University of BRISTOL

brl Bristol Robotics Laboratory

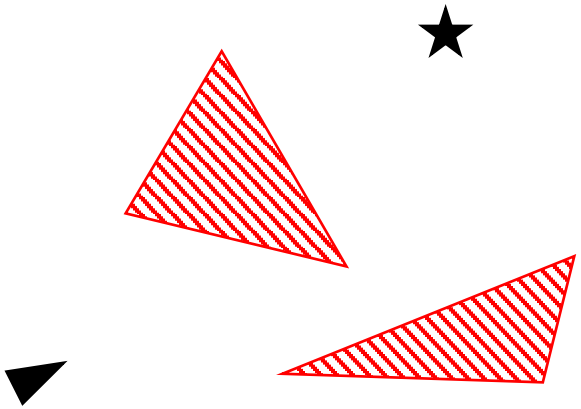
Aerial Robotics Path Planning III

Prof. Arthur Richards

bristol.ac.uk

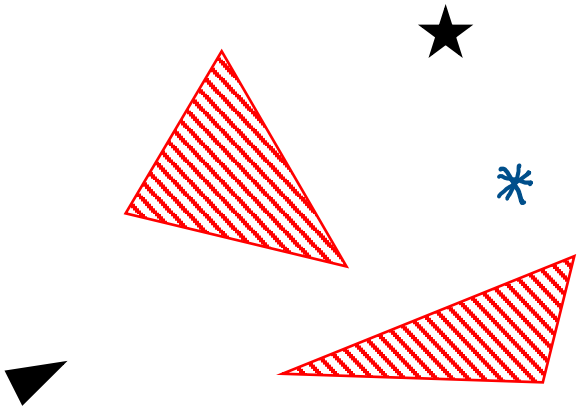
Rapidly Exploring Random Tree (RRT)

- Start with obstacles, goal, and initial pose



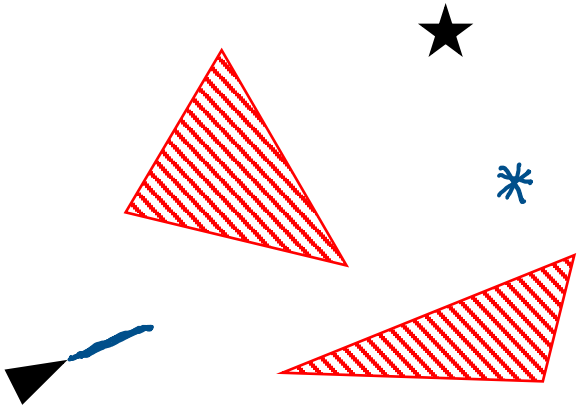
Rapidly Exploring Random Tree (RRT)

- Start with obstacles, goal, and initial pose
- Choose a random point



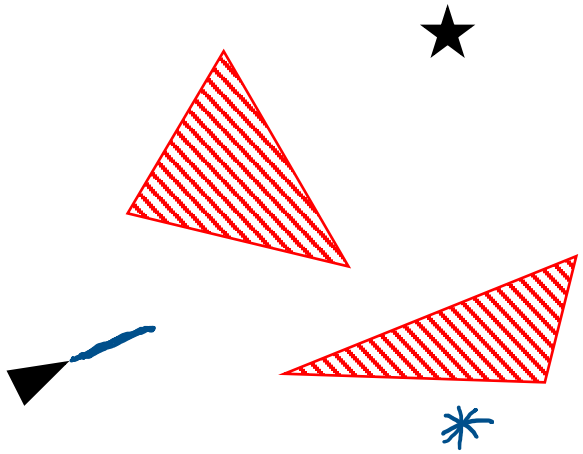
Rapidly Exploring Random Tree (RRT)

- Start with obstacles, goal, and initial pose
- Choose a random point
- Extend tree towards *



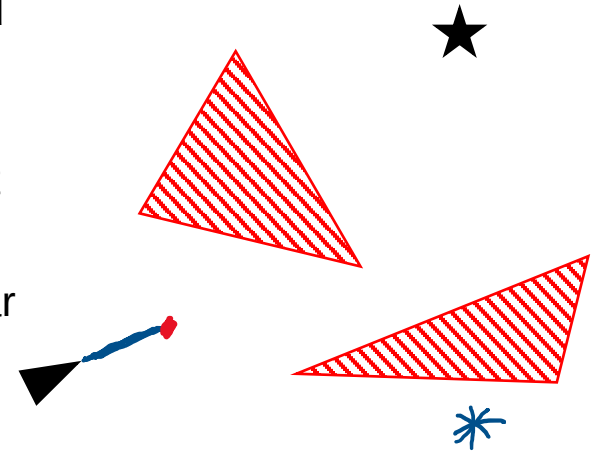
Rapidly Exploring Random Tree (RRT)

