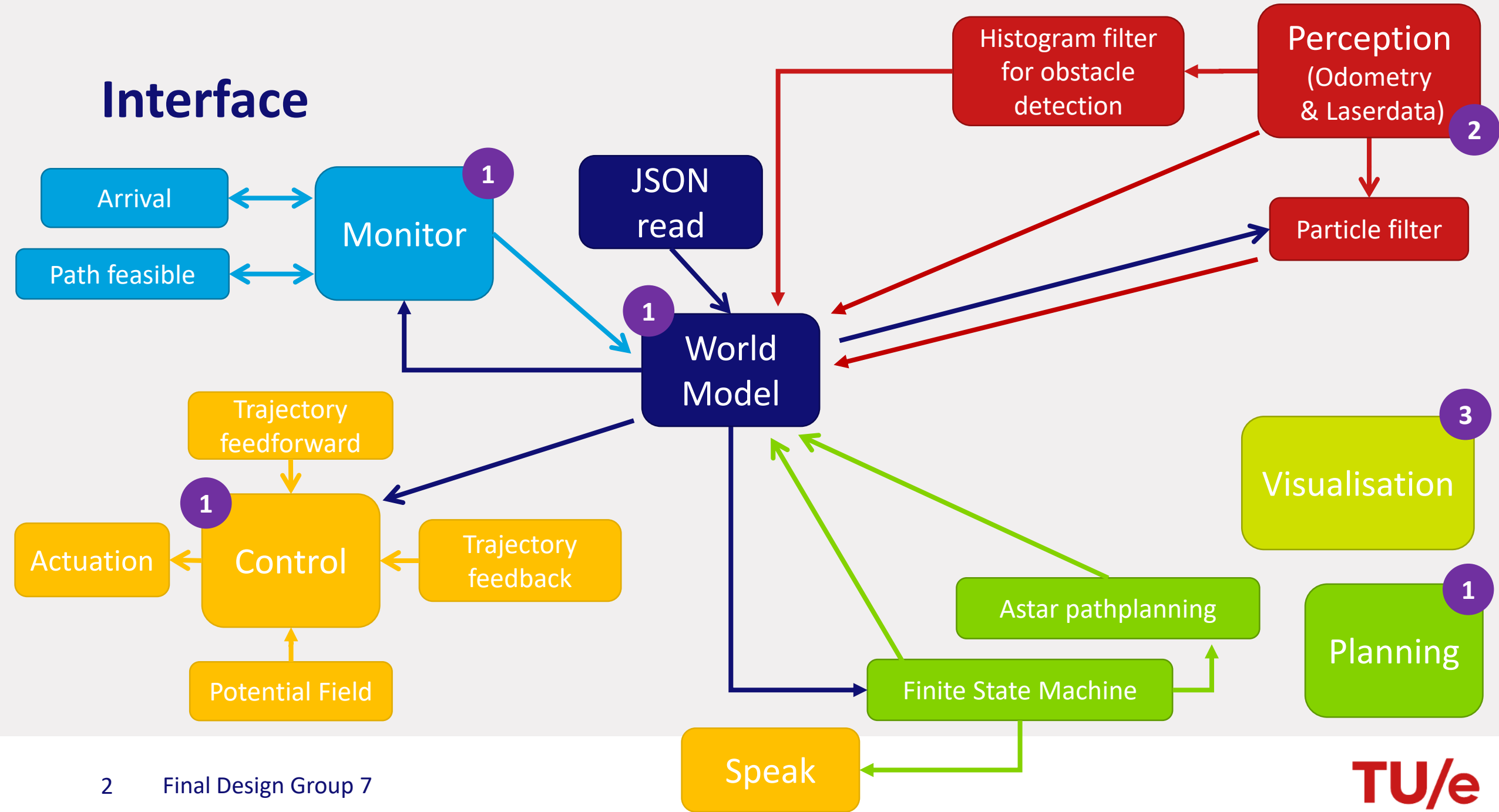




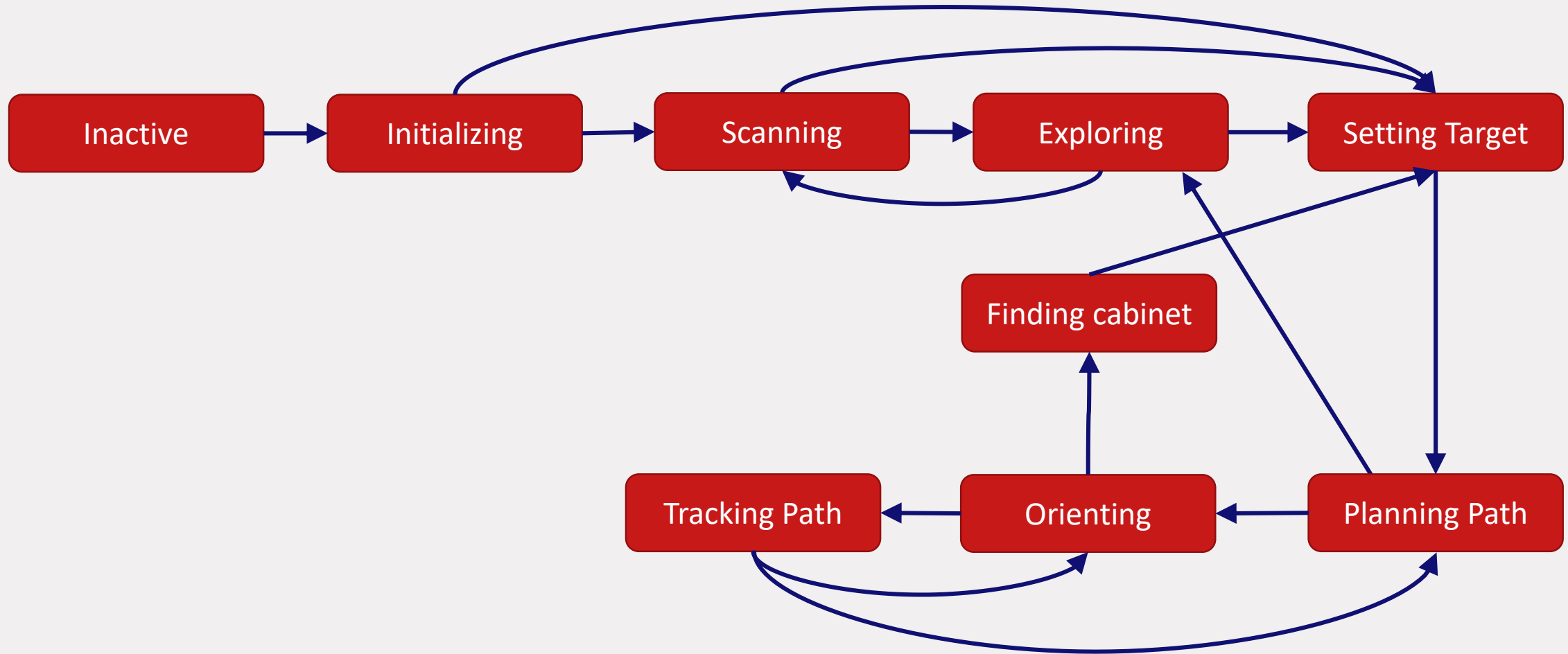
Final Design Group 7

Guus Bauwens
Ruben Beumer
Ainse Kokkelmans
Johan Kon
Koen de Vos

