Group 1

**Requirements Document for Smart Neighborhood Project**

Sprint 4.0 (submission)

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 and streetlights, while considering different cases and events, such as pedestrians walking around the neighborhood or crossing the street, and the daytime.

MAIN ASSUMPTIONS:

1. Eventually always it will become NIGHT, and it will become DAY.
2. The Crosswalk will eventually be free of pedestrians.
3. Eventually always, all garbage cans will become full.
4. 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.
5. Each full garbage can will stay full, until it is cleaned by a garbage truck.

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 is in front of a 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. Trucks at an empty garbage can, will keep moving next turn.
9. During the day, all lights are always off.
10. 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:

|  |  |  |
| --- | --- | --- |
| **ID** | **Priority**  **(H/M/L)** | **Description** |
| 1 | H | **Garbage Trucks Mechanism** |
| 1.1 | H | Truck moving routes- trucks can only travel on the right side of the road and in the right direction. |
| 1.2 | M | Two-lane road – to clean a garbage can in one lane (south or north) the truck needs to be on the same lane. |
| 1.3 | H | Safe crossing of crosswalks – no collision between trucks and crossing pedestrians. |
| 1.4 | H | Garbage collection – all full garbage cans will be emptied. |
| 1.5 | M | Garbage cleaning process- the garbage truck arrives to a full garbage can, then she needs to stop to clean it, and only after that she can continue moving. |
|  |  |  |
| 2 | M | **Streetlights 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 daytime lights won’t turn on. |
|  |  |  |
| 3 | H | **GUI- client side** |
| 3.1 | H | Neighborhood design |
| 3.2 | H | Moving and changing visualization of the environment and system variables. |
| 3.3 | H | Motion synchronized with controller |
| 3.4 | M | UX |
| 3.5 | M | Environment control panel- user interaction. |
| 3.6 | M | Predefined scenarios support |
|  |  |  |
| 4 | M | **Scenarios** **Mechanism** |
| 4.1 | M | Random scenarios mode |
| 4.2 | M | Predefined scenarios mode |
| 4.3 | M | Clearing neighborhood before applying predefined scenario. |
| 4.4 | M | Server-side support for scenarios |
|  |  |  |
|  |  |  |
| 5 | M | **Server-Client** |
| 5.1 | M | System sits on a remote server, communicating with users via web client. |
| 5.2 | H | Support for three modes of operations: automatic, semi-automatic, manual |

SCENARIOS:

|  |  |  |
| --- | --- | --- |
| **Number** | **Name** | **Description** |
| **1** | Save the planet | Lights are being turned on and off according to whether there are pedestrians near them or not. |
| **2** | It’s getting trashy | Cans are being filled from farthest to closest to each truck |
| **3** | Living life to the fullest | Truck and pedestrian(s) meet at the crosswalk. |
| **4** | It can never be too clean | Truck waits no time, and while waiting at the crosswalk, she keeps on cleaning. |
| **5** | My cleanliness don’t bring all the trucks to the yard | No garbage == no trucks. |