Plant Control System

Emre KARABULUT

Mustafa GOCAMARLI

github: https://github.com/Mustafagcmrl/BIM209_HW2.git

Statement of Work

We decided on this project when we were talking about how difficult it is to grow a plant at home or somewhere in your garden because of such reasons: First of all, the soil must be suitable for your plant. But it is not that hard to check whether your soil is compatible or not. However, serving the right conditions for your plant such as humidity, temperature and checking the conditions at correct times gets harder and harder. After considering all of these difficulties, we thought that our application would make them a lot easier. Then we need to think about all factors and we should make a plan in line with these factors.

According to our customers' goals we desire to make a system that allows our customer to follow the process of growing a plant easily. In this system, customers should be able to control over their plant’s environmental conditions such as checking or setting the environment temperature or soil humidity. By getting real-time data from the system, they will be changing the conditions to make it better for the plant, so that, plant will be healthier and be growing faster than the previous scenario.

Requirement List:

1. User should press the “Enter Button” to adjust the values.
2. There should be 2 different Check LEDs (Temperature & Humidity) which can shine both blue and red.
3. System warns the user by temperature and humidity conditions.
4. User should be able to select temperature or humidity mode to adjust.
5. Min & Max temperature levels should be adjustable by the user.
6. Min & Max humidity levels should be adjustable by the user.
7. If the values are in the intervals, any of LEDs won’t shine.
8. When the environment temp goes under the minimum level, the temperature LED shines blue.
9. When the environment temp goes higher than the maximum level, the temperature LED shines red.
10. When the soil humidity goes under the minimum level, the humidity LED shines blue.
11. When the soil humidity goes higher than the maximum level, the humidity LED shines red.
12. After setting the intervals, the system should go to sleep mode.

Use-Cases:

1st use-case

1. User wants to change the temp. interval values. (N/A)
2. User presses the “Enter” button to get into the system. (1)
3. Options will be shown up to the screen. (N/A)
4. User wants to change the feature settings of the system. (N/A)
5. User chooses temperature mode (4)
6. User sets a temperature interval that is suitable for the plant. (5)
    6.1 Max value of the interval is higher than 40°C (5)
        6.1.1 Minimum value of the interval is lower than 10°C (5)
        6.1.2 System warns the user “You set a value too low for a plant.” (3)
        6.1.3 Turns back to the 6th step. (N/A)
    6.2 System warns the user “You set a value too high for a plant” (3)
    6.3 Turns back to the 6th step. (N/A)
7. System goes to sleep mode. (12)

Start Condition: 2
Stop Condition: 7
Clear Value: User will apply the temperature interval changes with success.
External Initiator: User

2nd use case

1. User wants to change the humidity interval values. (N/A)
2. User presses the “Enter” button to get into the system. (1)
3. Options will be shown up to the screen. (N/A)
4. User wants to change the feature settings of the system. (N/A)
5. User chooses humidity mode (4)
6. User sets a humidity interval that is suitable for the plant. (6)
        6.1 Max value of the interval is higher than 60% (6)
            6.1.1 Minimum value of the interval is lower than 20% (6)
            6.1.2 System warns the user “You set a value too low for a plant.” (3)
            6.1.3 Turns back to the 6th step. (N/A)
        6.2 System warns the user “You set a value too high for a plant” (3)
        6.3 Turns back to the 6th step. (N/A)
7. System goes to sleep mode. (12)

Start Condition: 2
Stop Condition: 7
Clear Value: User will apply the humidity interval changes with success.
External Initiator: User

3rd use case

1. System reads temperature from the temp. sensor
2. System reads humidity from the humidity sensor
3. User checks if one of the LEDs is shining. (N/A)
4. Temperature LED is dimming. (7)
   4.1 Temperature LED is shining red. (9)
      4.1.1 Temperature LED is shining blue. (8)
      4.1.2 User needs to turn on the heater. (N/A)
      4.1.3 Temperature LED turns off after a while. (7)
      4.1.4 User turns off the heater. (N/A)
      4.1.5 Goes to the 4th step. (N/A)
   4.2 User needs to turn off the heater. (N/A)
   4.3 Temperature LED turns off after a while. (7)
5. Humidity LED is dimming. (7)
   5.1 Humidity LED is shining red. (11)
      5.1.1 Humidity LED is shining blue. (10)
      5.1.2 User understands that s/he needs to water the plant. (N/A)
      5.1.3 User waters the plant. (N/A)
      5.1.4 Humidity LED turns off after a while. (7)
      5.1.5 User understands the water is enough for the plant. (N/A)
      5.1.6 Goes to 5th step. (N/A)
   5.2 User understands that s/he has watered the plant too much. (N/A)
   5.3 User waits until the LED is turned off. (7)
6. User understands everything is fine.
7. System goes to sleep mode. (12)

