CPSC 875 PROJECT PROPOSAL

Smart Thermostat System

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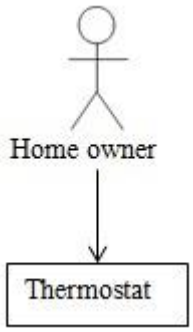
Description

Thermostat regulates the temperature of the House or Building by controlling heating or cooling equipment to maintain a temperature at constant level, as required by the User.
It is a “closed loop” control device, as it seeks to reduce the error between the desired and measured temperatures.

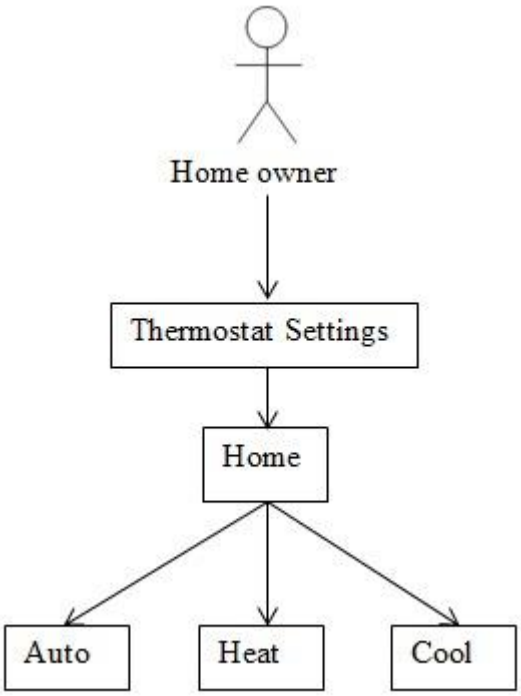
The Smart Thermostat provides an additional functionality to adjust the temperature remotely through an app on the Smart Phone. It provides various benefits to the user and it also saves energy consumption compared to the regular Thermostat.

Use Case Diagrams

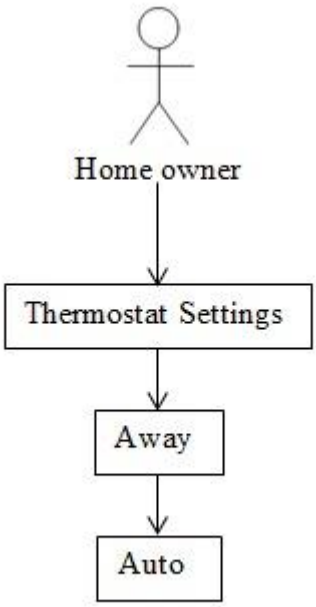
1. **Use Case Diagram- 1 : Participants**