- Start with obstacles, goal, and initial pose
- Choose *another* random point



Rapidly Exploring Random Tree (RRT)

- Start with obstacles, goal, and initial pose
- Choose *another* random point
- Get closest point on tree so far



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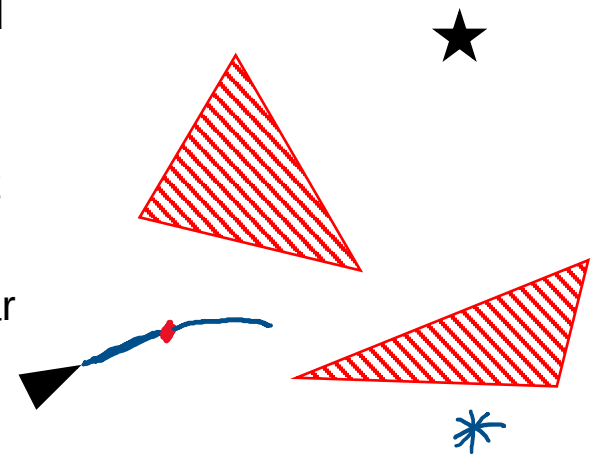
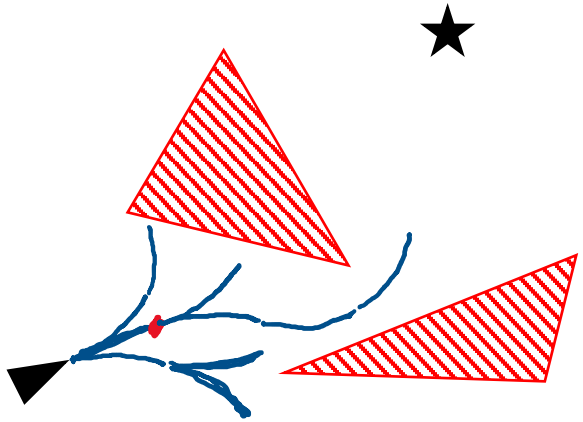


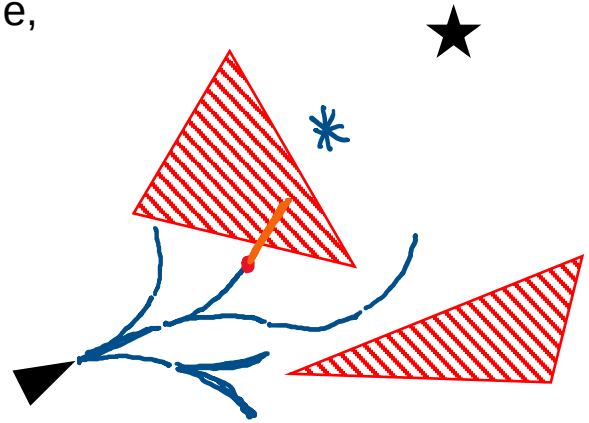
Rapidly Exploring Random Tree (RRT)

- Repeat a few times



Rapidly Exploring Random Tree (RRT)

