Change light behavior of traffic light Requirements Spec

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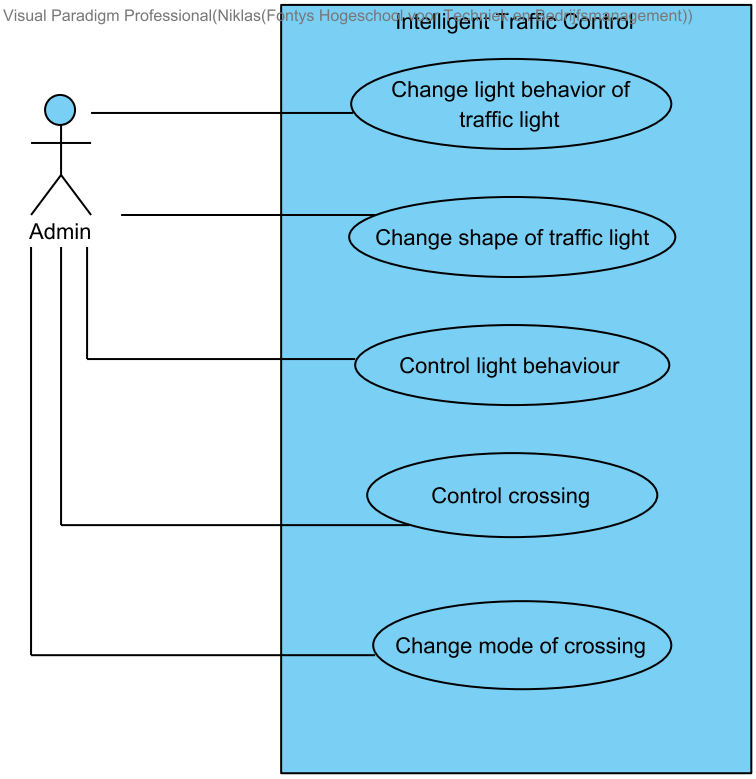
1. Use Case Diagram



1.1. Admin

ID: AC04

1.2. Change light behavior of traffic light

ID: UC01

The admin might want to change the light patterns of the traffic light.

1.3. Change mode of crossing

ID: UC5

1.4. Change shape of traffic light

ID: UC2

The shape of the traffic light together with the color of the light define the signal of the street traffic light. For pedestrian traffic lights the shape does not define the signal but can vary depending on the location of the traffic light, therefore the shapes for both Street and Pedestrian traffic lights can be changed.

1.5. Control crossing

ID: UC4

1.6. Control light behaviour

ID: UC3

The light behaviour controls the transitioning of the light states of the traffic light. Basically the traffic light has the light behaviour (or the light state as we defined it with the Enum), which has different states that can be navigated to. The states are controlled separately from the traffic light.

1.7. Intelligent Traffic Control

2. Change shape of traffic light

ID: UC2

The shape of the traffic light together with the color of the light define the signal of the street traffic light. For pedestrian traffic lights the shape does not define the signal but can vary depending on the location of the traffic light, therefore the shapes for both Street and Pedestrian traffic lights can be changed.

2.1. Primary Actors

Admin

2.2. Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A
Author	N/A
Assumptions	N/A

2.3. Scenarios

2.3.1. Pedestrian traffic light scenario

1. Actor supplies new pedestrian light shape to pedestrian traffic light.
2. System changes shape of traffic light with the new shape.

2.3.2. Street traffic light scenario

1. Actor supplies new street light shape to street traffic light.
2. System changes shape of traffic light with the new shape.

2.3.3. Pedestrian shape test scenario

1. Actor supplies new pedestrian shape to pedestrian traffic light.
2. System changes shape of the traffic light.
3. Test if the supplied shape is equal to the supplied shape.

2.3.4. Street shape test scenario

1. Actor supplies new street shape to street traffic light.
2. System changes shape of the traffic light.
3. Test if the supplied shape is equal to the supplied shape.