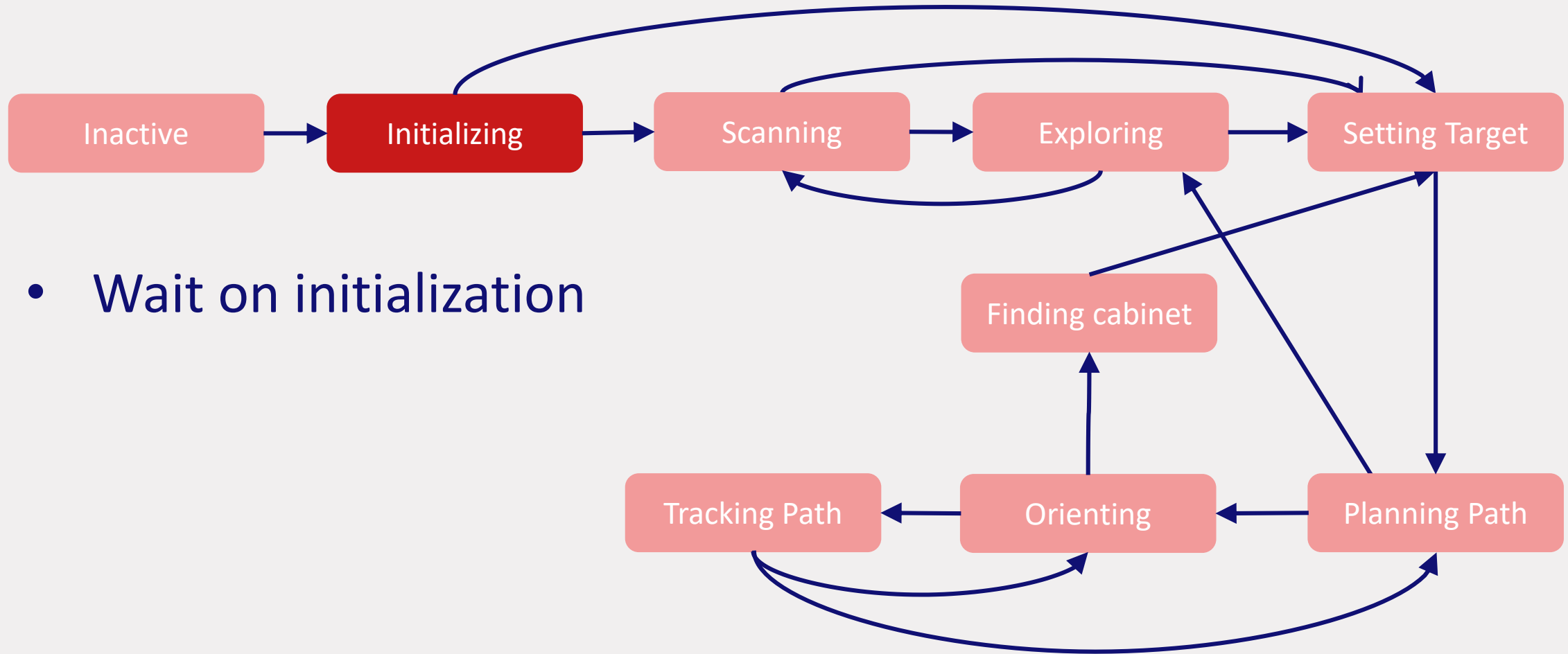
Interface



Finite State Machine

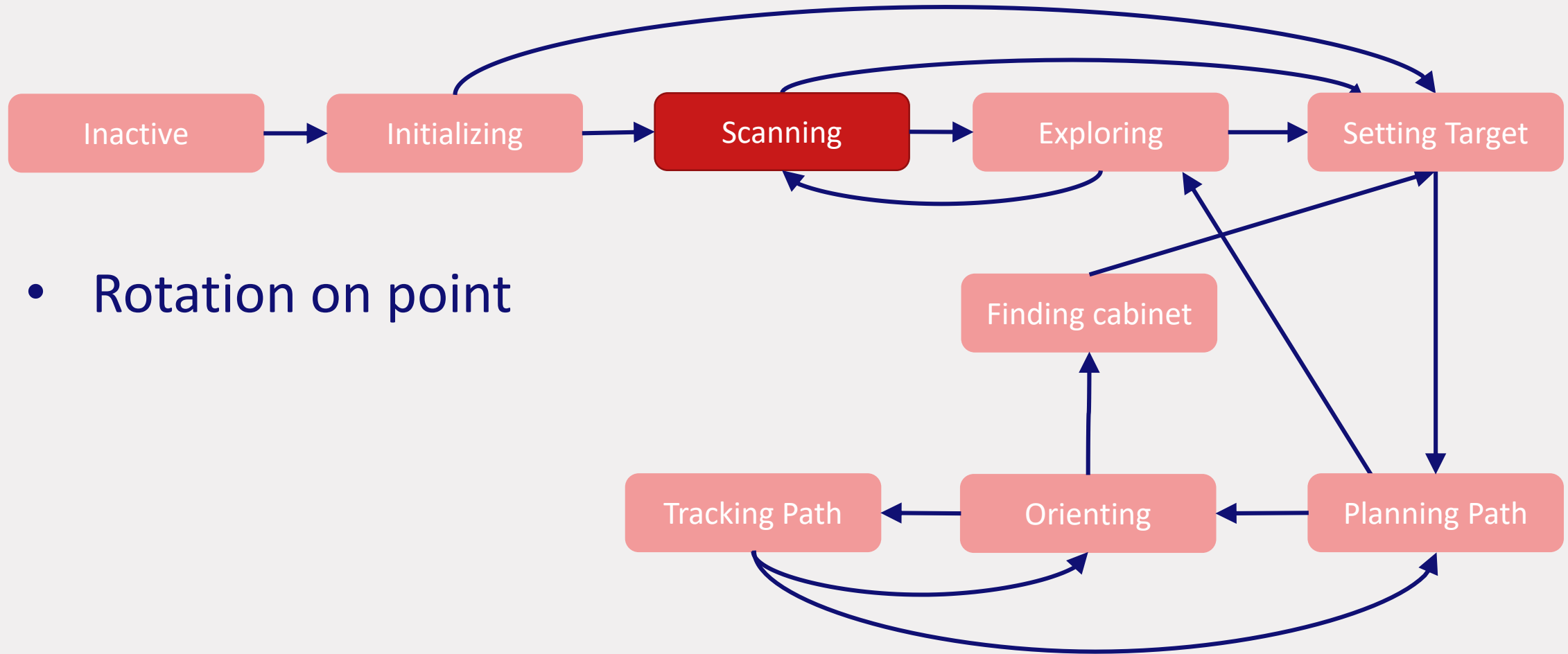


Finite State Machine



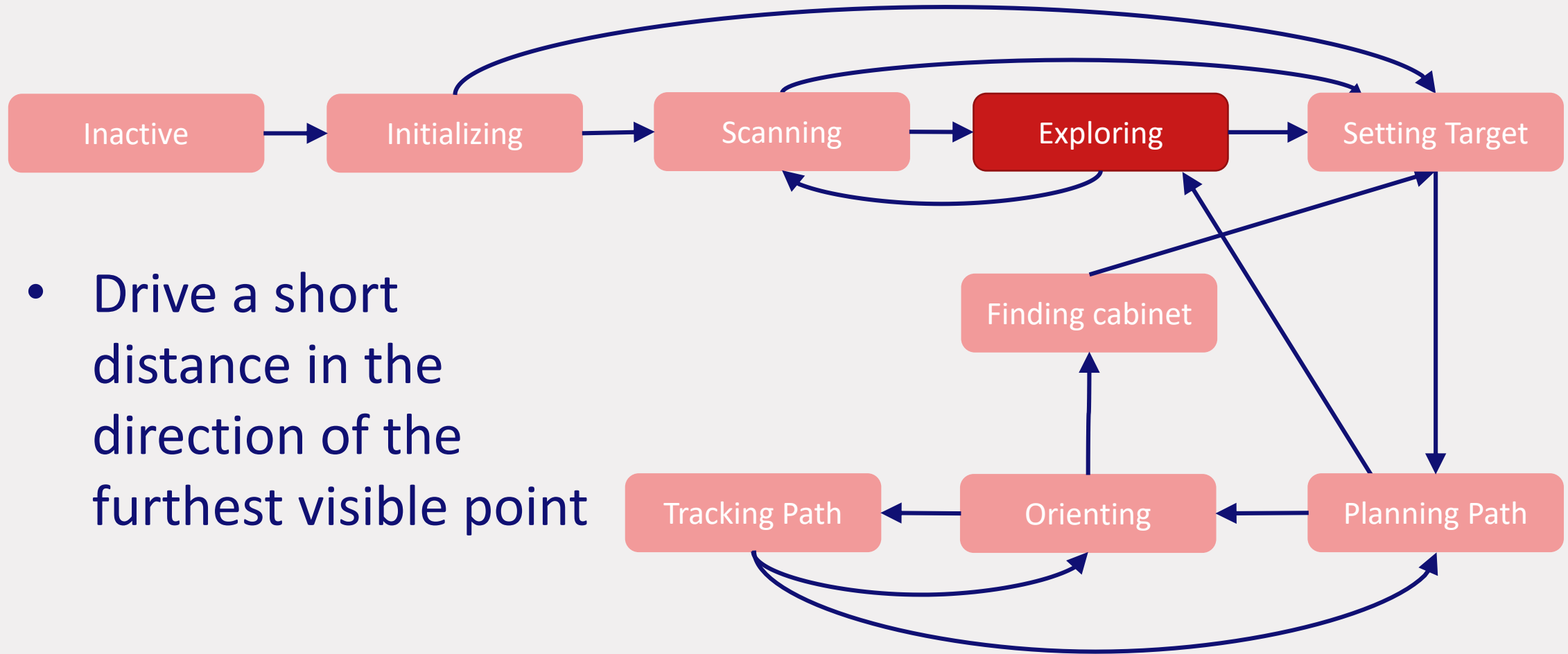
