

Computational Motion Planning

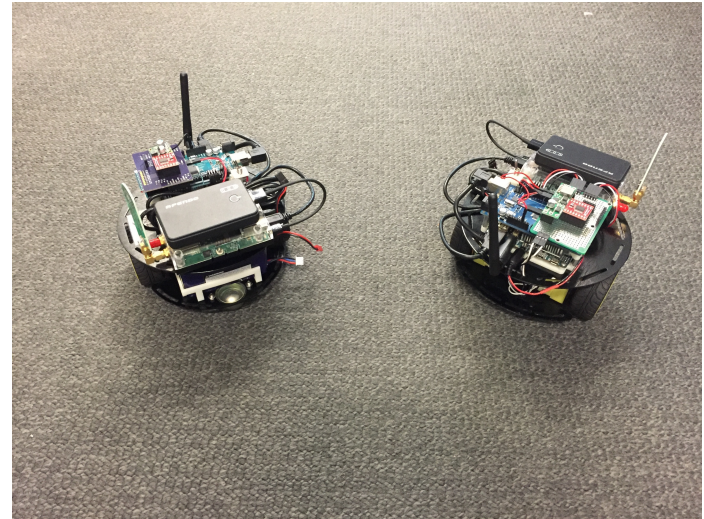
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SECTION 1.1 - INTRO

The Motion Planning Problem

- A special case of the more general planning problem
- The goal is to develop techniques that would allow a robot or robots to **automatically** decide how to move from one position or configuration to another.
 - Specifically concerned with planning motions – get robot from place A to B

Motion Planning for Robotics



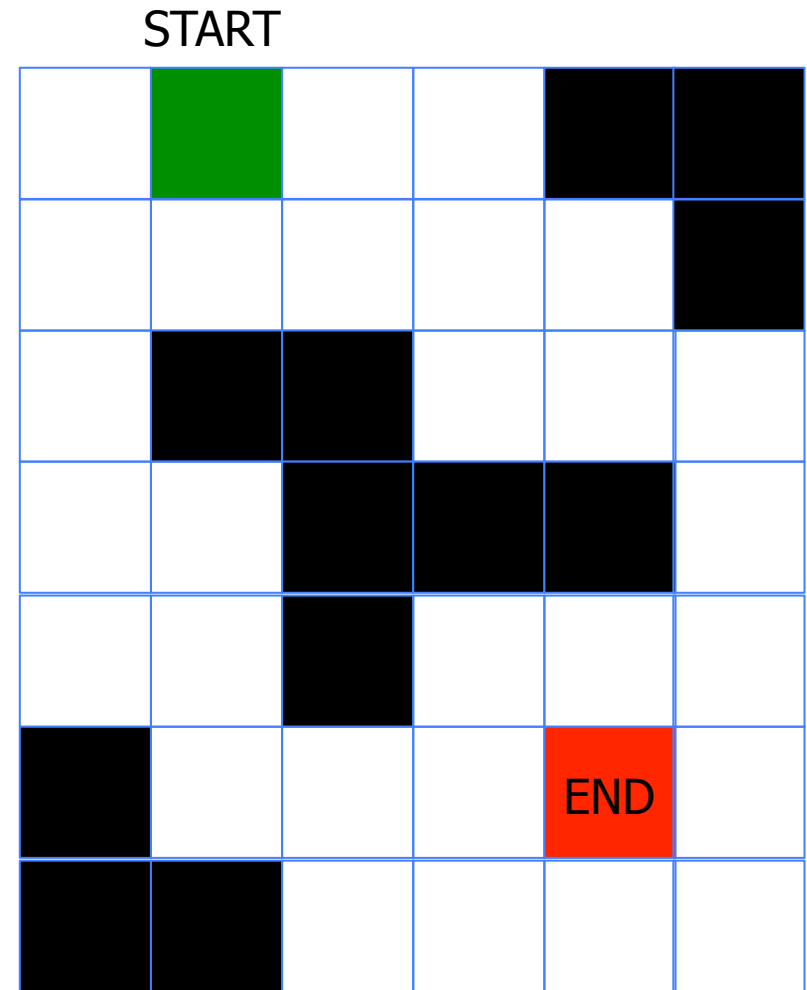
An Example – the PacMan problem

- How does the computer guide the ghosts back to their lair when they are eaten?