2.4. Requirements

2.4.1. A traffic light shall only have one active shape

ID: UC2.REQ001

2.4.2. The combination of shape, type and name of the light shape must be unique

ID: UC2.REQ002

2.4.3. Type of the shape shall match the type of the traffic light

ID: UC2.REQ003

2.5. Relationships

Relationship	From	To
unnamed	Change shape of traffic light	Admin

3. Change mode of crossing

ID: UC5

3.1. Primary Actors

Admin

3.2. Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A
Author	N/A
Assumptions	N/A

3.3. Scenarios

3.3.1. Scenario

1. Actor supplies the crossing with a new crossing mode.
2. System applies the new crossing mode to the crossing.

3.3.2. Simple to German crossing mode test scneario

1. Actor provides Simple crossing mode to a crossing.
2. System applies Simple crossing mode to the crossing.
3. Test if the crossing loop logic is the same as the logic defined in the Simple crossing mode.
4. Actor provides German crossing mode to a crossing.
5. System applies German crossing mode to the crossing.
6. Test if the crossing loop logic is the same as the logic defined in the German crossing mode.

3.4. Requirements

3.4.1. The crossing loop shall not be active when changing the mode

ID: UC5.REQ001

3.4.2. The new crossing mode shall be able control at least the two main street and pedestrian traffic lights.

ID: UC5.REQ002

3.5. Relationships

Relationship	From	To
unnamed	Admin	Change mode of crossing

4. Change light behavior of traffic light

ID: UC01

The admin might want to change the light patterns of the traffic light.

4.1. Primary Actors

Admin

4.2. Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	The type of light behavior shall be compatible with the type of traffic light.The new light behavior shall be compatible with the local law.
Post-conditions	N/A
Author	N/A
Assumptions	N/A

4.3. Scenarios

4.3.1. Pedestrian traffic light scenario

1. Actor supplies new pedestrian light behavior to pedestrian traffic light.
2. System applies new pedestrian light behavior to the pedestrian traffic light.

4.3.2. Street traffic light scenario

1. Actor supplies new street light behavior to street traffic light.
2. System applies new street light behavior to the street traffic light.

4.3.3. Test Scenario: Pedestrian: change behavior from German to Dutch

1. Actor supplies Dutch pedestrian light behavior

2. System applies Dutch light behavior to traffic light
3. Test if the predefined sequence is correct.

4.3.4. Test Scenario: Pedestrian: change behavior from Dutch to German

1. Actor supplies German pedestrian light behavior
2. System applies German light behavior
3. Test if the predefined sequence is correct.

4.3.5. Test Scenario: Street: change behavior from Dutch to German

1. Actor supplies German street light behavior to street traffic light
2. System applies German street light behavior to traffic light
3. Test if the predefined light sequence is correct.

4.3.6. Test Scenario: Street: change behavior from German to Dutch

1. Actor supplies Dutch street light behavior to street traffic light
2. System applies Dutch street light behavior to traffic light
3. Test if the predefined light sequence is correct.

4.4. Requirements

4.4.1. The new light behavior shall be compatible with the local law.

ID: UC01.REQ001

4.4.2. The type of light behavior shall be compatible with the type of traffic light.

ID: UC01.REQ002

4.5. Relationships

Relationship	From	To
unnamed	Admin	Change light behavior of traffic light

4.6. Reference Diagrams

4.6.1. Change light behavior of traffic light Requirements Spec

Change light behavior of traffic light Requirements Spec

5. Control light behaviour

ID: UC3

The light behaviour controls the transitioning of the light states of the traffic light. Basically the traffic light has the light behaviour (or the light state as we defined it with the Enum), which has different states that can be navigated to. The states are controlled separately from the traffic light.

5.1. Primary Actors

Admin

5.2. Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A
Author	N/A
Assumptions	N/A

5.3. Scenarios

5.3.1. Scenario

1. Actor requests state change on traffic light.
2. System changes state of traffic light.

5.3.2. Test: changeState of German Pedestrian Light Behaviour

1. Actor requests change state from RED_LIGHT to GREEN_LIGHT
2. System changes state to GREEN_LIGHT
3. Assert that the new state is GREEN_LIGHT

5.3.3. Test: changeState of German Street Light Behaviour

1. Actor requests change state from RED_LIGHT to YELLOW_LIGHT
2. System changes state to YELLOW_LIGHT
3. Actor requests change state from YELLOW_LIGHT to GREEN_LIGHT
4. System changes state to GREEN_LIGHT
5. Assert that the new state is GREEN_LIGHT