- Wait on initialization

Finite State Machine



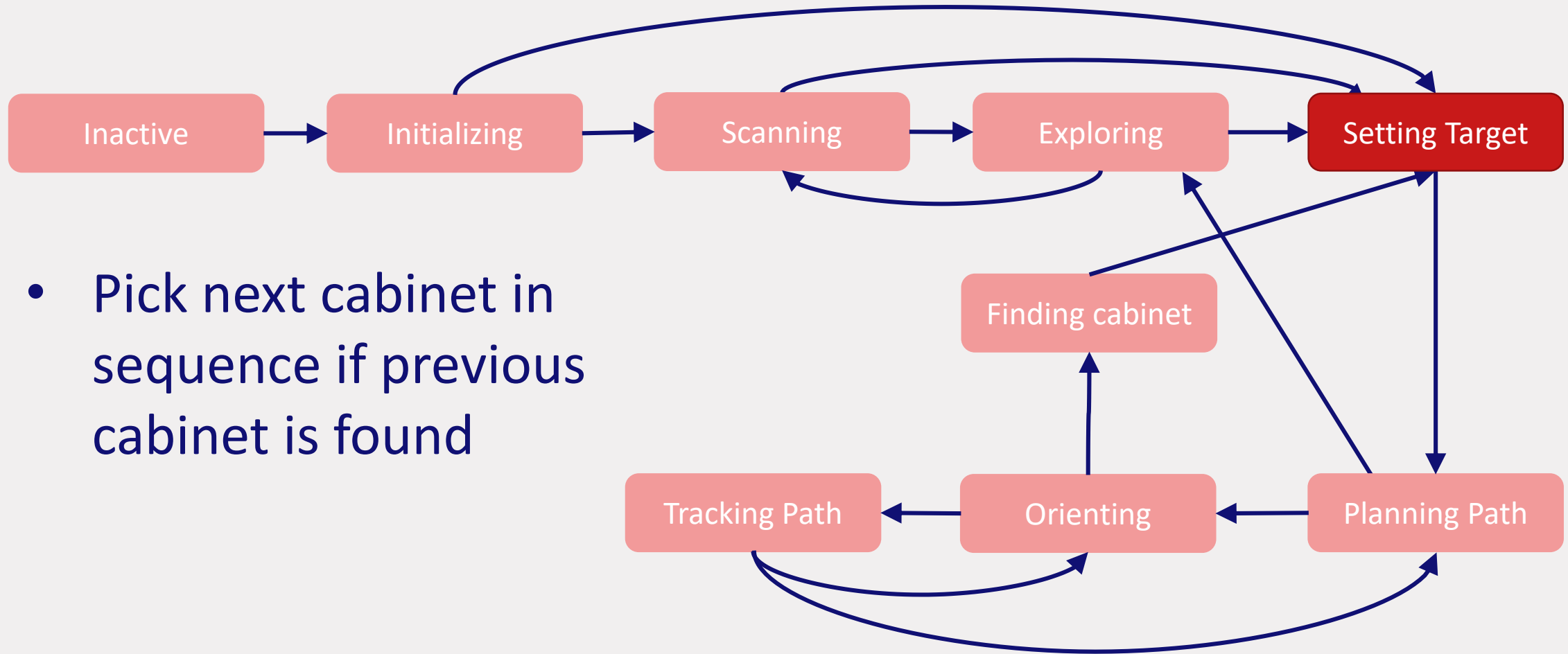
- Rotation on point

Finite State Machine



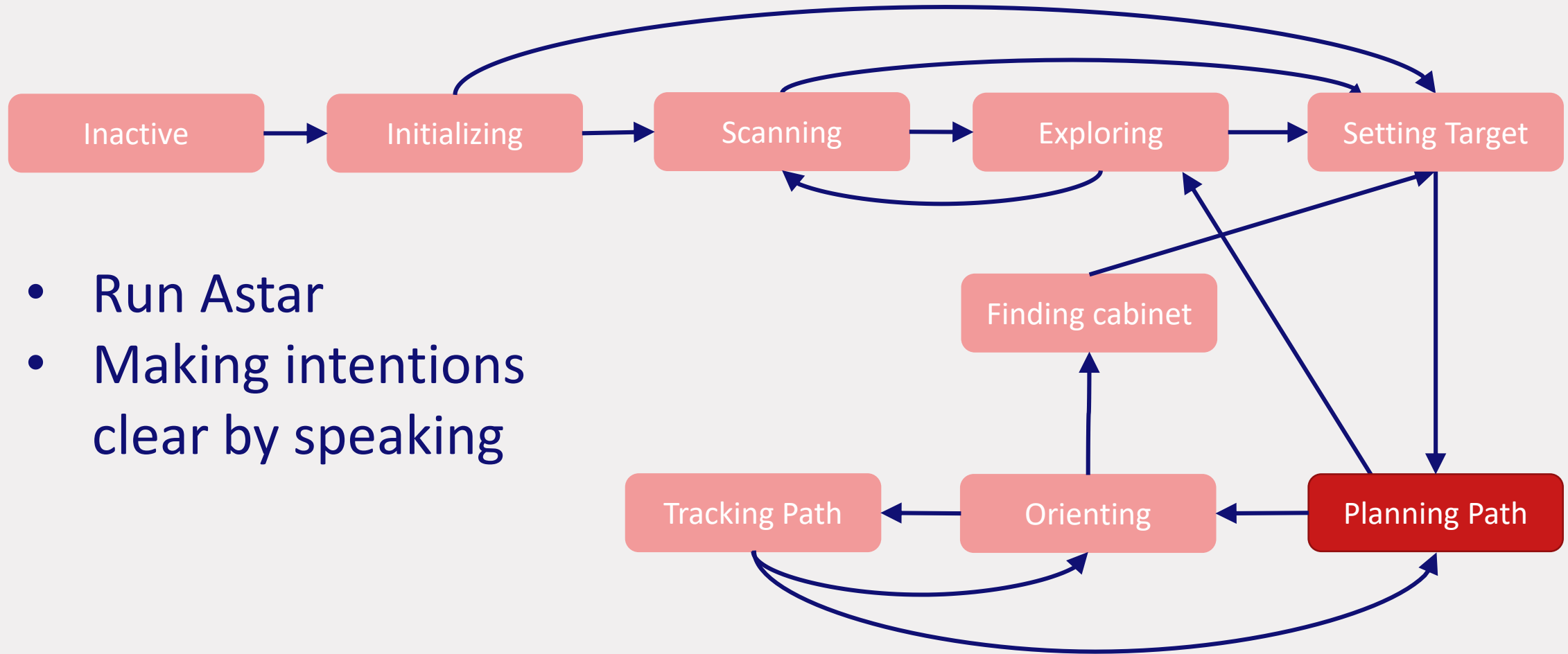
