**Auto Driving Car Simulation System (Python Program)**

**User Manual**

1. Run the following command line to start up the python program:

python auto\_driving.py

The system will display the following text:

Welcome to Auto Driving Car Simulation!

1. The system will prompt to input the width and height of the simulation field:

Please enter the width and height of the simulation field in x y format:

User can input the width and height (as positive integers), for example, input

10 10

The system then will display the following message:

You have created a field of 10 x 10.

Note: user cannot input any non-positive-integer or non-integer values, e.g., if you input:

-1 3.5

The system will prompt the following error message:

Invalid input. Please enter two integers.

Then the system will re-prompt you to input the width and height:

Welcome to Auto Driving Car Simulation!

Please enter the width and height of the simulation field in x y format:

1. The system will prompt to either add a car or run the simulation:

Please choose from the following options:

[1] Add a car to field

[2] Run simulation

Note: if you have not added any car, you cannot run simulation, e.g, if you select:

2

Then the system will display the following error message:

You have not added any car, so cannot run a simulation.

Then the system will re-prompt the following text for you select 1 or 2:

Please choose from the following options:

[1] Add a car to field

[2] Run simulation

Then you must select 1 to add one or multiple cars at first:

1

1. You enter the stage of adding one or multiple cars. The system will prompt to enter the name of the to-be-added car:

Please enter the name of the car:

Then you input the name of the to-be-added car, e.g.,

A

Note: car name cannot be duplicated, e.g., if you already add a car name A, and then

you attempt to add a new car with name A, the system will return the

following error message:

Sorry your input car name A has already existed, please re-enter another car name.

After the car name, the system will prompt you to enter the original coordinates and

Direction:

Please enter initial position of car A in x y Direction format:

Then you input the coordinates x and y values (must within the range of the

simulation field) and the direction value (N/E/S/W), e.g.,

3 9 S

Note: if your entered coordinates values are beyond the field range, e.g., you input:

5 12 N

Then the system will return the following error message:

Sorry you input invalid coordinates (5, 12) for the car B.

Note: if you input an invalid direction value, e.g, you input:

4 8 M

Then the system will return the following error message:

Sorry you input an invalid direction (M) for the car B.

After inputting valid coordinates and direction values, the system will prompt you to

input the commands of the newly-added car:

Please enter the commands for car A:

Your input commands string can only contain the 3 characters of ‘F’, ‘L’ and ‘R’, e.g.,

you can input:

FLFFFFFFLR

Thereafter, the system will put the newly-added car into the list, and display the

following message:

Your current list of cars are:

- A, (3,9) S, FLFFFFFFLR

However, if you input invalid commands, e.g., you input:

FLFFFFFFLr

Then the system will display the following error message:

Sorry you input invalid commands (FLFFFFFFLr) for the car B.

Then the system will prompt you to re-enter the commands of the car, until you can

input a valid commands.

By repeating all the above operations (under point 4), you can add multiple cars into

the simulation field.

1. After adding one or multiple cars, you can run simulation. When the system prompts the following text again:

Please choose from the following options:

[1] Add a car to field

[2] Run simulation

Then you select:

2

The system will at first display the original status (including coordinates, direction and commands) of each car in the fleet:

Your current list of cars are:

- A, (3,9) S, FLFFFFFFLR

- B, (2,6) S, LFFFRRFFFL

The system will then run a simulation based on each car’s original status and commands, and return the final status (coordinates and direction) of all cars in the fleet.

If there is not any collision happening across cars, the system will display normal status like below:

After simulation, the result is:

- A, (9,8) E

- B, (2,6) S

If there is any collision between cars, the system will display something like below:

After simulation, the result is:

- A, collides with C,B at (5,4) at step 7

- B, collides with A,C at (5,4) at step 7

- C, collides with A,B at (5,4) at step 6

- D, (5,1) E

- E, (8,9) N

1. After running the simulation, the system will prompt the following text for a user to decide whether to start over or exit the system:

Please choose from the following options:

[1] Start over

[2] Exit

If you select:

1

Then the system will start over and repeat from Step 2

If you select:

2

Then you will exit the car simulation system, and get the following "goodbye" message displayed:

Thank you for running the simulation. Goodbye!