캡스톤 디자인

2학기

- A* Algorithm

A6 Blue

2022/9/6

Path Planning

Search-based
- Dijkstra
- A* - Dijkstra + heuristic cost
- D* - Dynamic A*

Sampling-based
- RRT - Random Tree
- RRT* - RRT + rewire

Artificial Intelligence
- ANN - Artificial Neural Network
- GA - Genetic Algorithm

Our Algorithm

- Design own algorithm
  - D*(A*) 기반 : 장애물 회피

- Using drone
  - 3D path planning
  - Safety distance
  - Cost function optimization
    : Distance(Euclidean) ~~+ Power(battery) + Stability(?)~~

- Using python & ROS
  - Simulation & 실제 비행

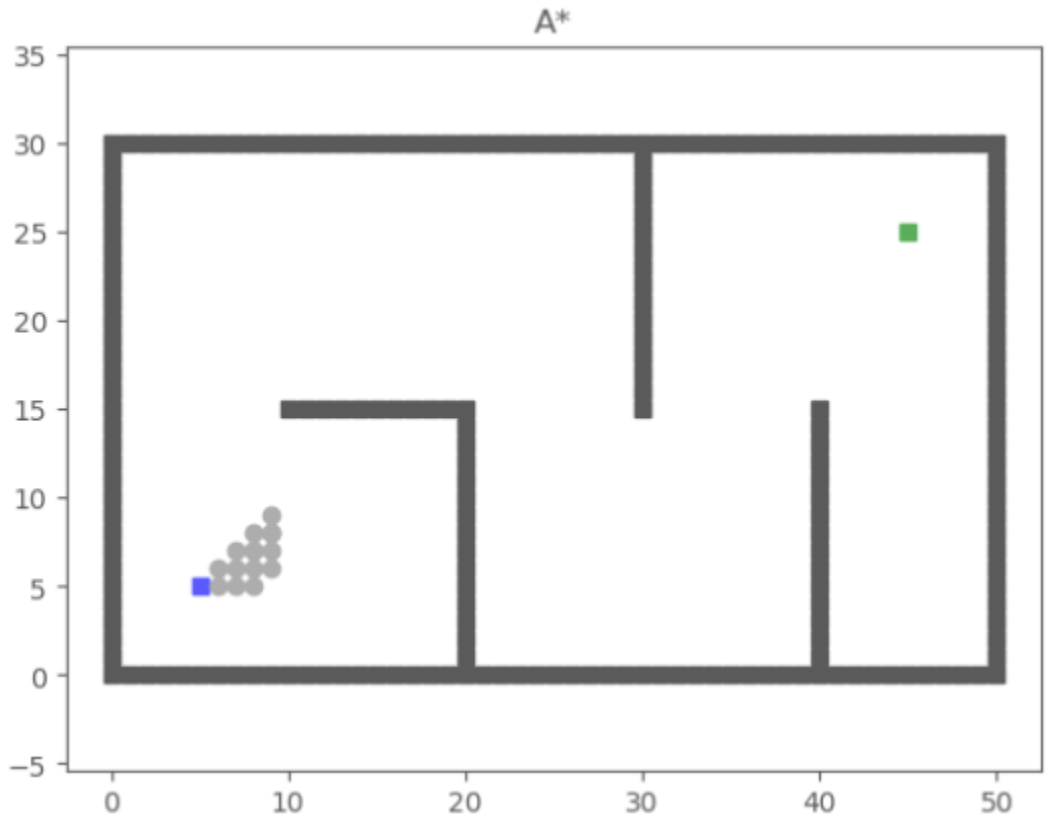
A* Algorithm

- Search-based algorithm
- Dijkstra + heuristic cost

- Cost function : f(n) = g(n) + h(n)

