Embedded System Design
Project 1 UML

Max Thrun — Ian Cathey — Mark Labbato

October 15, 2012

Use Case

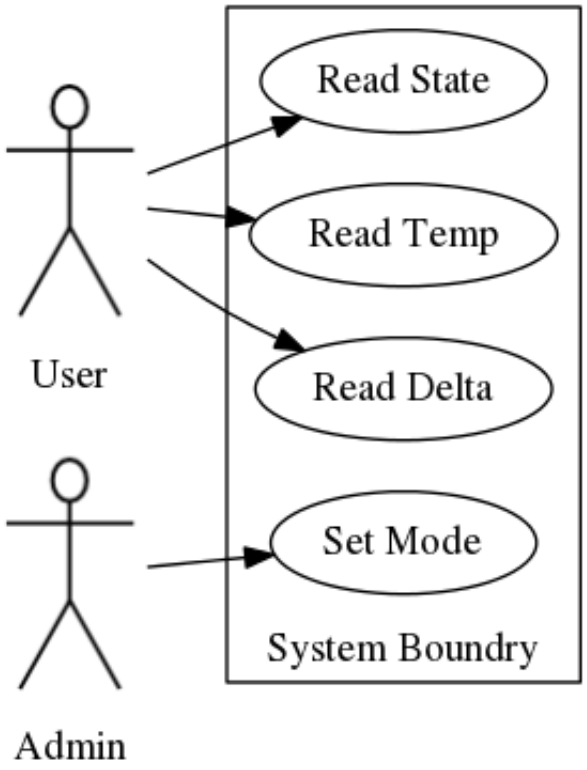

Figure 1: Use Case Diagram

- Two functional use cases:
  1. **Read Display:** The user should be able to read the current temperature on the 7-segment display.
  2. **Set Mode:** The admin should be able to set the temperature mode.
- One quality use case:
  1. **Read Delta:** The delta value read by the user should be accurate within 0.1 degrees

Acceptance Test

- **Read Display:**
    1. Reset the system
    2. Enter temperature value 35
    3. Ensure that the 7-segment display shows 35
    4. Reset the system
    5. Enter temperature value 50
    6. Ensure that the 7-segment display shows 50
- **Set Mode:**
    1. Reset the system
    2. Set mode switch to 1 (negative values)
    3. Enter temperature value 40
    4. Ensure that the 7-segment shows -40
    5. Reset the system
    6. Set mode switch to 0 (positive values)
    7. Enter temperature value 40
    8. Ensure that the 7-segment shows 40

Implementation

Modules supporting the above use cases:

- Temperature Input
- State Monitor
- Display Driver
- Display Output

For this project a pure hardware solution was chosen due to the simplicity of the requirements. Incorporating software into this design would require some kind of softcore processor which would vastly increase the complexity.

Black Box Tests

- **Temp input:** record the current temperature reading. Enter in a specific temperature on the switches and then press the .load. button. View the new current temperature reading as well as the last temperature reading and verify that they are correct.
- **State monitor:** enter in a temperature. Then enter in another temperature in a different state, verify that the new state is the correct state. Do this for each state transition.
- **Display driver:** Input a temperature, and state data. The output should be the corresponding display sequence for the Display Output module.
- **Display output:** Input decoded display data: temperature, state, alarm, delta. The output on the 7-segments should show the correct values