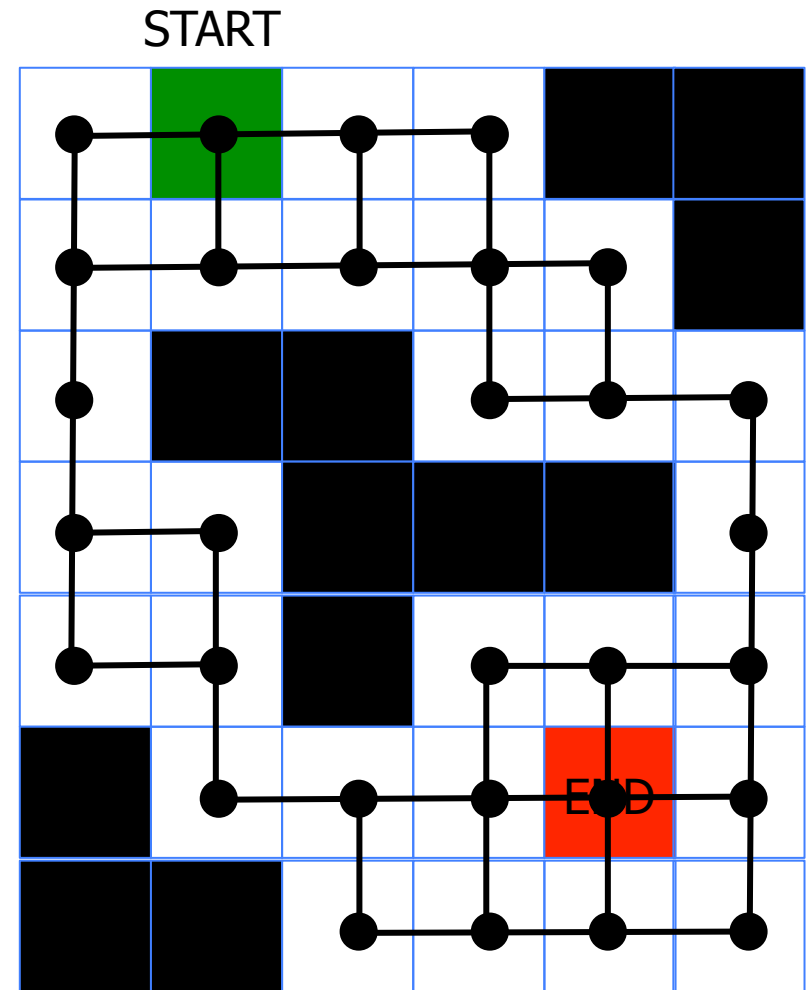
Planning on a grid

- In this example the robot can move between adjacent cells on the grid
- The dark squares indicate obstacles that the robot cannot traverse.