  g(n) : 현재 node까지의 cost

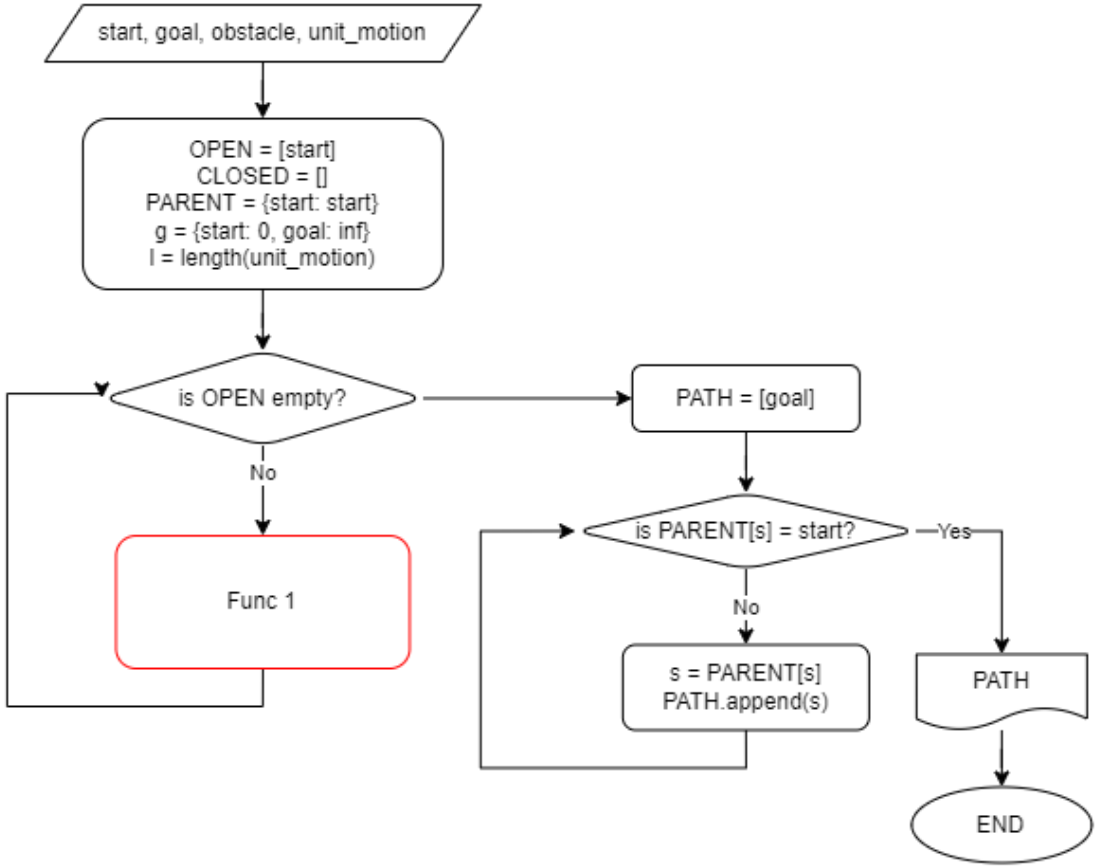
  h(n) : 현재 node부터 목표 node까지의 heuristic cost

