

README

Softwares used:

- Ubuntu 20.04
- ROS Neotic
- Gazebo
- Python3

Libraries used:

- math
- matplotlib
- numpy
- networkx
- PIL
- scipy

Navigate to the '**darkwarehouse**' folder. The folder contains this '**README**' file, '**Warehouse Automation in Dark**' PPT file, '**Experiment Videos**' folder which has some of our result videos, and two ROS workspaces, namely '**single**' and '**multi**'.

Map Generation:

To start mapping the environment please launch

- *cd /single*
- *source devel/setup.bash*
- *roslaunch atom world.launch*
- *roslaunch atom gmapping.launch*

Move the robot manually to all the places in environment

- *roslaunch teleop_twist_keyboard teleop_twist_keyboard.py*

Saving the map using map_server

- *roslaunch map_server map_saver -f map*

This command would give the following result:

```
[ INFO] [1418594807.613374681]: Waiting for the map
[ INFO] [1418594807.958979924, 126.530000000]: Received a 4000 X 4000 map @ 0.050 m/pix
[ INFO] [1418594807.959452501, 126.530000000]: Writing map occupancy data to map.pgm
[ INFO] [1418594808.997886519, 127.085000000]: Writing map occupancy data to map.yaml
[ INFO] [1418594808.998301431, 127.085000000]: Done
```

This command will create two files, `map.pgm` and `map.yaml`. The first one is the map in the `.pgm` format (the portable gray map format). The other is the configuration file for the map. If you open it, you will see the following output:

```
image: map.pgm
resolution: 0.050000
origin: [-100.000000, -100.000000, 0.000000]
negate: 0
occupied_thresh: 0.65
free_thresh: 0.196
```

The generated image is cropped accordingly and stored as `'warehouse.PNG'` in both the folders required `'/single/src/PRM'` and `'/multi/src/PRM'`.

For single robot environment

- `cd /single`
- `source devel/setup.bash`

Path Planning:

The start position and goal position of the robot can be altered in the lines 46-48 in `'/single/src/PRM/main.py'`. Then run the following commands and a path will be given in the terminal

- `cd /src/PRM`
- `python3 main.py`

Loading ROS warehouse environment:

- `roslaunch atom world.launch`
- `roslaunch atom lift_effort_control.launch`

Navigation:

Navigate back to the **'darkwarehouse'** folder.

- `cd /single/src/atom/scripts`
- `python3 pose_goal.py`

For two robot environment

Navigate back to the '**darkwarehouse**' folder. Then,

- `cd /multi`
- `source devel/setup.bash`

Path Planning:

The start position and goal position of the two robots can be altered in the lines 46-52 in '`/multi/src/PRM/main.py`'. Then run the following commands and two paths for two robot will be given in the terminal

- `cd /src/PRM`
- `python3 main.py`

Loading ROS warehouse environment:

- `roslaunch atom world.launch`
- `roslaunch atom lift_effort_control.launch`

Navigation:

Navigate back to the '**darkwarehouse**' folder.

- `cd /multi/src/atom/scripts`

Open two terminals and use the following commands, one in each of the terminals

- `python3 pose_goal.py`
- `python3 pose_goal_first.py`

Run both the commands in two terminals simultaneously.