- Drive a short distance in the direction of the furthest visible point

Finite State Machine



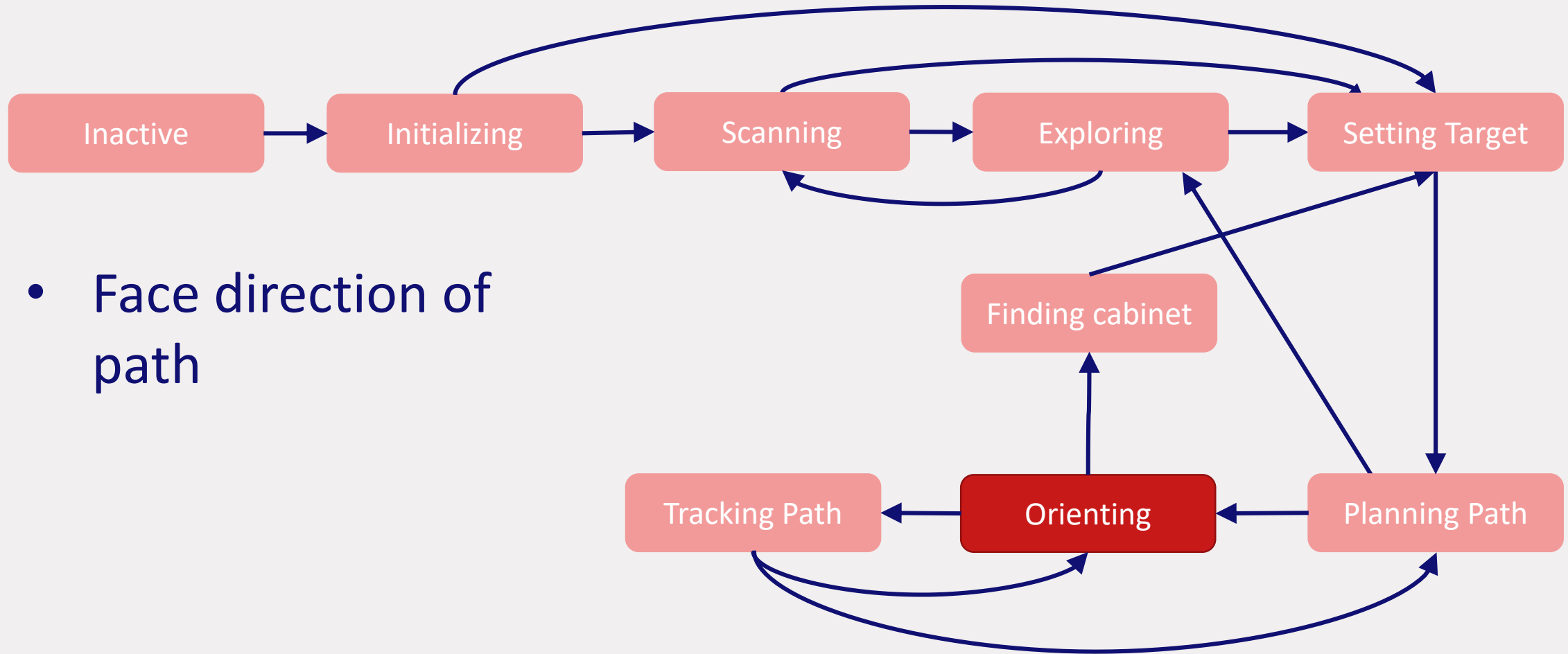
- Pick next cabinet in sequence if previous cabinet is found