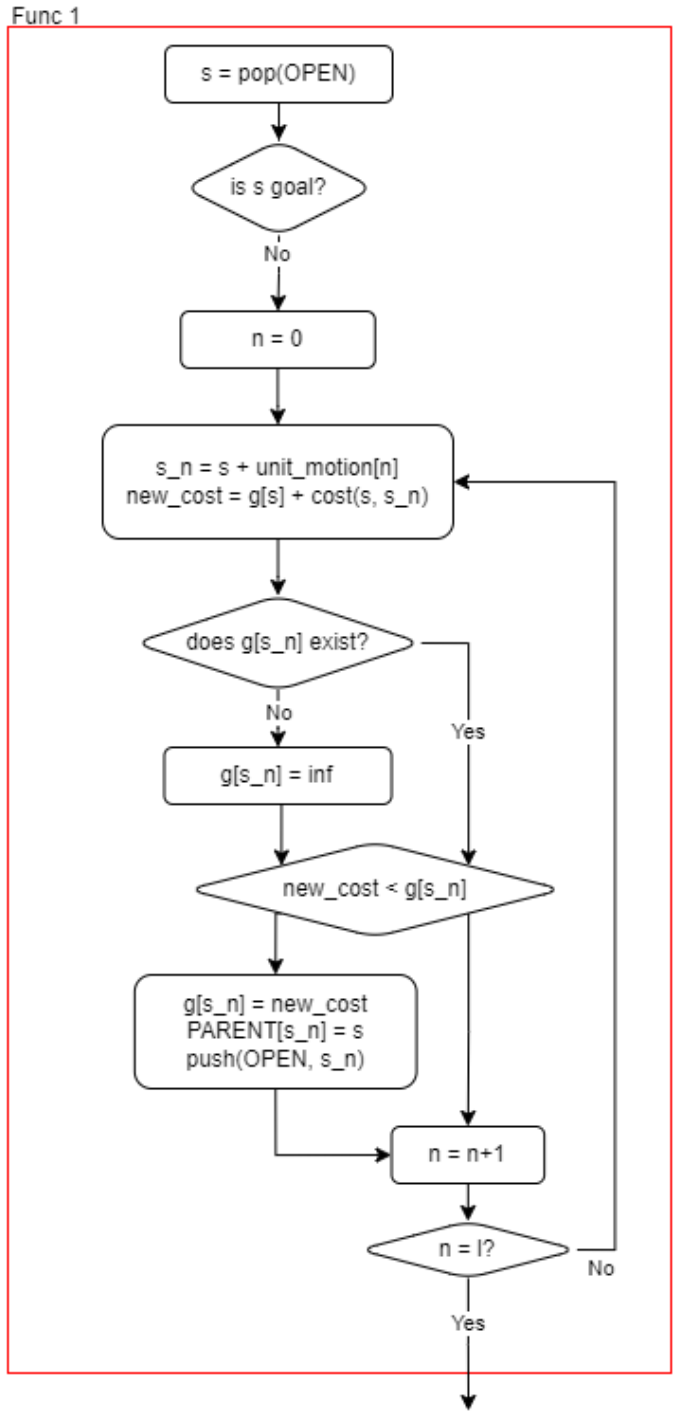


A* Algorithm

A6 Blue

- Flowchart



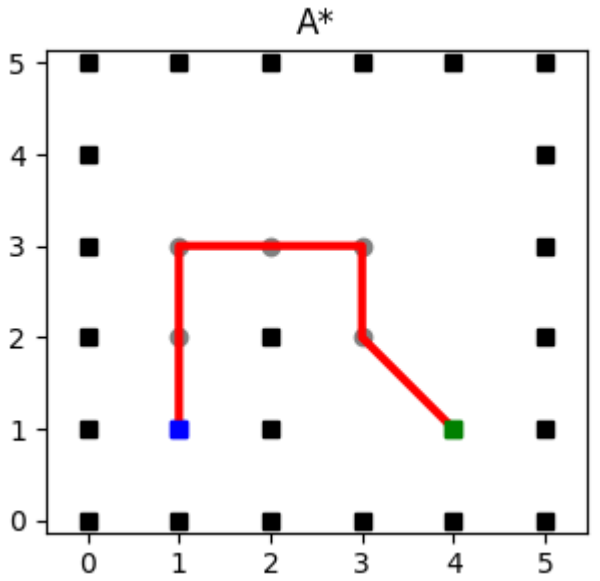


A* Algorithm

- Start = (1,1)
- Goal = (4,1)
- Unit_motion (이동할 수 있는 단위)

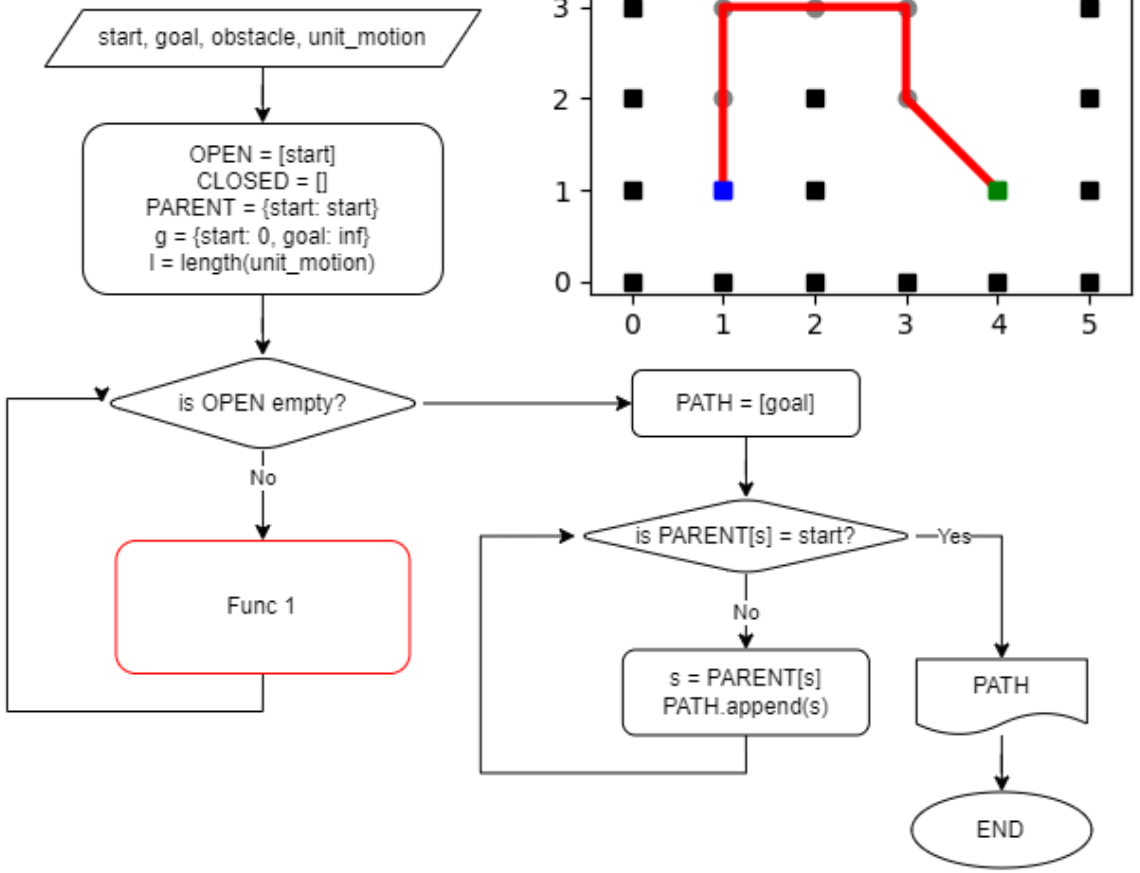
  [(-1, 0), (-1, 1), (0, 1), (1, 1), (1, 0), (1, -1), (0, -1), (-1, -1)]
- obstacle (장애물)

