**Requirements Document for Smart Neighborhood Project**

Sprint 3.0 (submission)

Delta from sprint 2.0:

1. Server Side:
   1. Support for three modes of operations: automatic, semi-automatic, manual (not in the client side yet).
   2. Scenario manager with 8 possible scenarios.
   3. Added simulations of new environment variables – for the simulation of pedestrians, we created a Pedestrian Class, that represents a single pedestrian, walking around.
2. Client Side:
   1. Added a new visualization for day and night modes.
   2. Added support for future Panel for the Manual mode of operation – environment instructions given from the client.
   3. Added visual support for Pedestrians that walk on 4 block in the north, in the south and also the crosswalk.
   4. Added visual support for each of the 6 lights to light independently.
3. Spectra:
   1. New Spectra Day Time Logic - New variable with type DayTime- night or day. Indicates whether the lights should be off (during the day) or on (during the night).
   2. New variable for Electricity Saving mode which indicates whether the light will turn on during the night only if a pedestrian in walking near them.
   3. New pedestrian and light logic:
      1. Added support pedestrians, by way of am enviroment Boolean array that acts as a sensor for places that have a pedestrian on them, including the crosswalk.
      2. Added a Boolean array for distinct lights, that now light up, only if a pedestrian has been sensed around them.

PURPOSE:

The purpose of the "Smart Neighborhood" system is to manage a neighborhood's facilities, in a safe and independent way.

The system handles all garbage collection, street lights, (and more in the future) while considering different cases and events, such as pedestrians crossing the street.

MAIN ASSUMPTIONS:

1. The Crosswalk will eventually be free of pedestrians.
2. Eventually always, all garbage cans will become full.
3. If a garbage truck is in front of a full garbage can and it is in cleaning mode, then on the next step, the can will be empty.
4. Each full garbage can stays full, until it is cleaned by a truck.
5. Eventually always it will become NIGHT, and it will become DAY.

MAIN GUARANTEES:

1. If a truck is in front of a crosswalk, while a pedestrian is crossing it, then the truck will wait in place until the crosswalk is free.
2. If a truck at full can, it stays there to clean it next turn.
3. If a truck is currently cleaning a full can, next state it won't be cleaning and the can will be empty.
4. If the truck is cleaning it means it is in front of a full garbage can.
5. Eventually always, the truck will come to clean all full cans.
6. Garbage trucks on the street, can only move one garbage can forward, or stay in place.
7. Garbage trucks that are not in the street, can only appear at the start of the road.
8. During the day, all lights are always off.
9. During the night:
   1. If Energy Efficiency Mode (EEF) is off, all lights will always be turned on.
   2. If EEF is on - individual lights will turn only if and only if a pedestrian is near it (in the block to the left or right)

REQUIREMENTS:

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| --- | --- | --- |
| **ID** | **Priority**  **(H/M/L)** | **Description** |
| 1 | H | **Garbage Trucks Mechanism** |
| 1.1 | H | Safe crossing of crosswalks – No collision between trucks and crossing pedestrians. |
| 1.2 | H | Garbage collection – All full garbage cans will be emptied. |
|  |  |  |
| 2 | M | **Street Light Mechanism** |
| 2.1 | M | Every pedestrian on the sidewalk won't be in the dark. |
| 2.2 | L | Energy efficiency – lights won't turn on unless needed. |
| 2.3 | M | Day and night modes- during day time lights wont turn on. |
|  |  |  |
| 3 | H | **GUI** |
| 3.1 | H | Neighbourhood design |
| 3.2 | H | Motion synchronized with controller |
|  |  |  |
| 4 | M | **UX** |
| 4.1 | M | Environment control panel |
| 4.2 | M | Predefined scenarios support |
|  |  |  |
| 5 | M | **Scenarios** **Mechanism** |
| 5.1 | M | Random scenarios mode |
| 5.2 | M | Predefined scenarios mode |
|  |  |  |
| 6 | M | **Server-Client** |
| 6.1 | M | System sits on a remote server, communicating with users via web client. |

SCENARIOS:

|  |  |  |
| --- | --- | --- |
| **Number** | **Name** | **Description** |
| **1** |  | Garbage truck comes to the street, wants to pass the crosswalk while a pedestrian is crossing. |
| **2** |  | Pedestrian comes near a light while it off, in energy efficient mode. |
| **3** |  | Garbage cans become full, while the garbage truck is not on the street. |
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