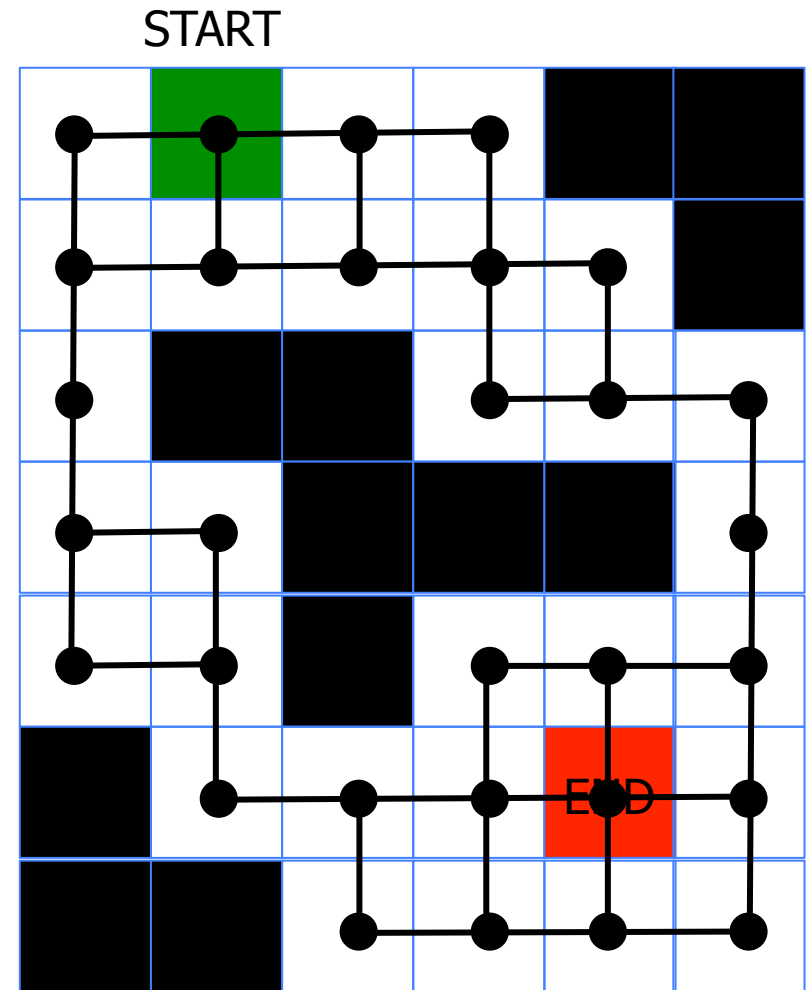
Graph Structure

- We can think of the unoccupied cells as **nodes** and draw **edges** between adjacent cells as shown here.
- This set of nodes and **edges** constitutes a graph.