Start Condition: 1
Stop Condition: 5
Clear Value: User notices if there is something wrong and fixes it successfully.
External Initiator: User

Noun-Verb Analysis: GREEN:NOUN BLUE:VERB

1st use-case

1. User wants to change the temp. interval values. (N/A)
2. User presses the “Enter” button to get into the system. (1)
3. Options will be shown up to the screen. (N/A)
4. User wants to change the feature settings of the system. (N/A)
5. User chooses temperature mode (4)
6. User sets a temperature interval that is suitable for the plant. (5)
   6.1 Max value of the interval is higher than 40°C (5)
      6.1.1 Minimum value of the interval is lower than 10°C (5)
      6.1.2 System warns the user “You set a value too low for a plant.” (3)
      6.1.3 Turns back to the 6th step. (N/A)
   6.2 System warns the user “You set a value too high for a plant” (3)
   6.3 Turns back to the 6th step. (N/A)
7. System goes to sleep mode. (12)

2nd use case

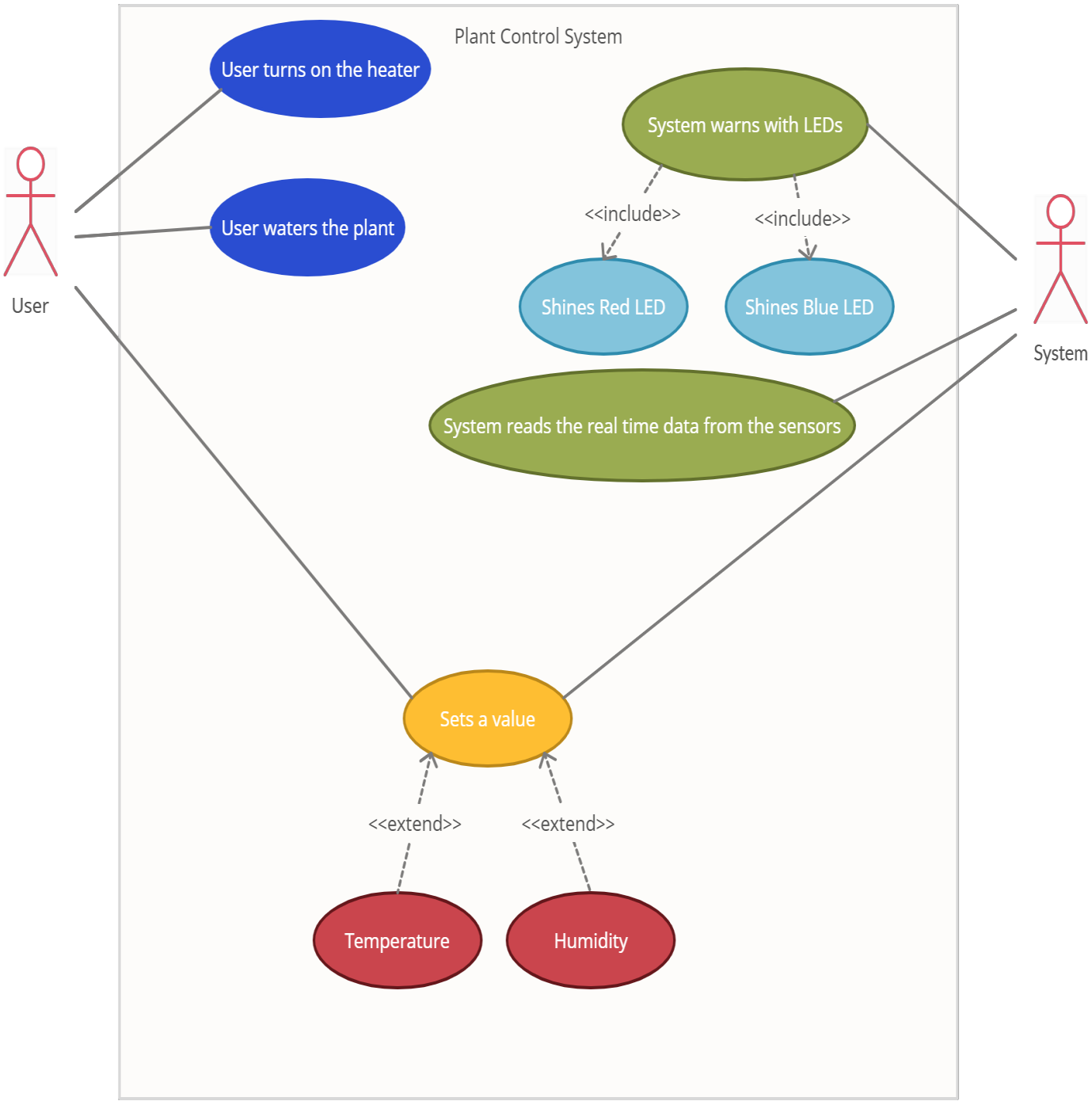
1. User wants to change the humidity interval values. (N/A)
2. User presses the “Enter” button to get into the system. (1)
3. Options will be shown up to the screen. (N/A)
4. User wants to change the feature settings of the system. (N/A)
5. User chooses humidity mode (4)
6. User sets a humidity interval that is suitable for the plant. (6)
   6.1 Max value of the interval is higher than 60% (6)
      6.1.1 Minimum value of the interval is lower than 20% (6)
      6.1.2 System warns the user “You set a value too low for a plant.” (3)
      6.1.3 Turns back to the 6th step. (N/A)
   6.2 System warns the user “You set a value too high for a plant” (3)
   6.3 Turns back to the 6th step. (N/A)
7. System goes to sleep mode. (12)