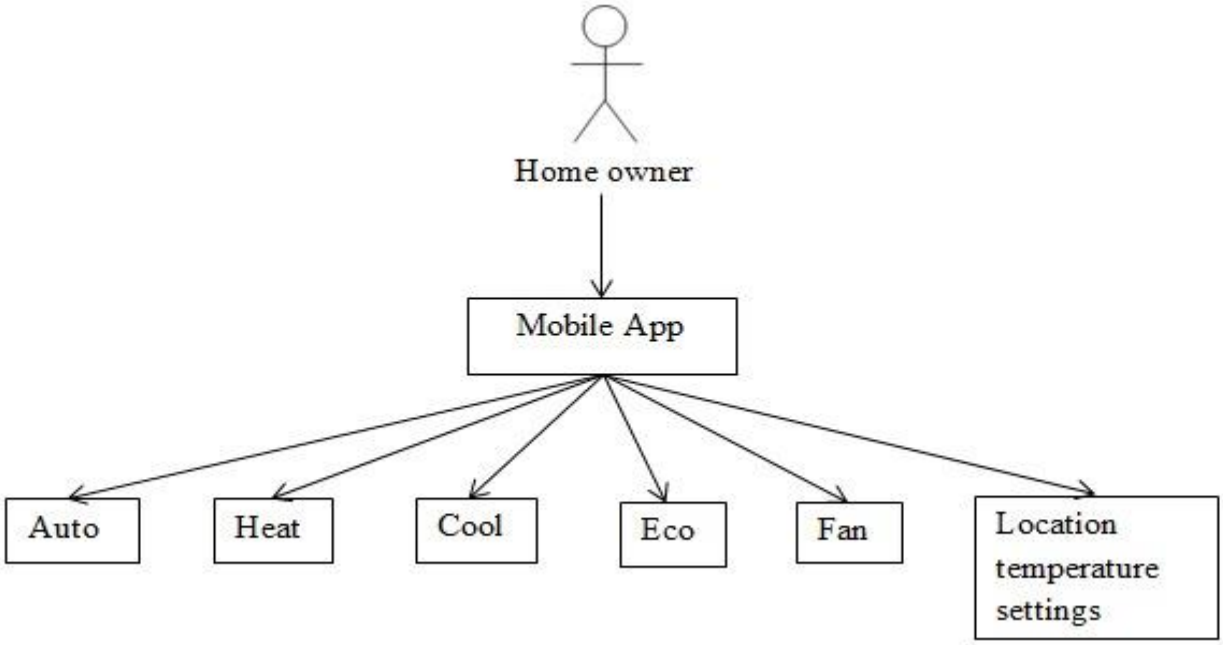
2. Use Case Diagram- 2 : Setting the temperature in Home Mode(Done Manually)



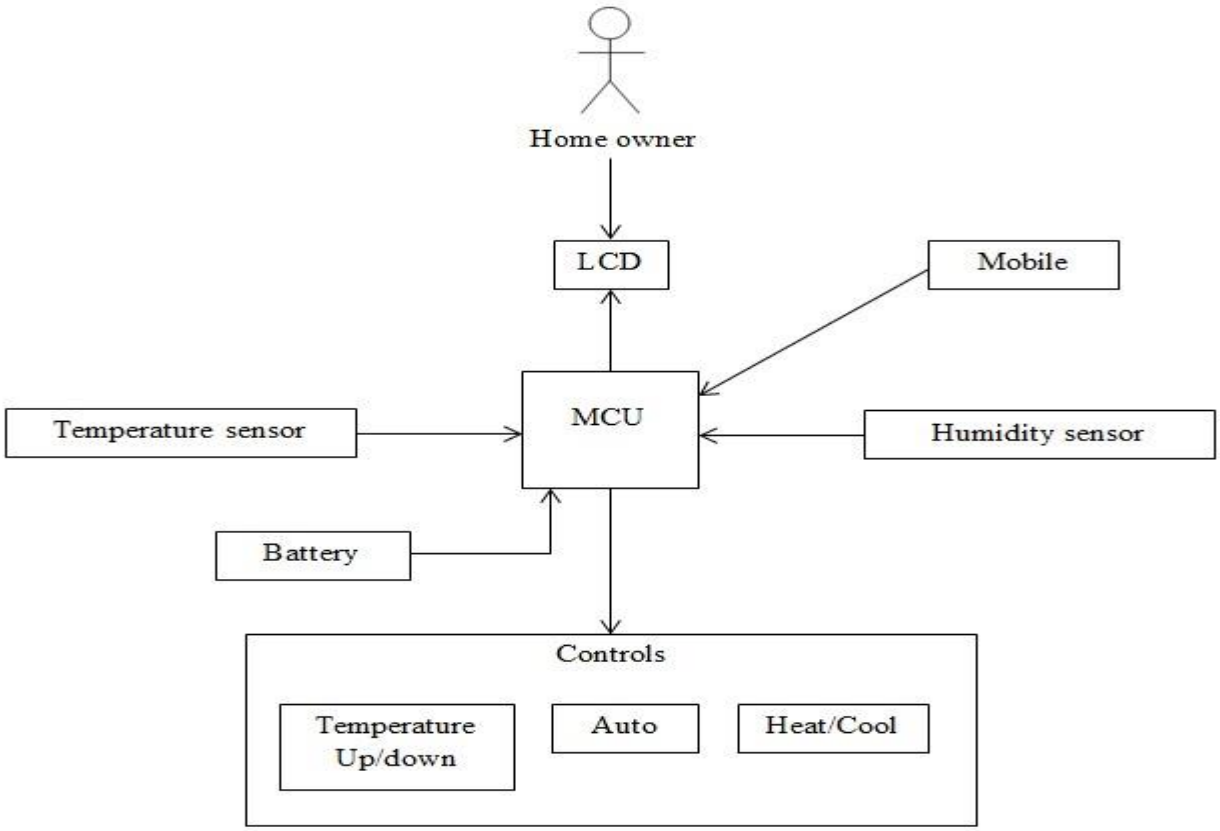
3. Use Case Diagram- 3: Automatic Temperature Setting in Away Mode