Finite State Machine



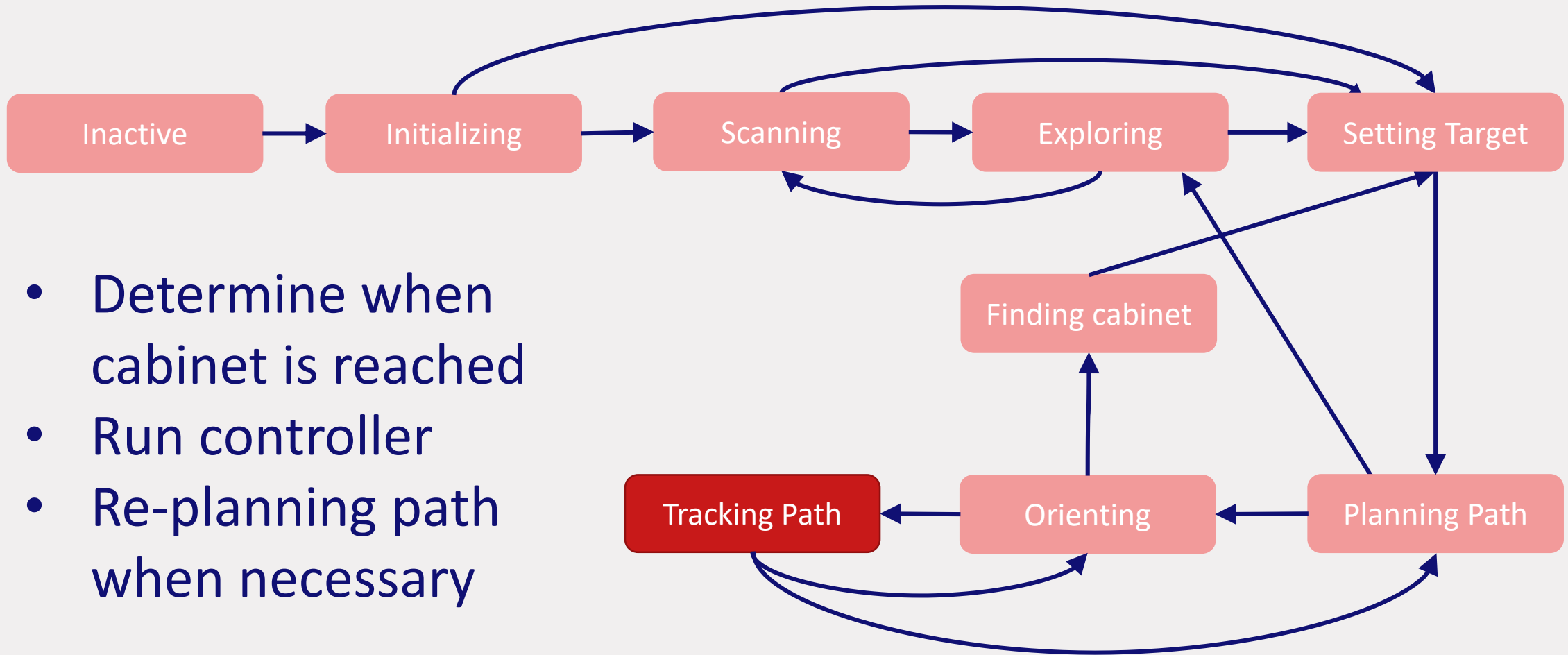
- Run Astar
- Making intentions clear by speaking