3rd use case

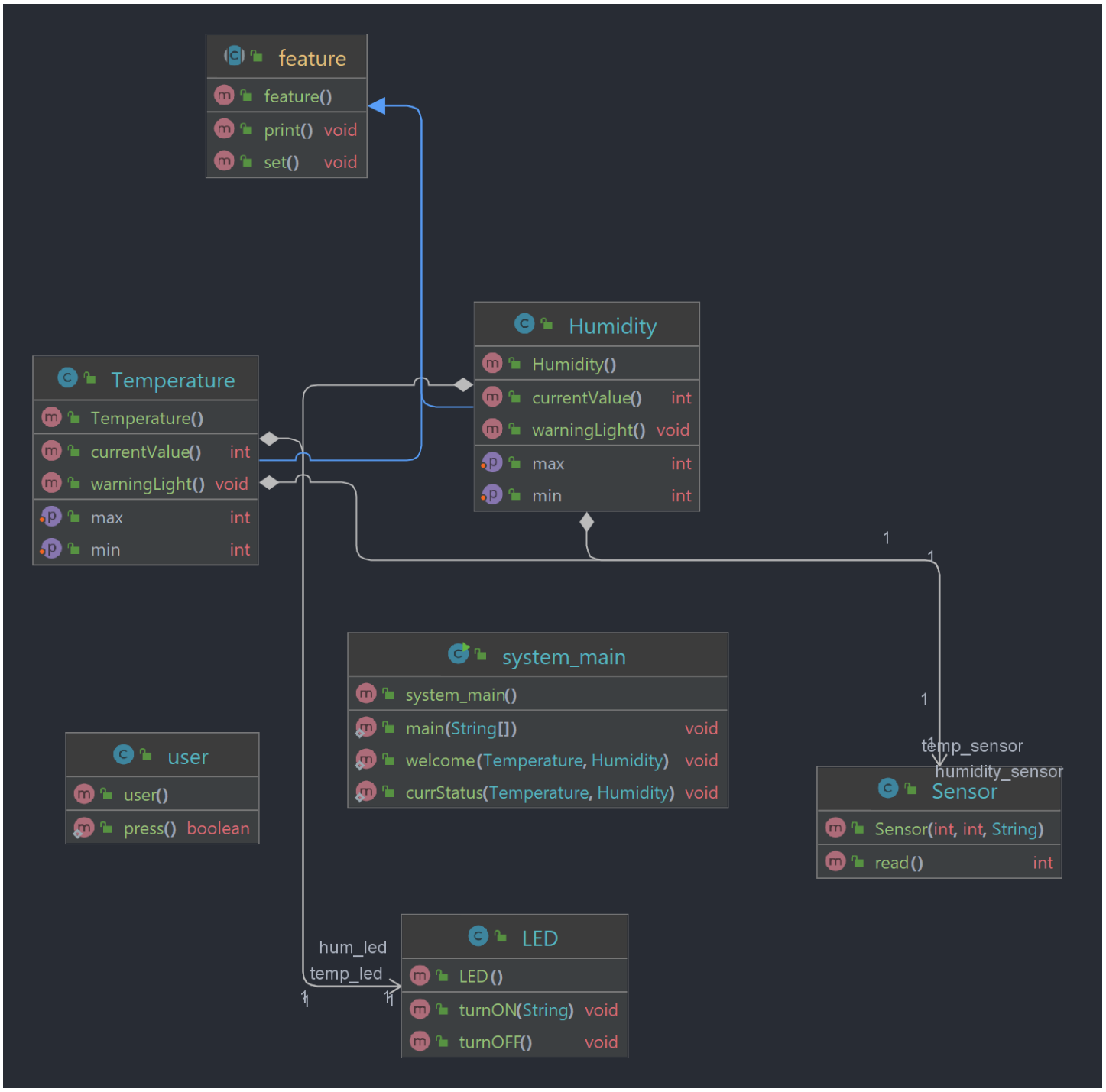
1. System reads temperature from the temp. sensor
2. System reads humidity from the humidity sensor
3. User checks if one of the LEDs is shining. (N/A)
4. Temperature LED is dimming. (7)
    4.1 Temperature LED is shining red. (9)
        4.1.1 Temperature LED is shining blue. (8)
        4.1.2 User needs to turn on the heater. (N/A)
        4.1.3 Temperature LED turns off after a while. (7)
        4.1.4 User turns off the heater. (N/A)
        4.1.5 Goes to the 4th step. (N/A)
    4.2 User needs to turn off the heater. (N/A)
    4.3 Temperature LED turns off after a while. (7)
5. Humidity LED is dimming. (7)
    5.1 Humidity LED is shining red. (11)
        5.1.1 Humidity LED is shining blue. (10)
        5.1.2 User understands that s/he needs to water the plant. (N/A)
        5.1.3 User waters the plant. (N/A)
        5.1.4 Humidity LED turns off after a while. (7)
        5.1.5 User understands the water is enough for the plant. (N/A)
        5.1.6 Goes to 5th step. (N/A)
    5.2 User understands that s/he has watered the plant too much. (N/A)