Sequence Diagram

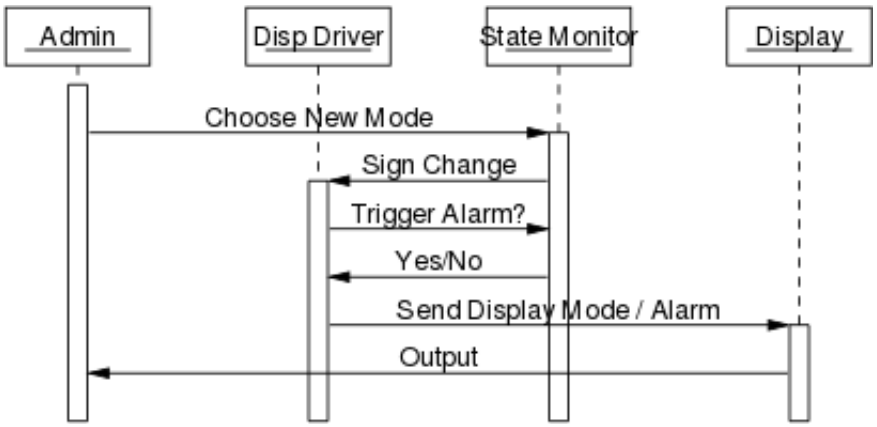

Figure 2: Sequence Diagram

State Diagram

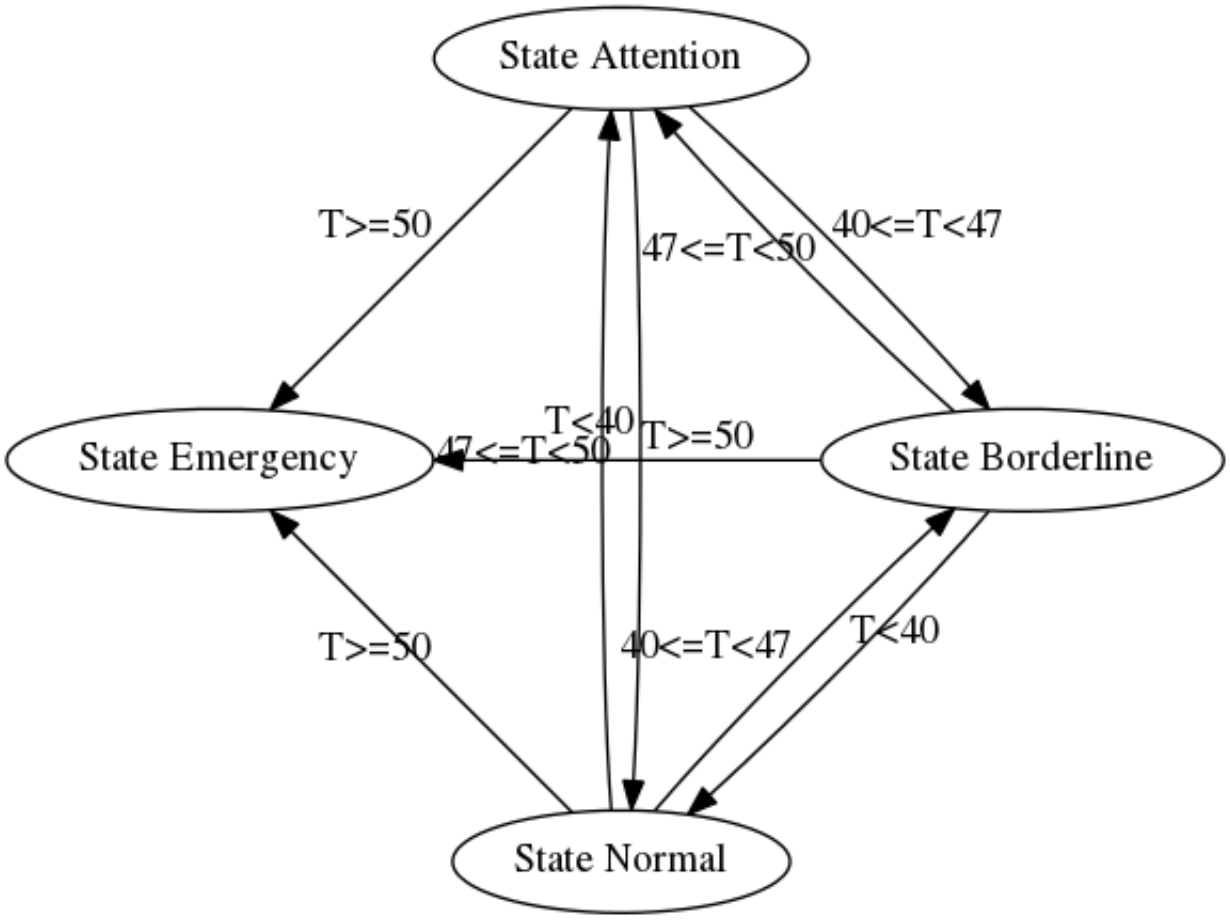

Figure 3: Temperature State Diagram