COMP280: Specialisms in Creative Computing

8: Navigation

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Pathfinding

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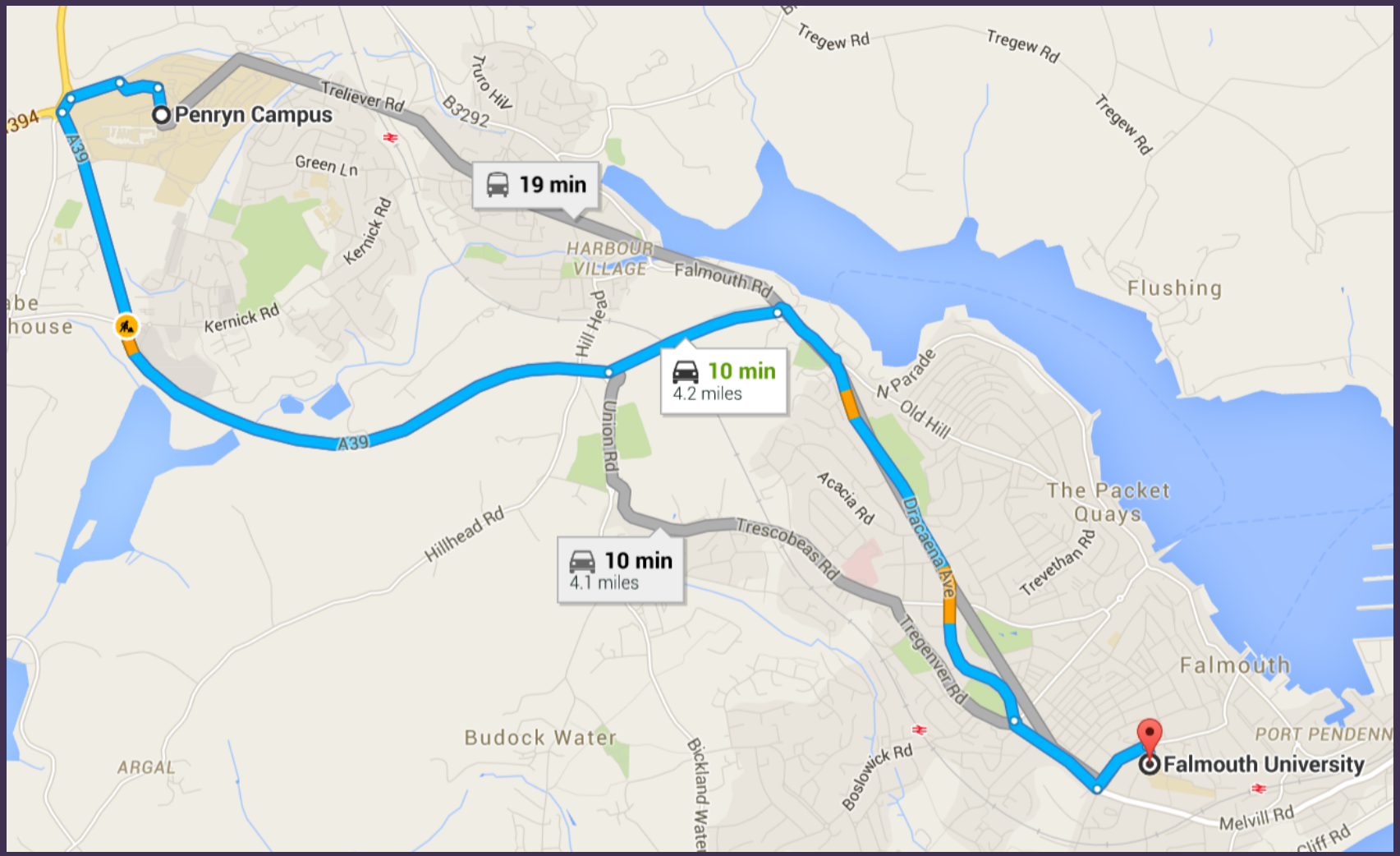
  - "Shortest" in terms of edge weights — could be distance, time, fuel cost, ...