5.4. Requirements

5.4.1. A state shall determine if it allows users to pass or not

ID: UC3.REQ003

5.4.2. A state shall only have one state to which it can switch to next

ID: UC3.REQ004

5.4.3. A traffic-light state sequence shall have at least one state which allows users to pass through

ID: UC3.REQ002

5.4.4. The order of the states shall be pre-defined

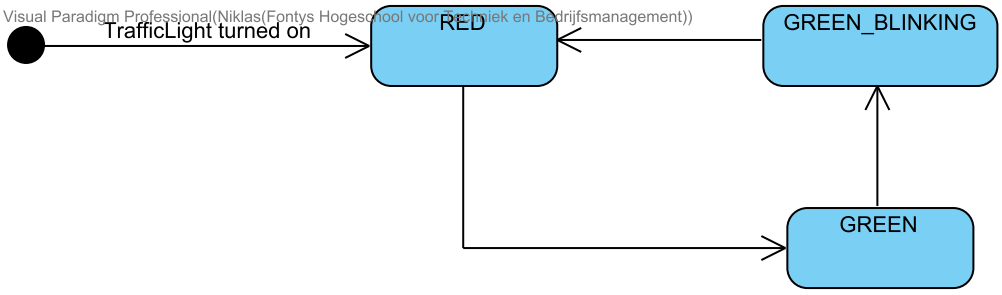
ID: UC3.REQ001

5.5. Relationships

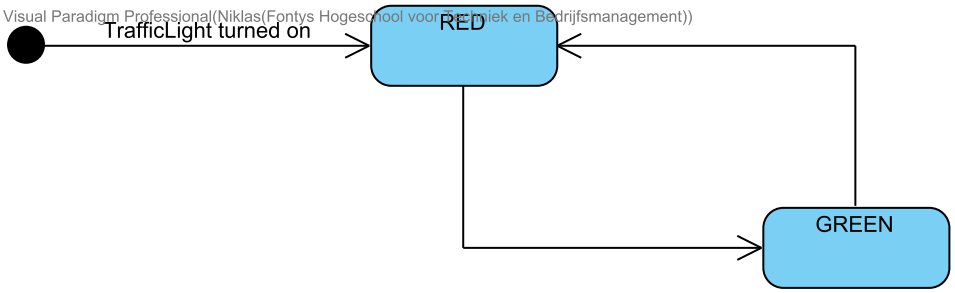
Relationship	From	To
unnamed	Control light behaviour	Admin

5.6. Sub Diagrams

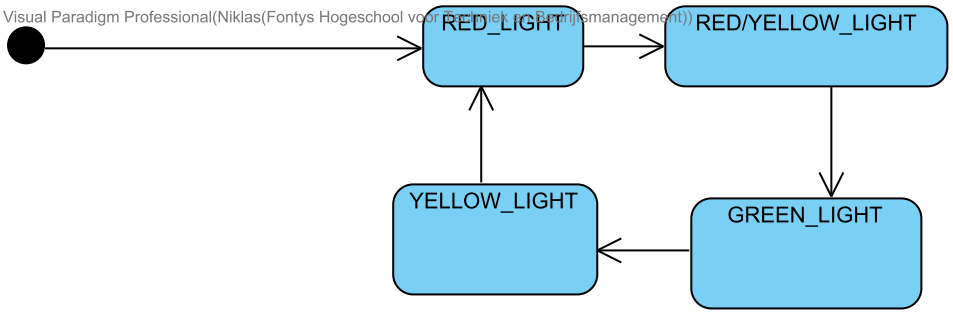
5.6.1. DutchPedestrianLightBehaviour



5.6.2. GermanPedestrianLightBehaviour



5.6.3. German Street Light Behaviour



6. Control crossing

ID: UC4

6.1. Primary Actors

Admin

6.2. Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A

Preconditions	N/A
Post-conditions	N/A
Author	N/A
Assumptions	N/A

6.3. Scenarios

6.3.1. Scenario

1. Actor activates crossing.
2. System activates crossing loop.
3. Actor deactivates crossing.
4. System deactivates crossing loop.

6.3.2. Test scenario for crossing

1. Actor activates the crossing.
2. System should start horizontal traffic first.
3. Actor verifies that the transition is in a specific order.
4. System should stop horizontal traffic and start vertical next.
5. Actor verifies that the horizontal traffic has stopped and the vertical has started.
6. System continues the crossing loop.