    5.3 User waits until the LED is turned off. (7)
6. User understands everything is fine.
7. System goes to sleep mode. (12)

Noun	class?	Verb	method?
user	no	want	no
options	no	change	no
button	no	press	no
system	yes	get into	no
screen	no	show-up	no
feature	yes	choose	no
temperature-mode	no	set	yes
temperature	yes	warn	yes
LED	yes	turn	no
value	no	go	no
interval	no	check	no
sleep-mode	no	shine	no
plant	no	dimm	no
humidity-mode	no	need	no
humidity	yes	turn on	yes
heater	no	turn off	yes
s/he	no	water	no
red	no	understand	no
blue	no	wait	no
sensor	yes	read	yes

Use-Case Diagram:



UML Diagram:


feature
feature()
print() void
set() void
Humidity
Humidity()
currentValue() int
warningLight() void
max int
min int
Temperature
Temperature()
currentValue() int
warningLight() void
max int
min int
1
1
system_main
system_main()
main(String[]) void
welcome(Temperature, Humidity) void
currStatus(Temperature, Humidity) void
1
temp_sensor
humidity_sensor
user
user()
press() boolean
Sensor
Sensor(int, int, String)
read() int
hum_led
temp_led
1
1
LED
LED()
turnON(String) void
turnOFF() void