Applications of pathfinding



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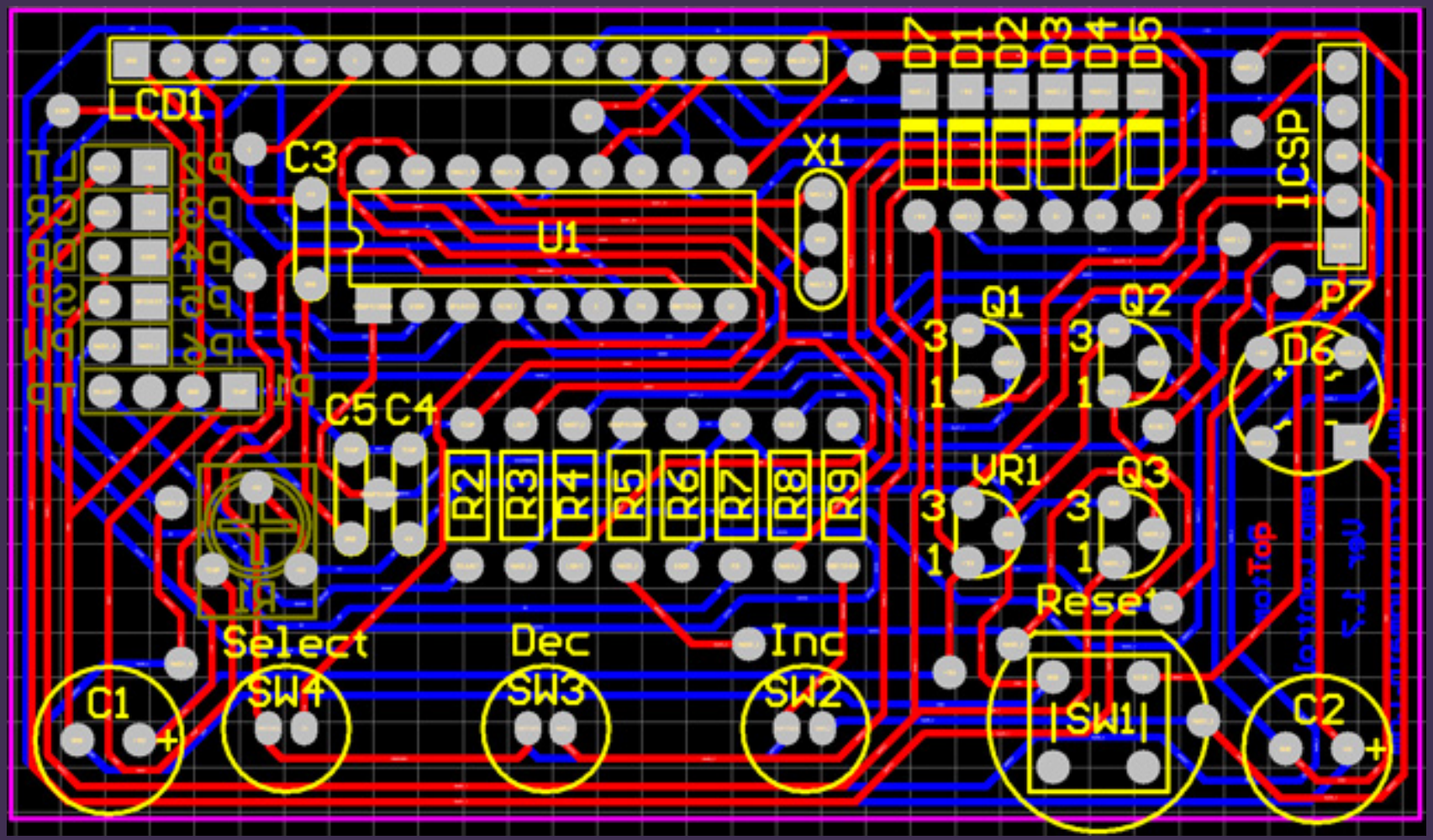