- If an extension cuts an obstacle, just skip it



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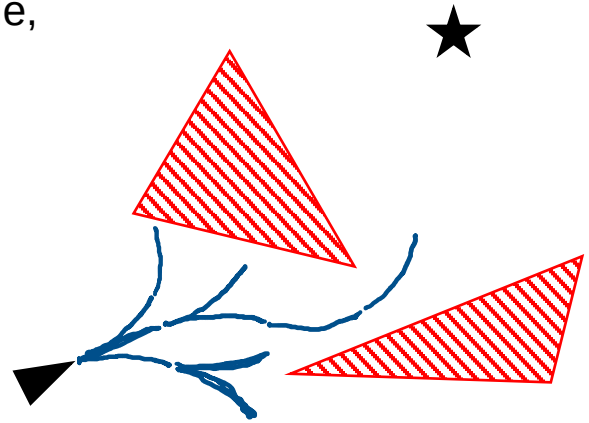
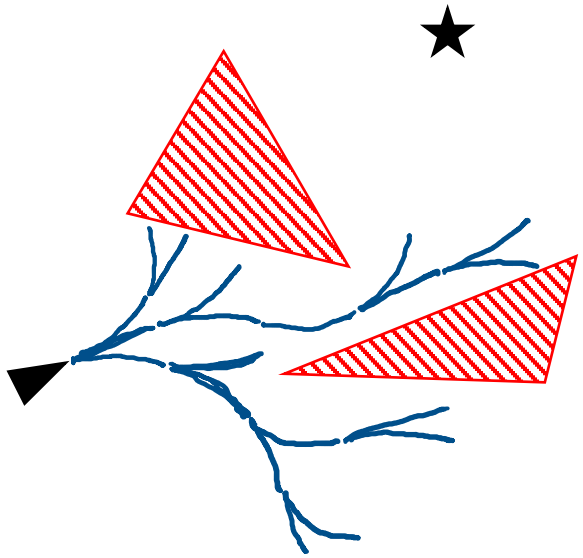


Rapidly Exploring Random Tree (RRT)

- Keep going until close enough to goal



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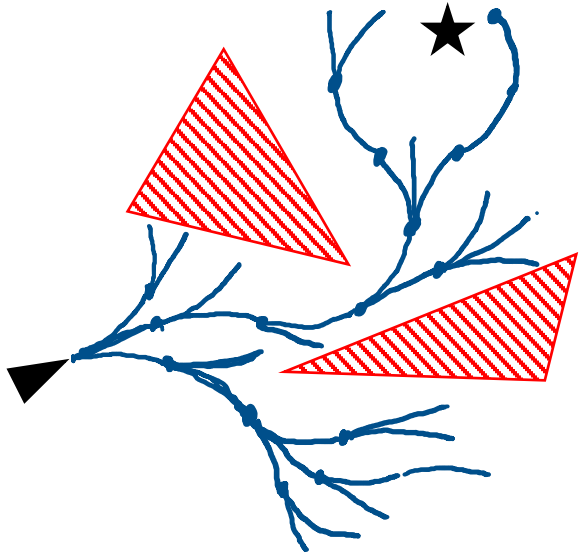

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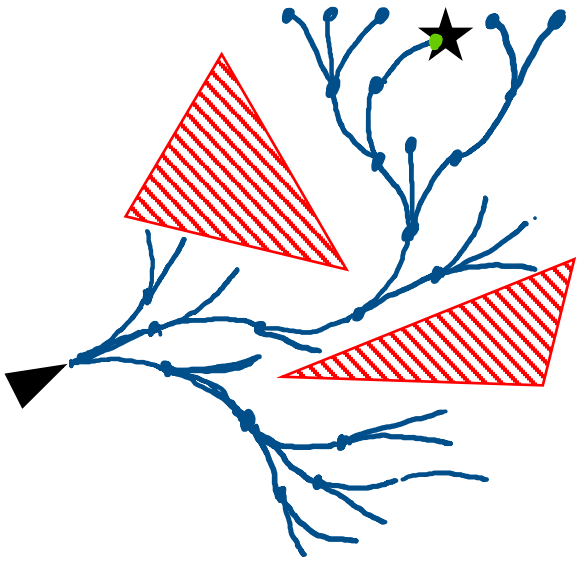

Rapidly Exploring Random Tree (RRT)