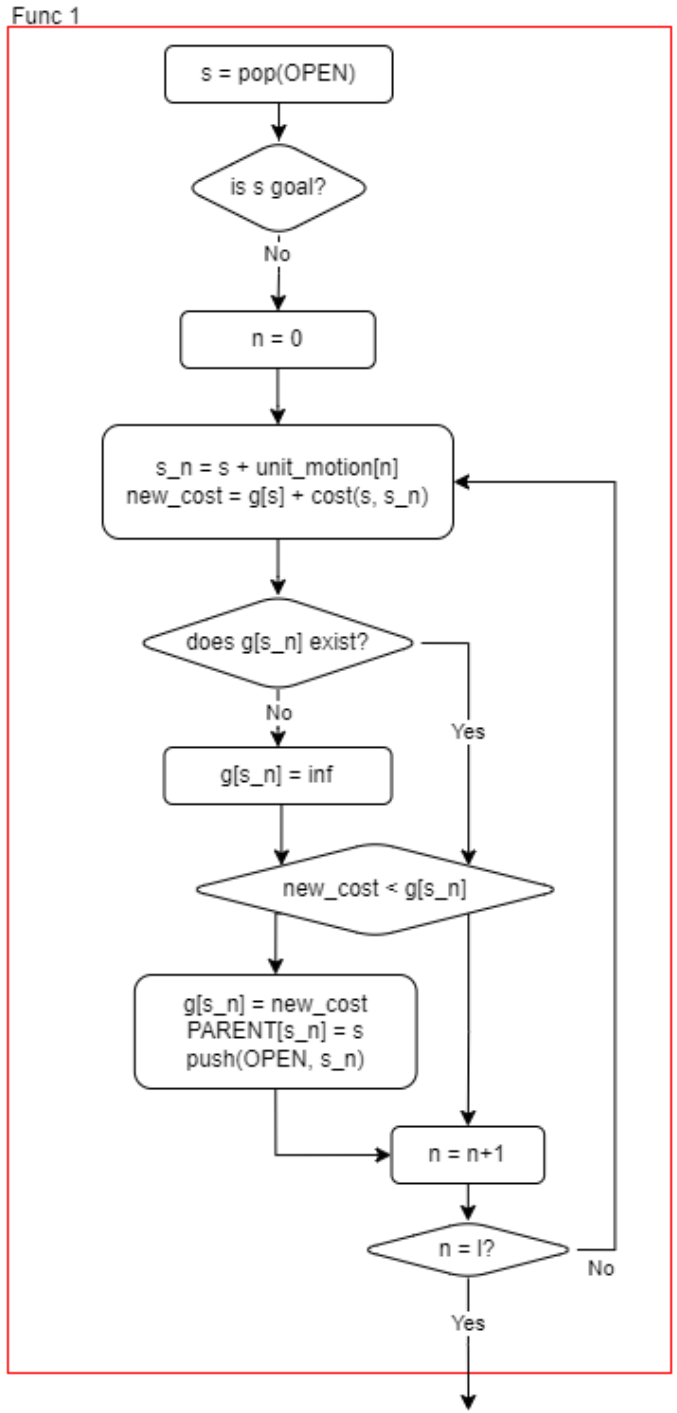
  {(4, 0), (3, 1), (5, 4), (5, 1), (0, 2), (0, 5), (1, 0), (2, 5), (3, 0), (0, 1), (0, 4), (1, 5), (3, 2), (3, 5), (5, 2), (5, 5), (0, 0), (0, 3), (2, 0)}



A* Algorithm

- Flowchart





D* Algorithm

- Search-based algorithm
- Dynamic A* algorithm

- 주어진 지도가 틀릴 경우, Local path를 수정하여 real-time path planning.