Finite State Machine



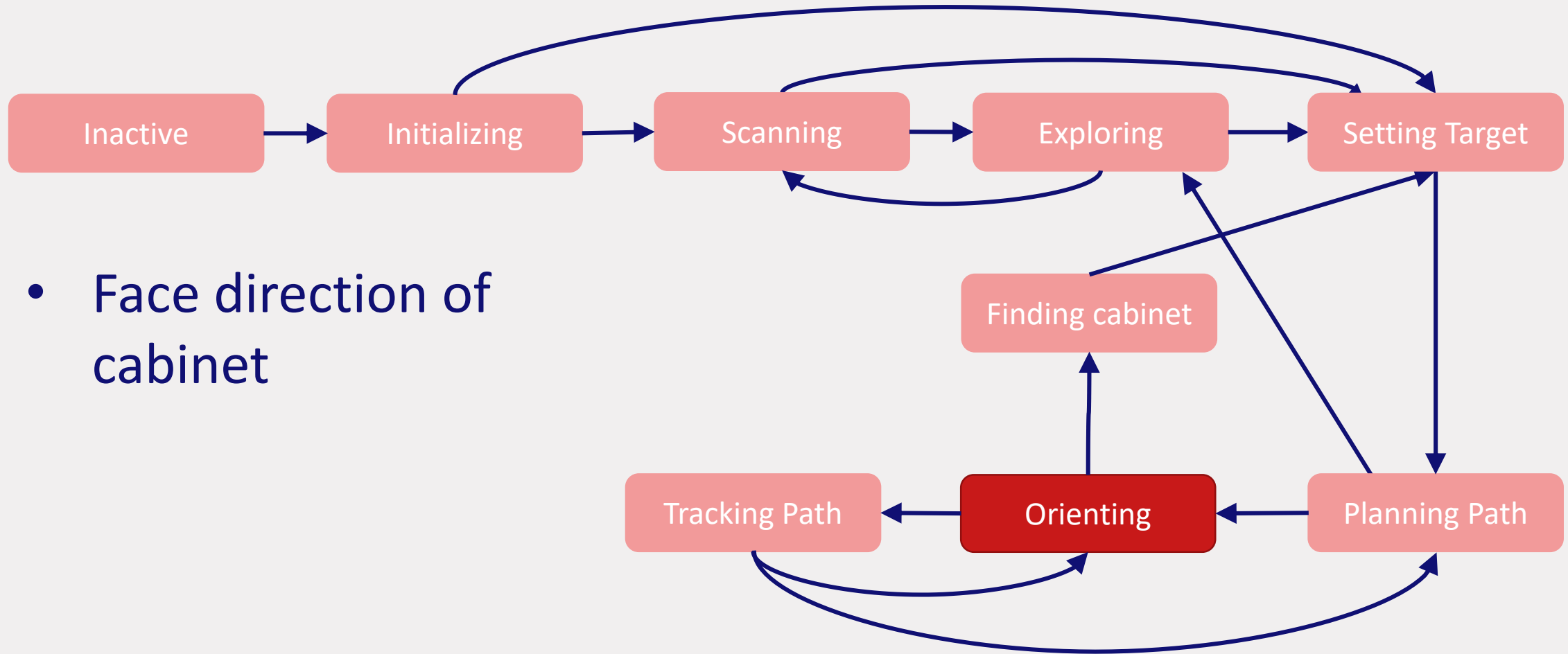
- Face direction of path

Finite State Machine



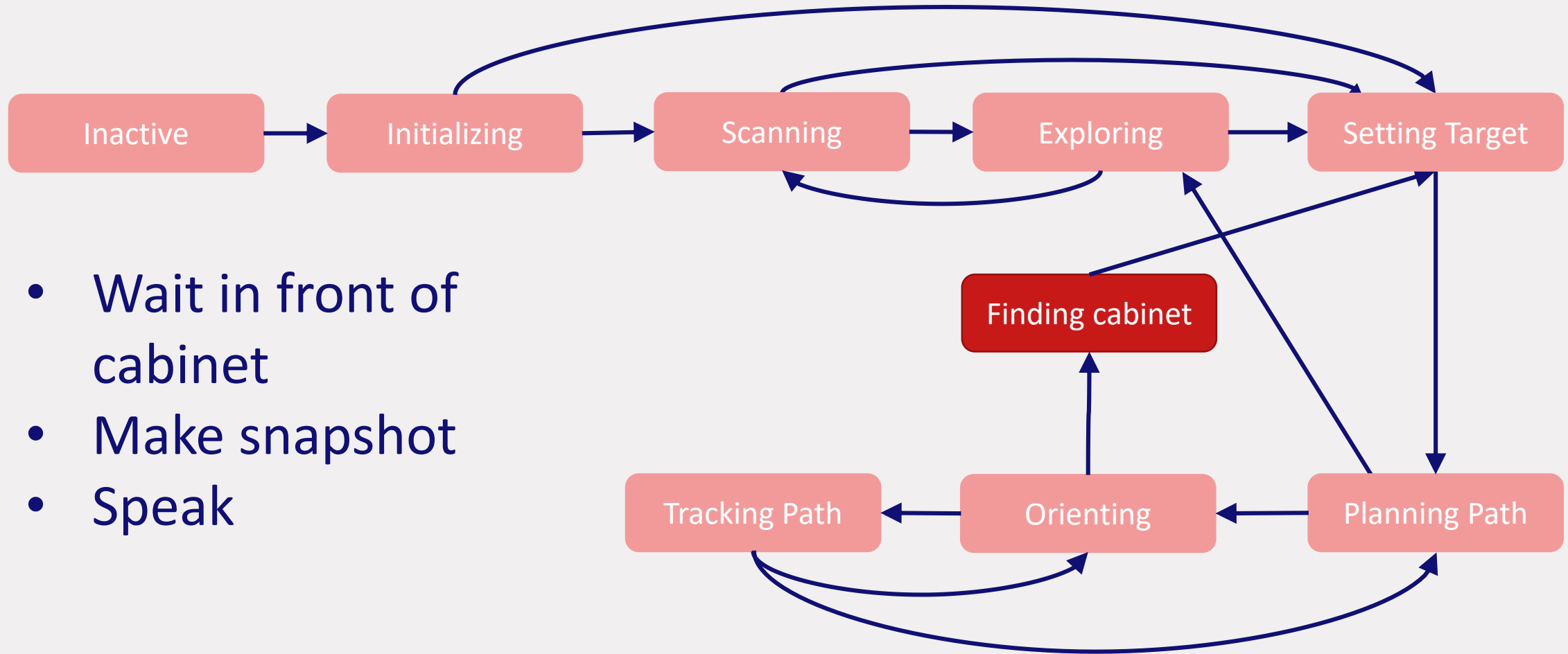
- Determine when cabinet is reached
- Run controller
- Re-planning path when necessary