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  - **Closed set**: nodes which have been added to the tree, and shouldn't be revisited (otherwise we could get stuck in an infinite loop)

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  - Often implemented with the open set as a **priority queue** — a data structure optimised for finding the **highest priority** item

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- ... but is not the most efficient algorithm for doing so

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- Choose a node that minimises $g(x) + h(x)$

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  - Heuristics are often used to prioritise search, i.e. explore the most promising options first

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- Different $h(x)$ can lead to different paths (if there are multiple "shortest" paths)

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  - Repeat until there are no more points that can be removed

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Navigation meshes

Pathfinding in videogames

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- A* works on any **graph**
- But what if the game world is not a graph? E.g. complex 3D environments

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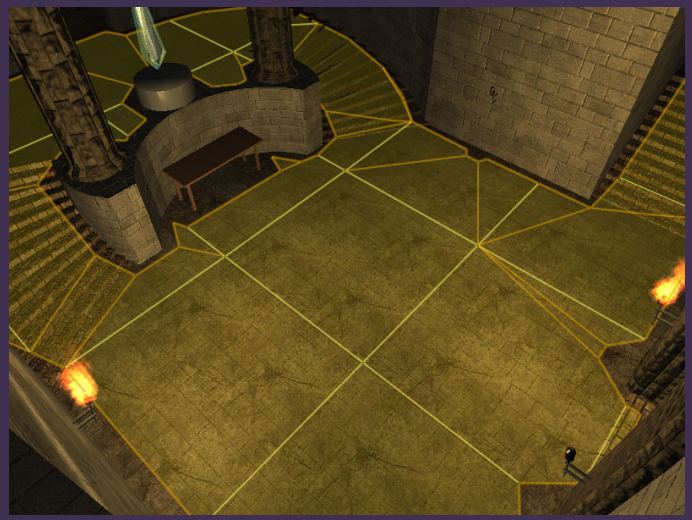

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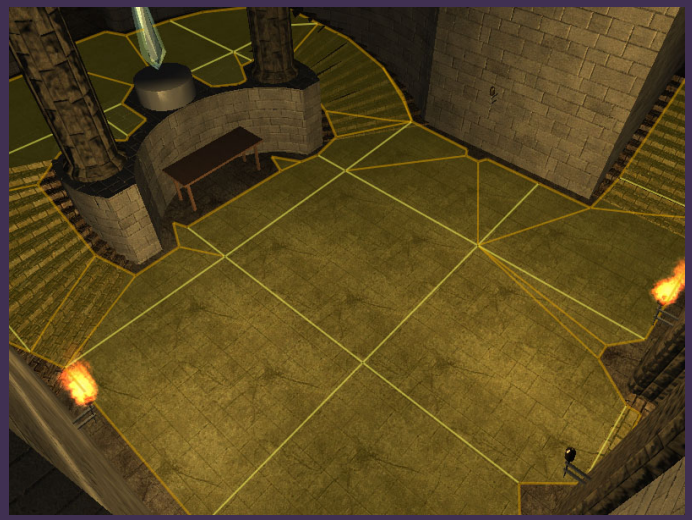

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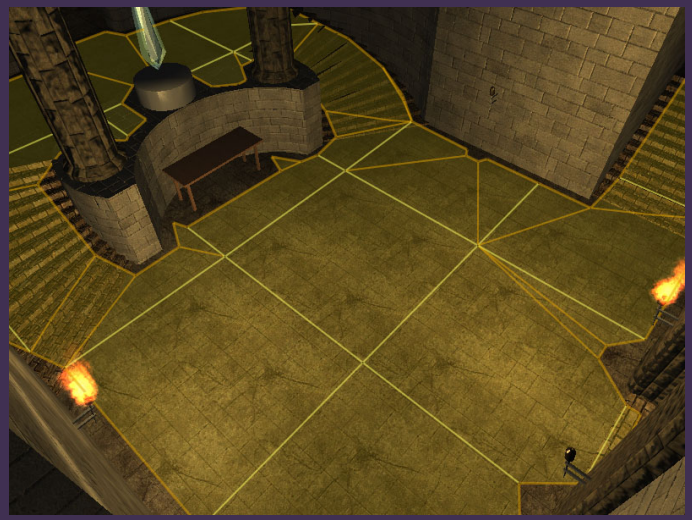