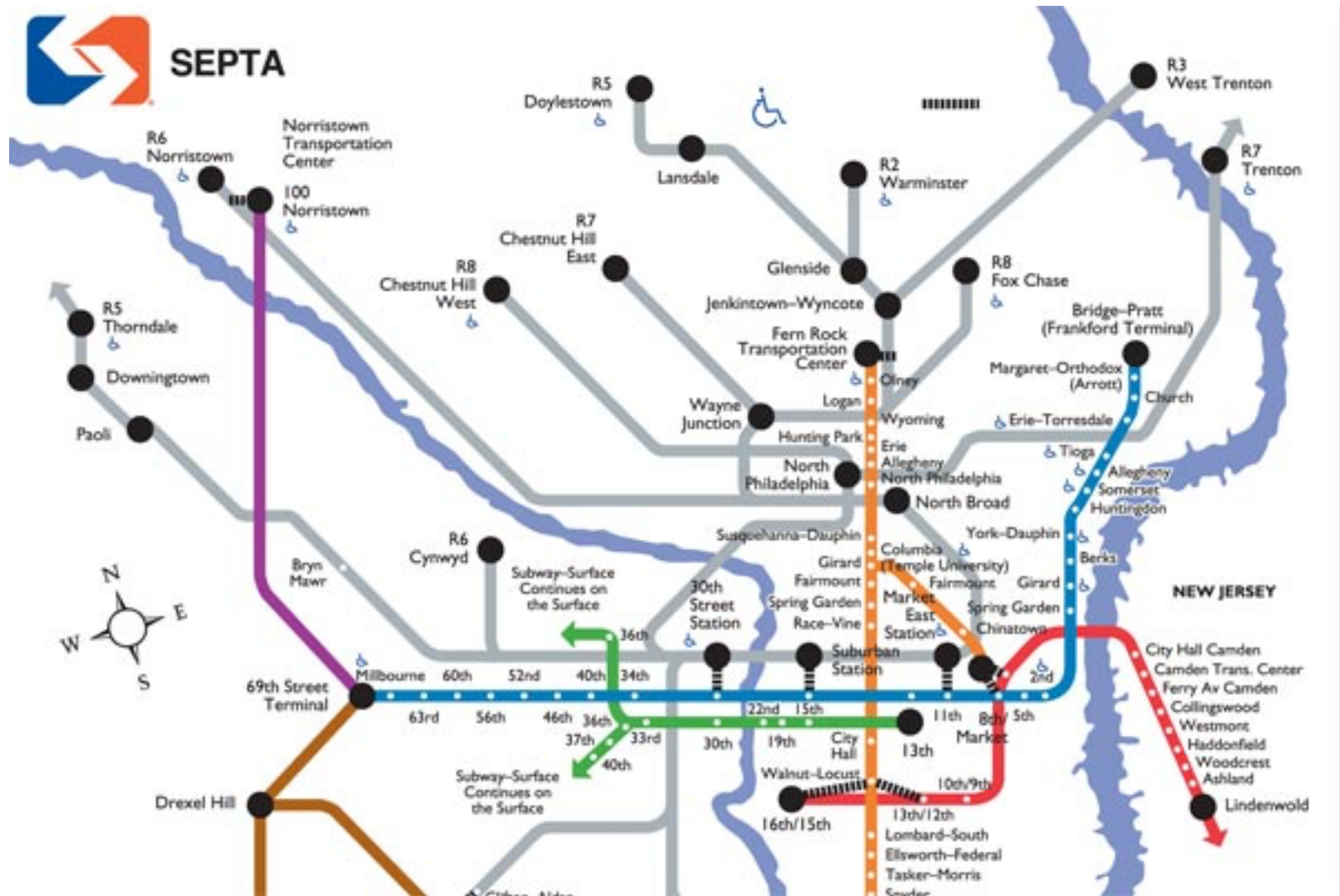


Graph Structure

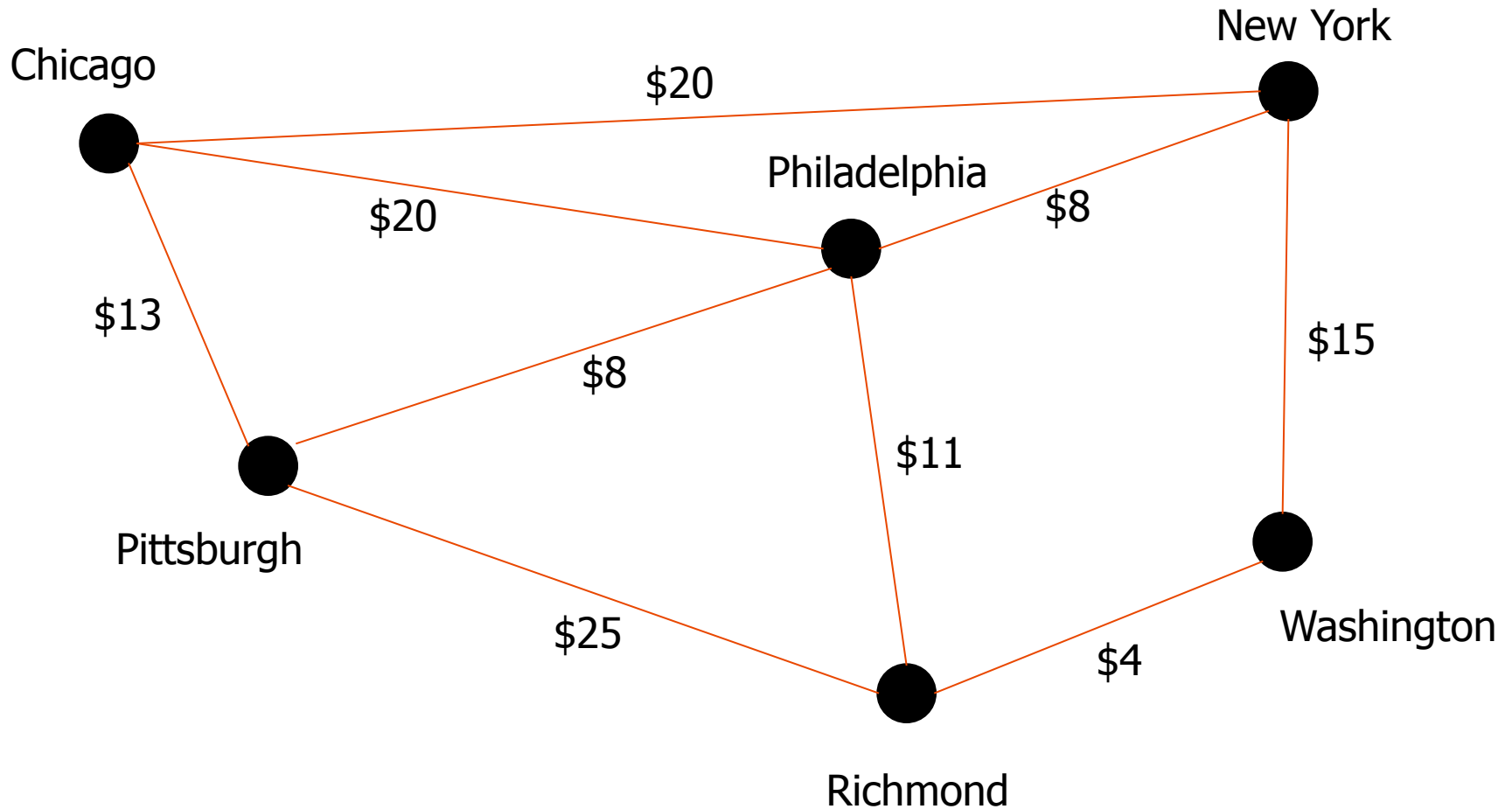
- A **graph**, G , consists of a set of vertices, V , and a set of Edges, E , that link pairs of vertices.
- The edges are often annotated with numerical values to indicate relevant quantities like distances or costs.



Examples of Graphs in the Wild



Examples of Graphs in the Wild – Toll Chart



Graph Structure

- In this grid graph we will implicitly associate a cost or distance of 1 with every edge in the graph since they link adjacent cells.