6.4. Requirements

6.4.1. All states of all traffic lights must be part of the crossing loop.

ID: UC4.REQ006

6.4.2. If any left or right street traffic light is at PASSING state all pedestrian traffic lights shall be at STOP state.

ID: UC4.REQ008

6.4.3. If the traffic light on a horizontal axis has a TRANSITION or PASSING state then the light on the vertical axis shall have a STOP state

ID: UC4.REQ005

6.4.4. Opposite Street- and Pedestrian traffic lights placed on the same axis shall be synchronized.

ID: UC4.REQ007

6.4.5. The maximum amount of traffic lights on each axis shall be three.

ID: UC4.REQ001

6.4.6. There shall be at least one main street traffic light on the horizontal axis

ID: UC4.REQ003

6.4.7. There shall be at least one main street traffic light on the vertical axis

ID: UC4.REQ004

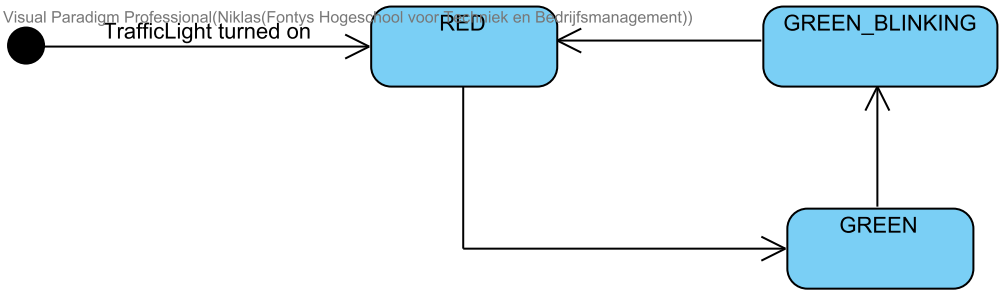
6.4.8. There shall be at least two main street- and pedestrian-traffic lights in a crossing

ID: UC4.REQ002

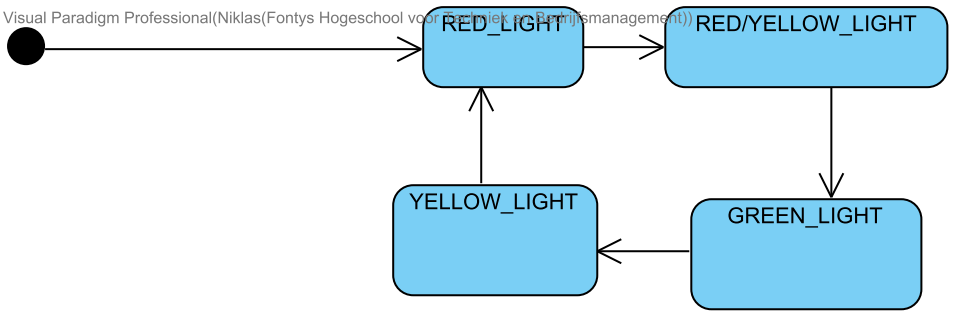
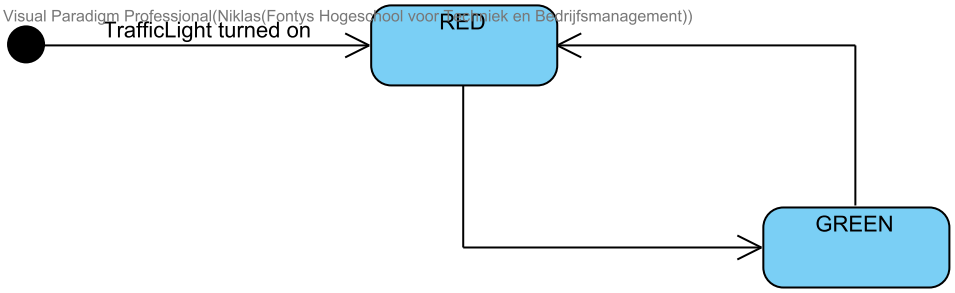
6.5. Relationships

Relationship	From	To
unnamed	Admin	Control crossing

7. DutchPedestrianLightBehaviour



8. German Street Light Behaviour



9. GermanPedestrianLightBehaviour