Finite State Machine



- Face direction of cabinet

Finite State Machine

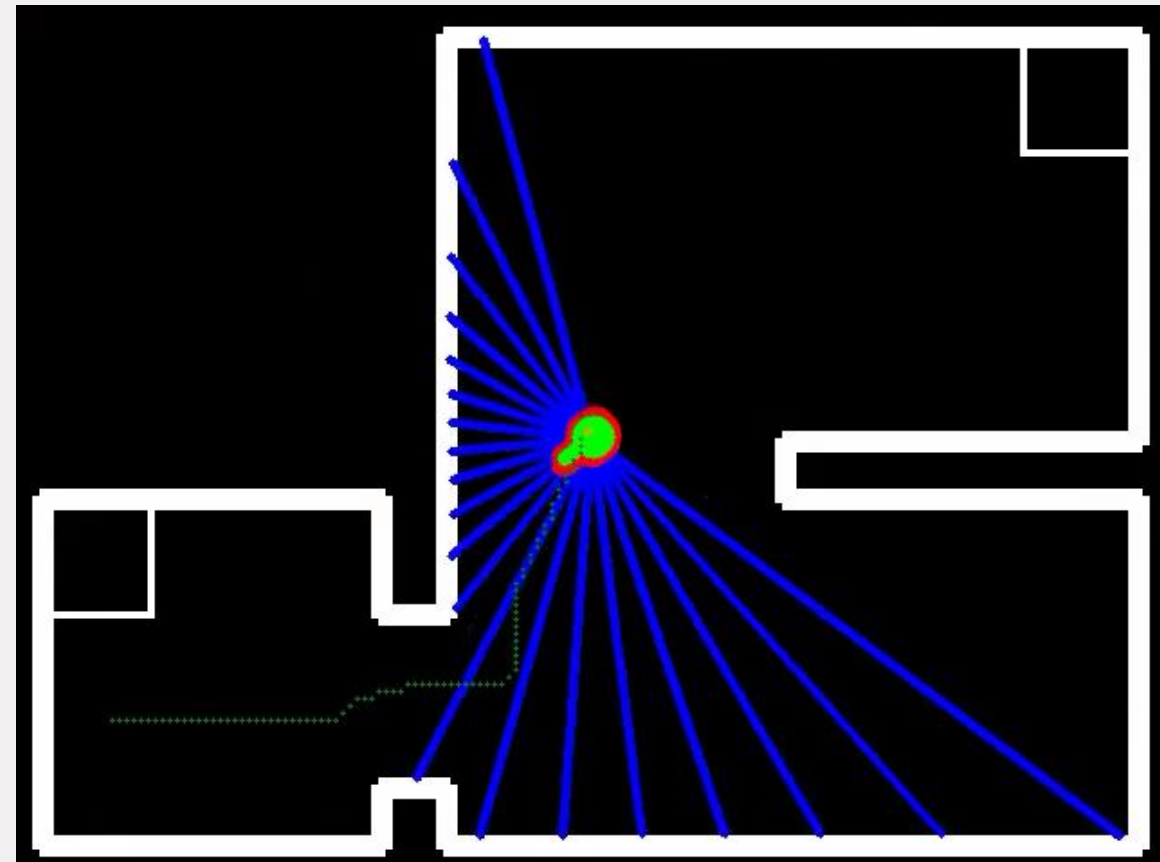


- Wait in front of cabinet
- Make snapshot
- Speak

Particle Filter

Localization on the given map

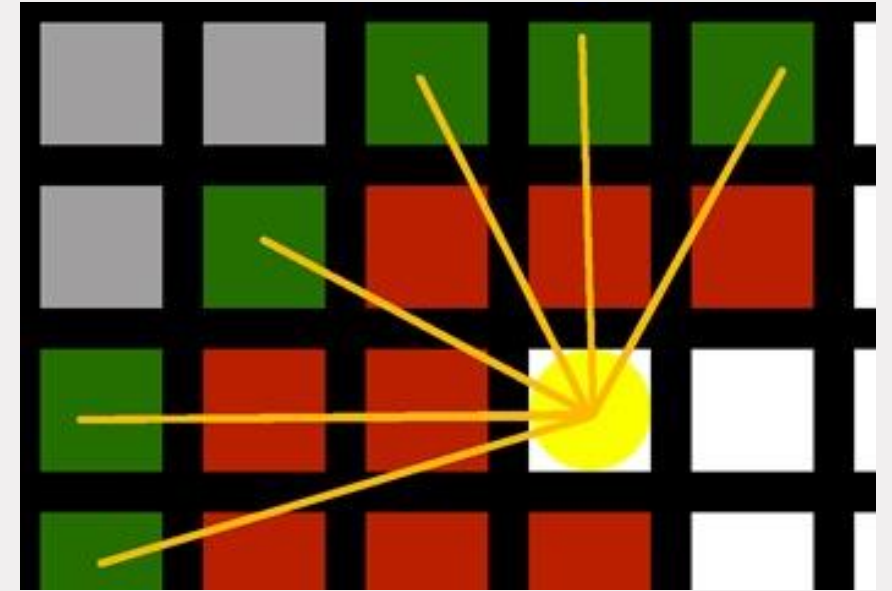
- Initialization procedure
- Particle -> Hypothesis of location
- LRF data compared to what particles “see”
- Resample based on particle probability
- Odometry data to propagate particles



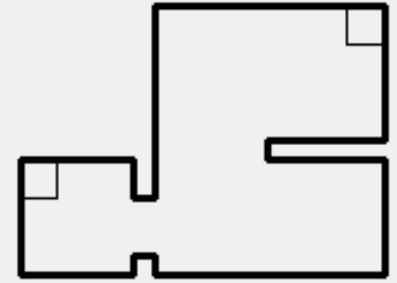
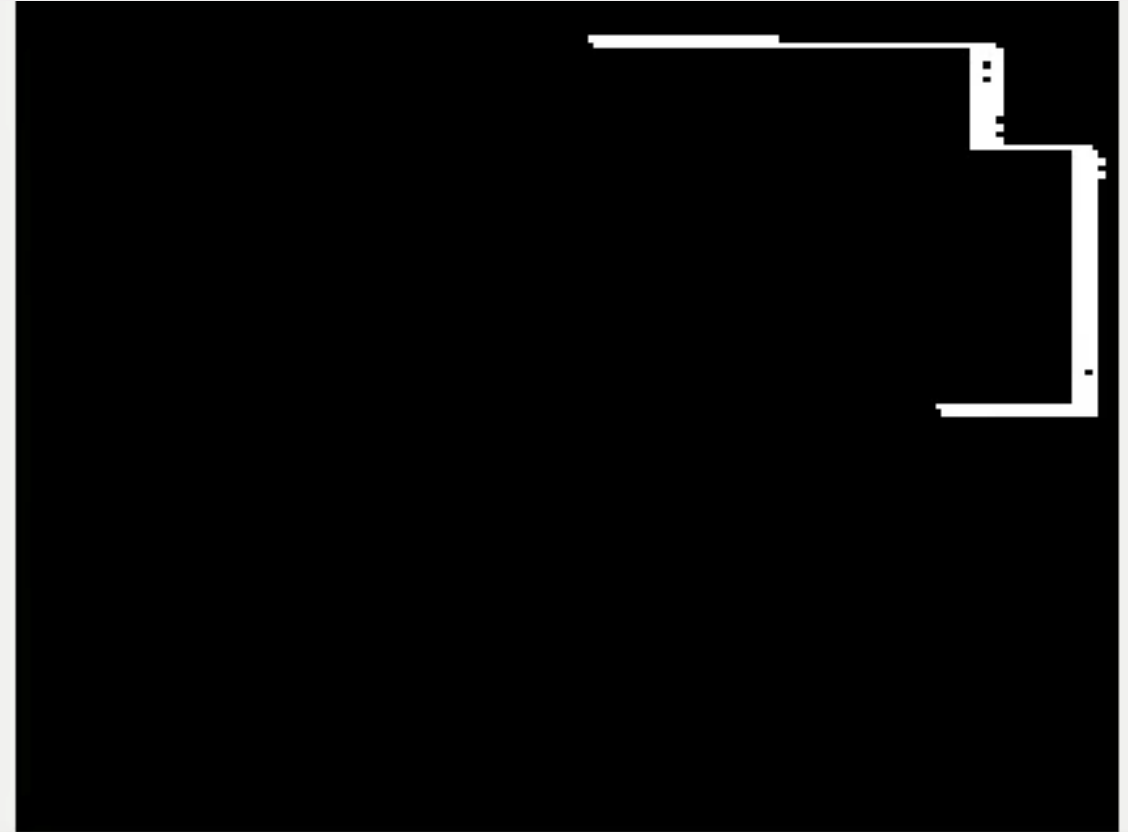
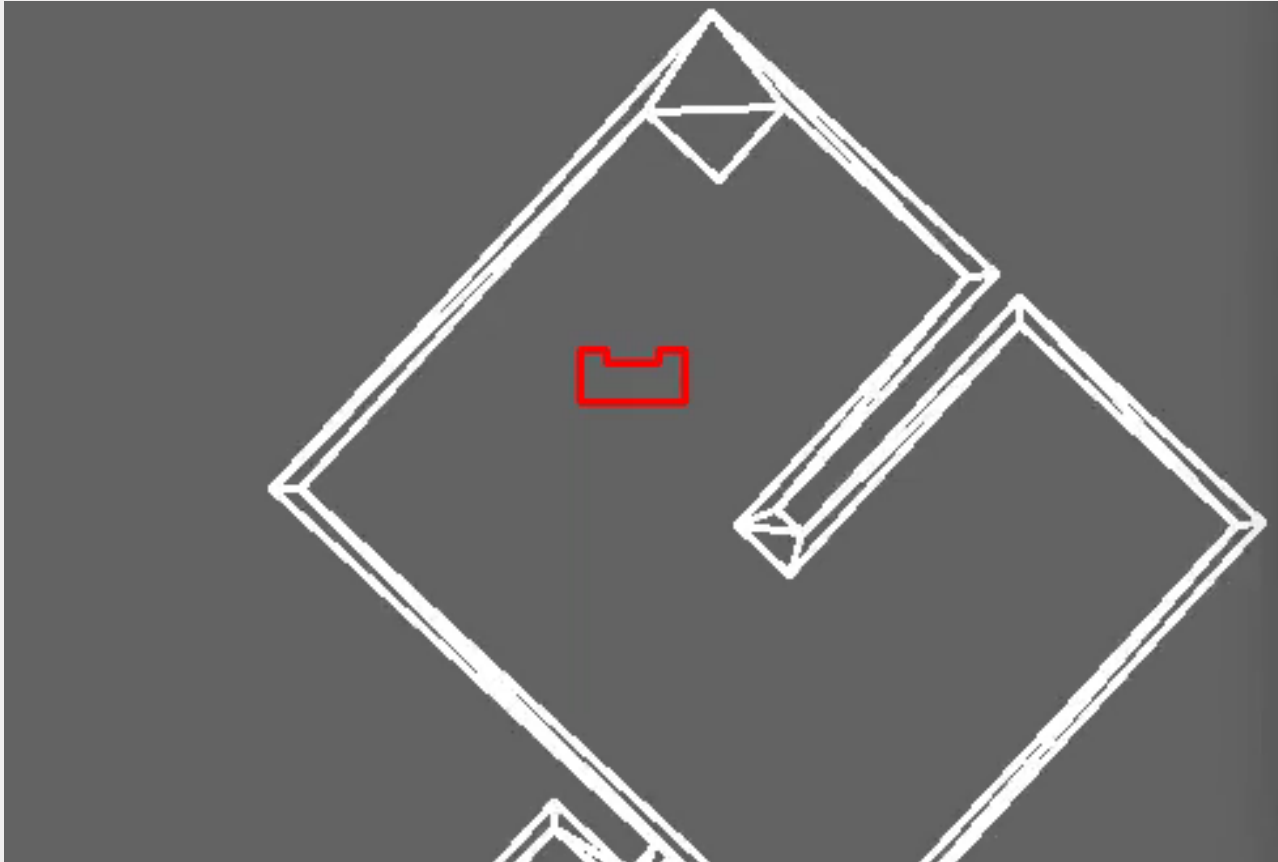
Histogram Filter

