Robotic Navigation and Exploration

HW1: Navigation with Known Map

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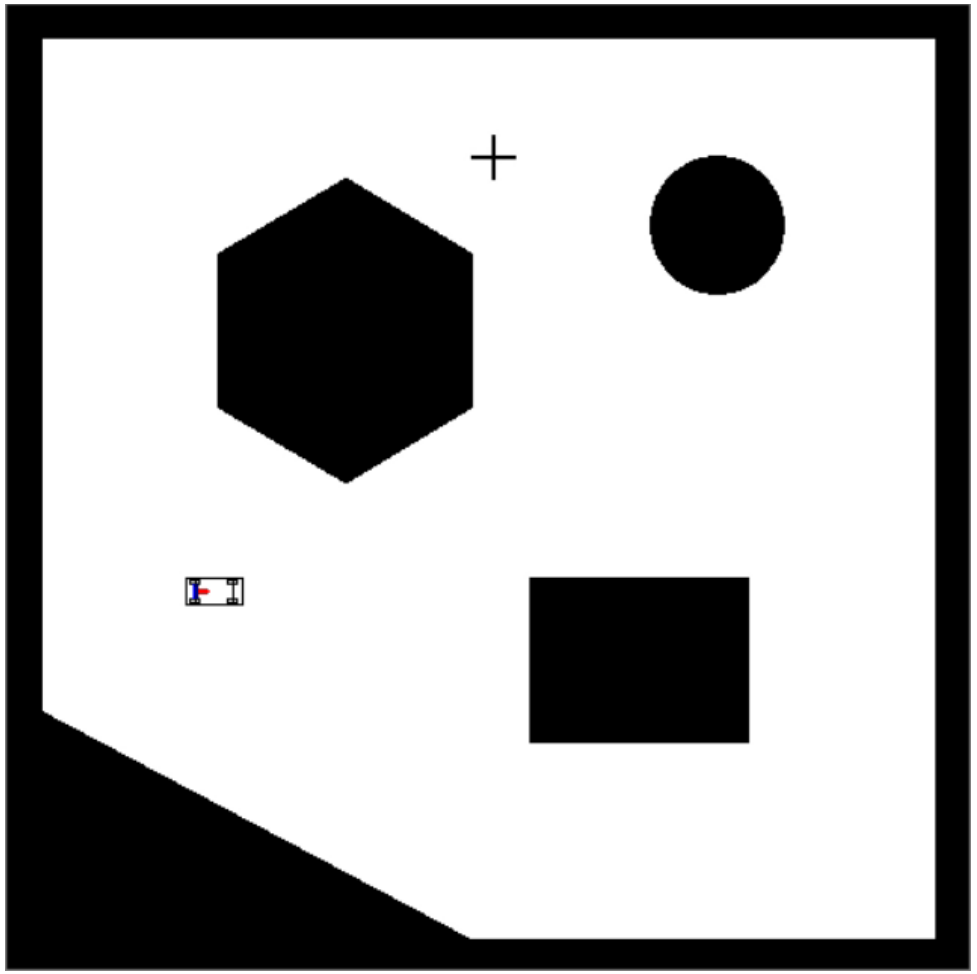
Navigation with Known Map



Control & Planning

- Complete the control of each vehicle.

```
if path is not None and collision_count == 0:
    # TODO: Planning anc Controlling
    if args.simulator == "basic":
        next_v = 0
        next_w = 0
        command = ControlState("basic", next_v, next_w)
    elif args.simulator == "diff_drive":
        next_lw = 0
        next_rw = 0
        command = ControlState("diff_drive", next_lw, next_rw)
    elif args.simulator == "bicycle":
        next_a = 0
        next_delta = 0
        command = ControlState("bicycle", next_a, next_delta)
    else:
        exit()
```

Collision Handling

- Handle the situation of collision.
- Hint: move backward and re-planning the path.

```
_, info = simulator.step(command)
# Collision Handling
if info["collision"]:
    collision_count = 1
if collision_count > 0:
    # TODO: Collision Handling
    pass
```

Run Code

```
python navigation.py -s [basic/diff_drive/bicycle] (simulator)
                     -c [pid/pure_pursuit/stanley/lqr] (controller)
                     -p [a_star/rrt/rrt_star] (planner)
                     -m [map path] (用預設就好)
```

Score

- **Path Tracking**
  - PID (Basic / Differential Drive / Bicycle) (7+7+6=20%)
  - Pure Pursuit (Basic / Differential Drive / Bicycle) (7+7+6=20%)
  - Stanley (Bicycle) (10%)
  - LQR (Basic / Differential Drive / Bicycle) (10% Bonus)
- **Path Planning**
  - A* (20%)
  - RRT* (20%)
- **Collision Handling** (10%)
- 請大家繳交前仔細確認以上功能

Deadline & Demo

- **Deadline: 2022/03/22 (10:00 pm)**
- **Homework Upload**
  - IP: 140.114.79.183 / Port 21
  - Directory: /RNE/HW1
  - Username: RNE_guest
  - Password: RNE2022nthu
  - 請將完整程式碼壓縮成zip並命名為 [學號]_[姓名]_v[版本].zip (如果要更新上傳檔案請設不同的版本號)
- **Demo**
  - 時間: 2022/03/24~2022/03/25 (2:00 pm ~ 5:00 pm)
  - 請至以下表單連結填寫Demo時間，各助教地點皆寫在上面
    - https://reurl.cc/NpgVXq
  - Deadline時我們會將上傳的檔案備份，之後繳交的不會採用，不用帶檔案或筆電過來