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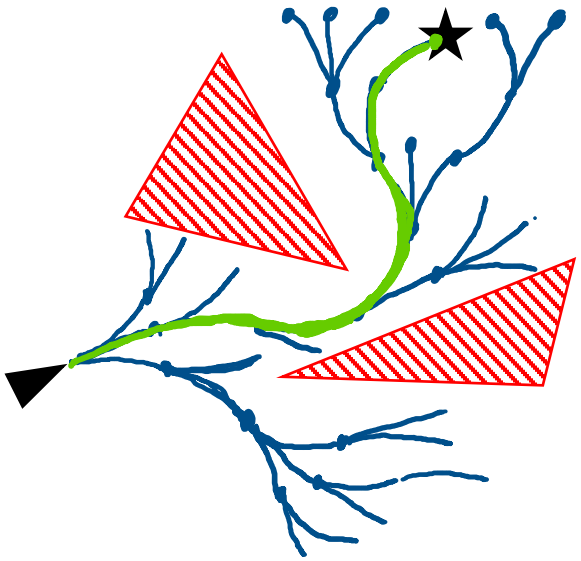
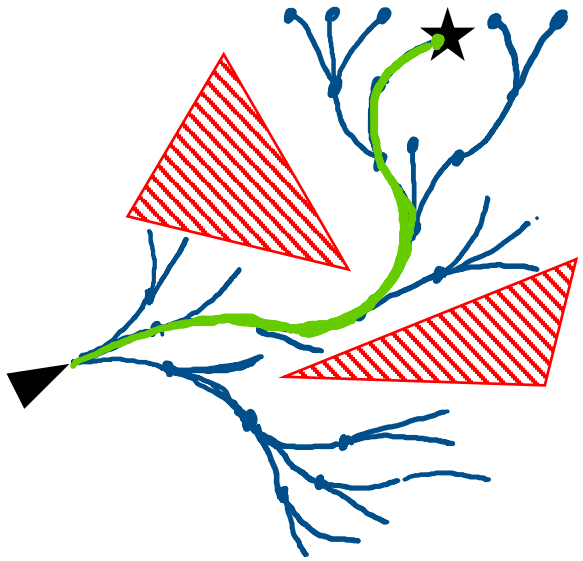


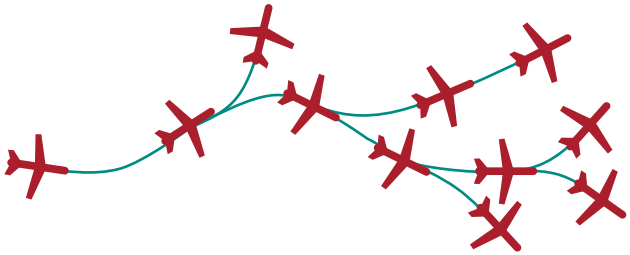
Rapidly Exploring Random Tree (RRT)

- Keep going until close enough to goal
- Can get quite bad paths
  - Essentially all luck
  - RRT* variant optimises…
  - …but far slower
- Really good at finding a path through cluttered worlds

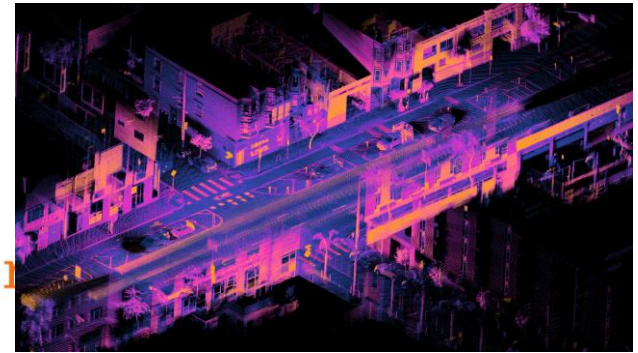


RRT Likes and Dislikes

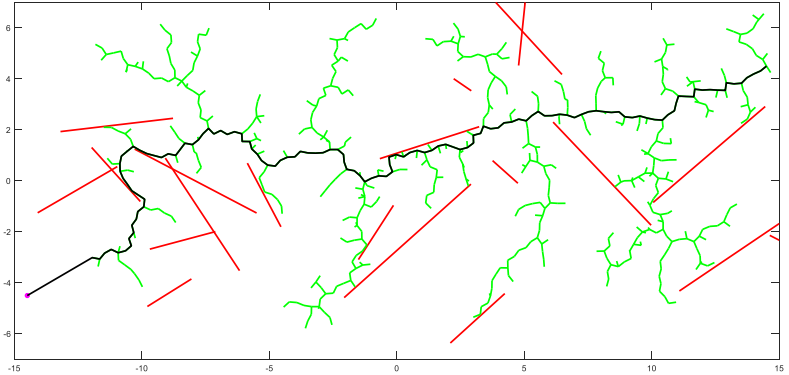
- Likes
  - Extends to more dimensions



  - Handles rich environment models



- Dislikes
  - Can be slow
  - Paths can be quite poor, neither efficient nor robust



Randomness is strength ***and*** weakness: good for identifying hard-to-find paths, but can give poor results where paths are obvious.