Detection of objects not on the map

- Uses estimated position
- Updating grid of possible object locations
- Recursively update probability (Bayes filter)
- Threshold probabilities to add object to map

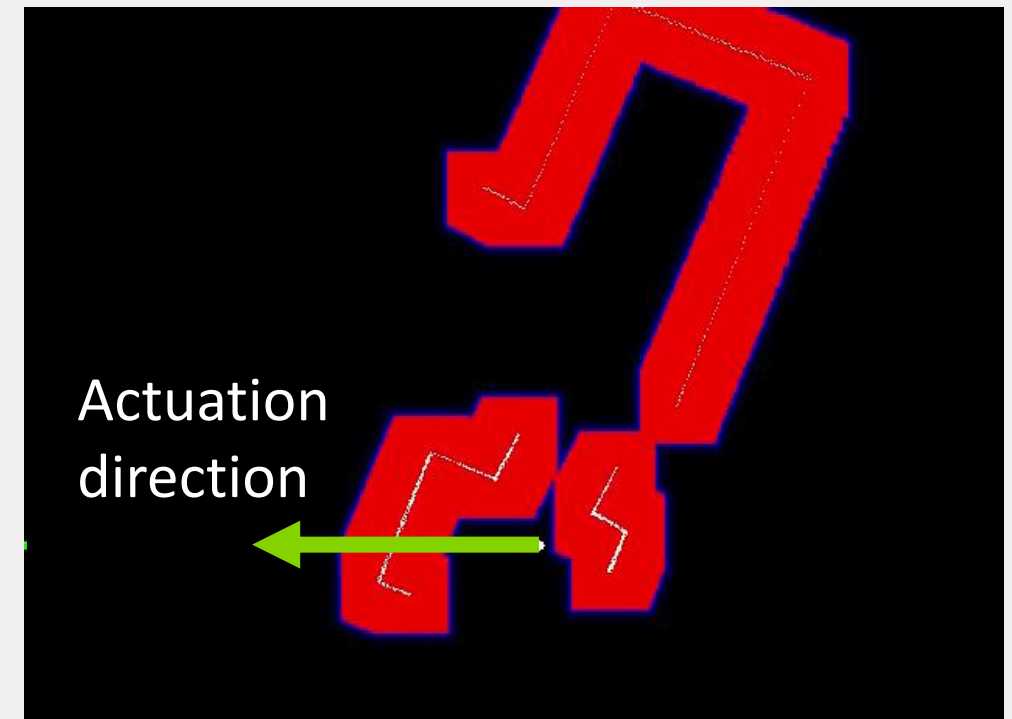
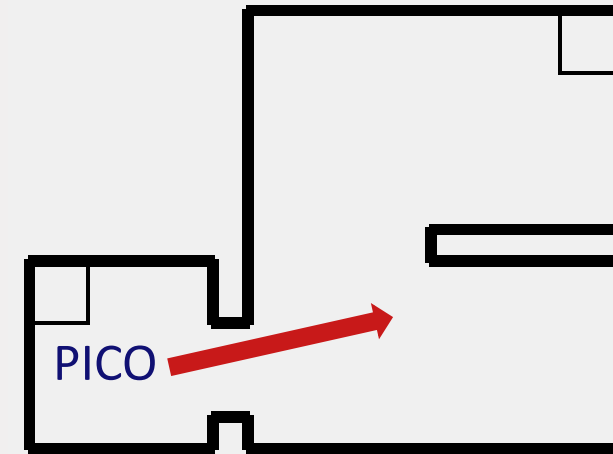


Histogram Filter



Potential Field

- LRF data points are used to create area where PICO is not allowed (red)
- Potential field scales inversely with distance to nearest wall
- Actuation direction based on gradient of field at robot location



Simulation test



Questions

The image shows a robot simulator interface. The main window displays a black maze with white walls. A small robot, represented by a green and red circle, is positioned in the center-right of the maze. Numerous blue lines radiate from the robot, representing its field of view or sensor rays. To the right of the maze is a smaller, zoomed-in view of the maze. Below the maze is a terminal window with a dark background and red text. The terminal shows the following log output:

(x=99, v=486) ~ R:100 G:100 B:100

```
roscore http://... x emc2019@EM... x emc2019@EM... x +
^[[1;6DPico says: Picobello, I am standing in front of cabinet 1
Pico says: Driving towards cabinet 2.
Pico says: Picobello, I am standing in front of cabinet 2
Pico says: Driving towards cabinet 3.
Pico says: Picobello, I am standing in front of cabinet 3
Pico says: Driving towards cabinet 0.
Pico says: I am replanning to cabinet 0.
Pico says: Driving towards cabinet 0.
Pico says: Picobello, I am standing in front of cabinet 0

```