4. Use Case Diagram- 4: User Interaction with Thermostat via Mobile App



5. Use Case Diagram- 5: Comprehensive System Functionality



Output from QAW

1. Quality Attributes to be met:

1. Availability
2. Correctness
3. Reliability
4. Efficiency
5. Robustness
6. Usability
7. Maintainability
8. Modifiability
9. Easy of learning
10. Understandability

2. Scenarios

1. User sets the temperature directly on the thermostat or via-a smart phone. The User can choose between various options to set the temperature on thermostat.
2. The Thermostat is set to ON state, the user selects from the modes below:
   2.1 When Heat or cold mode is selected by the User the thermostat adjusts the home to the target temperature.
   2.2 When Heat-Cool mode is selected by the User the thermostat keeps the home within a preferred temperature range.
   2.3 When Echo mode is selected, the thermostat applies energy-saving algorithms to keep the house comfortable and reduce energy usage
3. The Thermostat is set to Away State, then it automatically chooses the Echo mode to save energy Consumption
4. The Thermostat is to OFF State, its switched off and doesn't consume any power.
5. The Thermostat Shutdowns automatically on detection of smoke.
6. The Emergency Heat switch can be turned ON or OFF manually, it is set ON when the primary heating isn't functioning.
7. The app gives Error messages when you are setting the temperature through phone, if the app isn't up to date.
8. Many requests from the user within a short time, drops down the battery level of thermostat.
9. The user cannot interact via mobile with the thermostat when the battery level is low.
10. Modification to the temperature setting in the thermostat are not allowed, when the thermostat is offline (not connected to Internet)
11. The app is used to set default temperatures at particular times during day or night.
12. The temperature can be set differently at different locations in the house through the mobile app.

13. Error Messages are displayed when an incorrect setting or temperature values are gives.
14. The fan can be explicitly turned on via the mobile phone in order to make occupants more comfortable.
15. The thermostat, when exposed to sunlight it automatically adjusts according to the outside temperature.

3. Prioritized and Refined Scenarios:

1. User sets the temperature directly on the thermostat or via-a smart phone. The User can choose between various options to set the temperature on thermostat.
2. The Thermostat is set to ON state, the user selects from the modes below:
   2.1 When Heat or cold mode is selected by the User the thermostat adjusts the home to the target temperature.
   2.2 When Heat-Cool mode is selected by the User the thermostat keeps the home within a preferred temperature range.
   2.3 When Echo mode is selected, the thermostat applies energy-saving algorithms to keep the house comfortable and reduce energy usage
3. The Thermostat Shutdowns automatically on detection of smoke.
4. The temperature can be set differently at different locations in the house through the mobile app.
5. The app is used to set default temperatures at particular times during day or night.
6. The Emergency Heat switch can be turned ON or OFF manually, it is set ON when the primary heating isn't functioning.
7. The user cannot interact via mobile with the thermostat when the battery level is low.

Sources Of Information

[1] Tom Polanski, "Use Case Diagrams", Colarado University
[2] http://www.explainthatstuff.com/thermostats.html
[3] https://developers.nest.com/documentation/cloud/thermostat-guide