**Requirements Document for Smart Neighborhood Project**

Sprint 2.0 (submission)

Delta from sprint 1.0:

1. Server Side:
   1. Server now simulates the Spectra environment, receives requests from the client and sends all the variables values, accordingly.
   2. Scenarios: support of running different scenarios from input at client side:
      1. Scenario 0: Run specification randomly, according to the specification rules. (Currently the only working scenario).
2. Client Side:
   1. Client now sends requests to server to get the next state's variables values.
   2. Client graphicly shows a live animation of the current state of the environment and system.
3. Improved Spectra Truck Logic:
   1. Used Weights to compel truck to leave the parking (area N), and algorithmic instructions to keep truck moving if on an empty garbage can.
   2. Implemented better strategy with truck cleaning mode (isCleaning variable).
   3. Added South Truck and Garbage Cans functionality.
4. Implemented "Electricity Saving mode" logic in spectra:
   1. Lights will now be on only if a pedestrian is walking in the light's sidewalk
   2. This is currently the default mode (random mode).

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. Pedestrians walking route starting from the north sidewalk, has to continue to the crosswalk, and from there to the south sidewalk.
2. Each sidewalk and 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 stays full, until it is cleaned by a 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 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. Lights will always be turned on, if a pedestrian is near it.
9. Eventually all lights will turn off (each one individually).
10. Lights are off if there is no pedestrian near it.

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 will always eventually turn off. |
| 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 | User (neighbourhood resident) panel |
|  |  |  |
| 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** | **Description** |
| **1** | Garbage truck comes to the street, wants to pass the crosswalk while a pedestrian is crossing. |
| **2** | Pedestrian comes to one side of the street while the light on that side is off. |
| **3** | Garbage cans become full, while the garbage truck is not on the street. |