operational state. If the checks fail, there is a red X indicating the test failed with a descriptor as to why the system failed on the right side (where it states “System normal”)

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Report

The purpose and use of a class-based component design is to follow “key principles of component design” including modularity, meaning the components are contained and utilized in “specific ways,” cohesivity, meaning the modules are designed to fulfill a “specific set of goals”, reusable, and well documented (Class-Based Component Design: Principles & Process, 2018). Therefore, it can be said that the class-based features can offer a lot of flexibility and assist greatly in the design and deployment of an application. This is due to the fact the components of an application are broken up into smaller, manageable chunks to manage. This allows the development of the application to become more manageable.

A proposed testing plan for the smart thermostat application and system is the crawler-based technique whereby an automated process is followed to behave like a real user, and from that, determine test cases which are executed (Amalfitano et al., 2011). This process therefore allows the application to be accessed and utilized similar to how an end-user would access the application. The technique covers the entire application, utilizing automatic crash and regression testing by catching exceptions at run-time (Amalfitano et al., 2011). This method covers the entire application and all processes by utilizing a comparison, and monitors event handlers capturing all information about the running activity at the moment it fails. This provides information to fix issues and because the “crawling algorithm” provides significant information and covers the entire application, this testing method can be easily adapted from the data flow diagram, or the state diagram (Amalfitano et al., 2011).

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User interface design is meant to be as simplistic as possible with minimal clicks, with the overall display being appealing and easily readable to the user (Practical Application for Software Engineering: User Interface Design, 2018). The user interface for the smart thermostat system fulfills this requirement. The main display contains only essential information, and updating the temperature only involves pushing either an “up arrow” for temperature increase, or “down arrow” for temperature decrease. The total amount of time it would take a user to perform tasks on the thermostat is minimal. The setting menu is very simplistic offering only essential options to test the system, enable/disable scheduling, or connecting to the Wi-Fi. Fonts are readable and the color scheme is appropriate and appealing to the user. The end of the workflow is most important, and getting to that point in a simple manner is vital to user-friendly interfaces (Practical Application for Software Engineering: User Interface Design, 2018). The diagrams and graphical user interfaces are justifiably user-friendly with simplistic front-end designs.

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References

Class-Based Component Design: Principles & Process. (2018, December 18). Retrieved from

<https://study.com/academy/lesson/class-based-component-design-principles-process.html>.

D. Amalfitano, A. R. Fasolino and P. Tramontana, "A GUI Crawling-Based Technique for Android Mobile Application Testing," *2011 IEEE Fourth International Conference on Software Testing, Verification and Validation Workshops*, Berlin, Germany, 2011, pp. 252-261, doi: 10.1109/ICSTW.2011.77.

Practical Application for Software Engineering: User Interface Design. (2018, June 23). Retrieved from <https://study.com/academy/lesson/practical-application-for-software-engineering-user-interface-design.html>.