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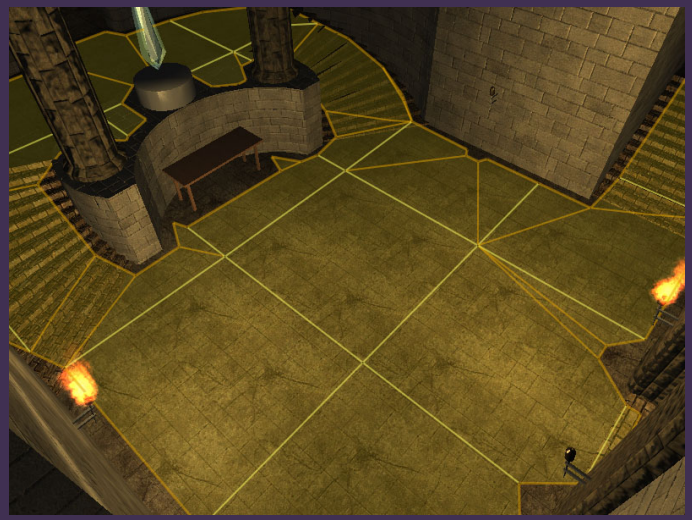

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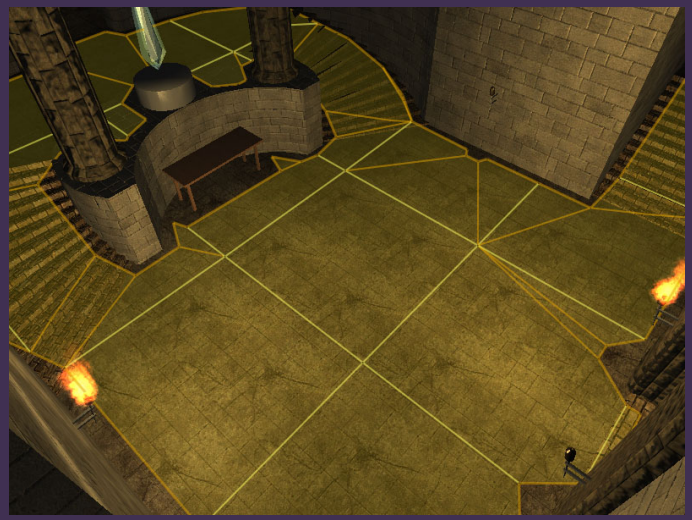

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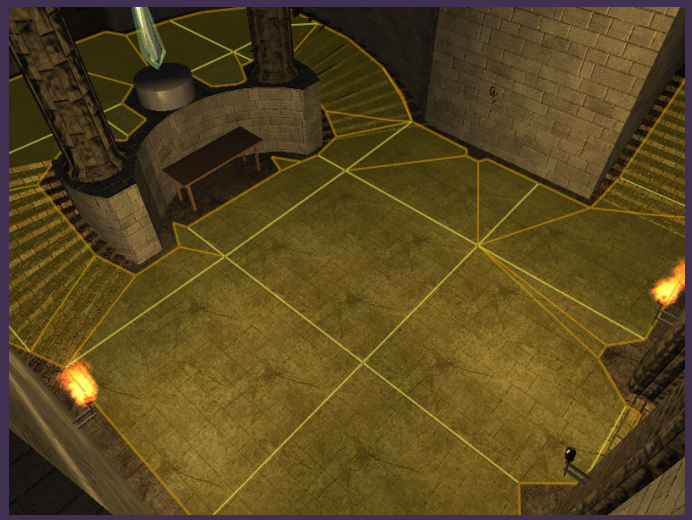

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- Unity and Unreal have good built-in navigation mesh generation

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- **Avoidance**: how to have NPCs avoid running into each other?

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Workshop