

# PUMASIMBOT

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PUMASIMBOT is a system to test robots behaviors.

To use it please follow the next instructions:

1. Using an Ubuntu-Linux operating system, unpack pumasimbot.zip in the user's directory.
2. Unpack data\_pumasimbot in the user's directory.
3. Open an X terminal and go to the directory where the programs are with the following command:

```
cd pumasimbot
```

Change the permissions of the file pumasimbot\_make with the following command:

```
chmod 777 pumasimbot_make
```

Compile the source files with the following command:

```
./pumasimbot_make
```

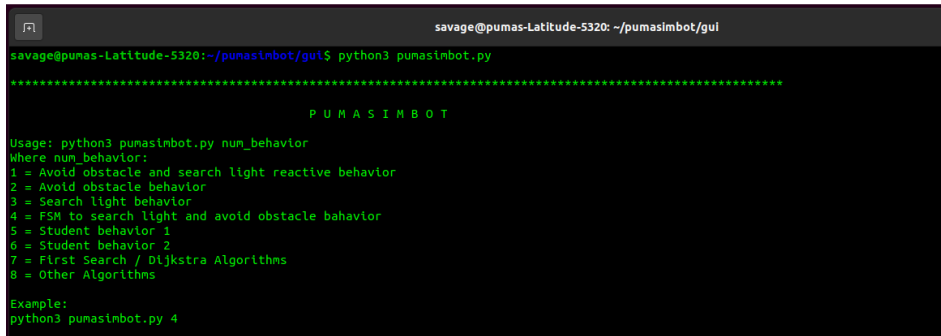
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During compilation is possible that some warnings will appear.

## 4. GUI usage:

If there were no critical compilation errors, go to directory gui and type the following command to see the system usage:

```
python3 pumasimbot.py
```



```
savage@pumas-Latitude-5320: ~/pumasimbot/gui
savage@pumas-Latitude-5320:~/pumasimbot/gui$ python3 pumasimbot.py
*****
                P U M A S I M B O T
Usage: python3 pumasimbot.py num_behavior
Where num_behavior:
1 = Avoid obstacle and search light reactive behavior
2 = Avoid obstacle behavior
3 = Search light behavior
4 = FSM to search light and avoid obstacle behavior
5 = Student behavior 1
6 = Student behavior 2
7 = First Search / Dijkstra Algorithms
8 = Other Algorithms

Example:
python3 pumasimbot.py 4
```

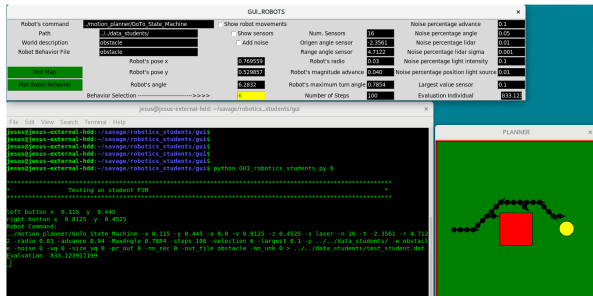
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5. Select the type of behavior to be tested after the command `python3 pumasimbot`

For example to test a behavior that looks for a light source while avoiding obstacles, type the following command:

```
python3 pumasimbot 4
```

In the PLANNER window select the robot's origin with the mouse's left button. Select the robot's destination with the mouse's right button.



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6. Different behaviors can be selected in the Behavior Selection option. In the field World description can be selected the environment where the simulated robot operates, there are 14 environments: obstacle, random\_1, random\_2,..., random\_13. When a new environment is selected push the Plot Map button to display it. The result of robot's results can be seen again pushing button Plot Robot Behavior. To display the robot's sensors select the check button Show sensors.

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To display the movement of the robot step by step select the check button Show robot movements. To add noise to the sensors and to the movement select the check button Add Noise.

The screenshot displays the PUMASIMBOT GUI, which is divided into several sections:

- Robot's command:** `./motion_planner/GoTo_State_Machine`
- Path:** `./data_students/`
- World description:** `obstacle`
- Robot Behavior File:** `obstacle`
- Buttons:** `Plot Map` and `Plot Robot Behavior` (highlighted in green).
- Behavior Selection:** A dropdown menu showing `0`.
- Robot's pose:**
  - Robot's pose x: `0.769559`
  - Robot's pose y: `0.529857`
  - Robot's angle: `6.2832`
- Sensors:**
  - Num. Sensors: `16`
  - Origin angle sensor: `-2.3561`
  - Range angle sensor: `4.7122`
  - Robot's radio: `0.03`
  - Robot's magnitude advance: `0.040`
  - Robot's maximum turn angle: `0.7854`
  - Number of Steps: `100`
- Noise percentage:**
  - Noise percentage advance: `0.1`
  - Noise percentage angle: `0.05`
  - Noise percentage lidar: `0.01`
  - Noise percentage lidar sigma: `0.001`
  - Noise percentage light intensity: `0.1`
  - Noise percentage position light source: `0.01`
  - Largest value sensor: `0.1`
  - Evaluation Individual: `833.12`
- Terminal:** Displays the command `python GUI_robotics_students.py 0` and the output: `Testing an student FSM`, followed by a series of parameters and the evaluation result `833.123917199`.
- PLANNER:** A 2D plot showing the robot's path (blue dots) and the environment (green background with a red square obstacle and a yellow circle).