

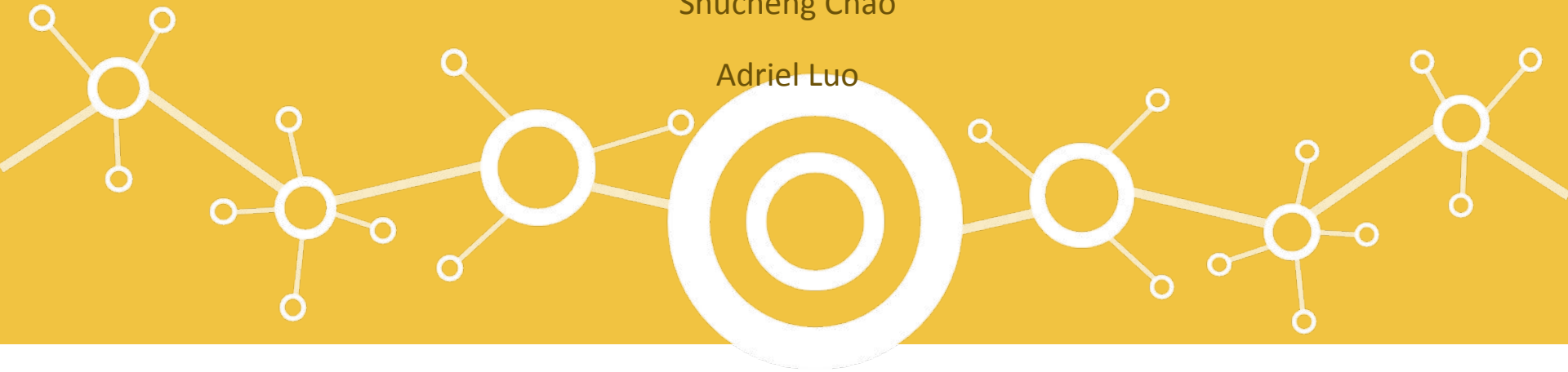
16311 Spring 16

Lab 5 - Path Planning

Lab TAs:

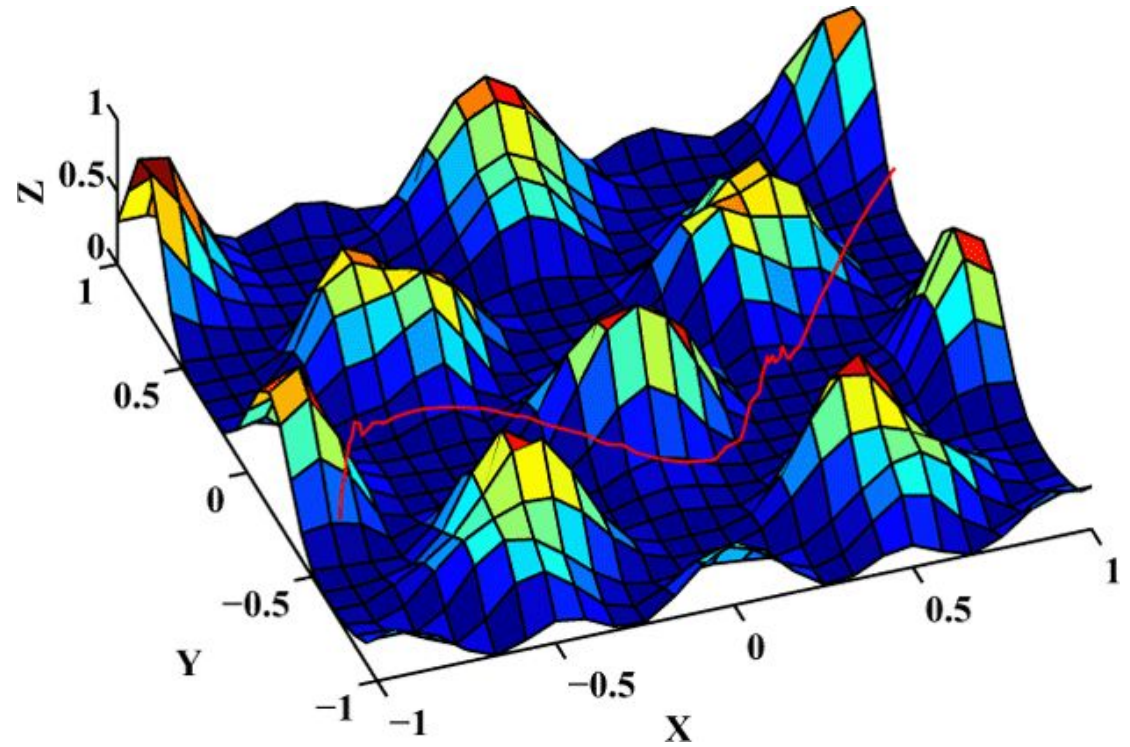
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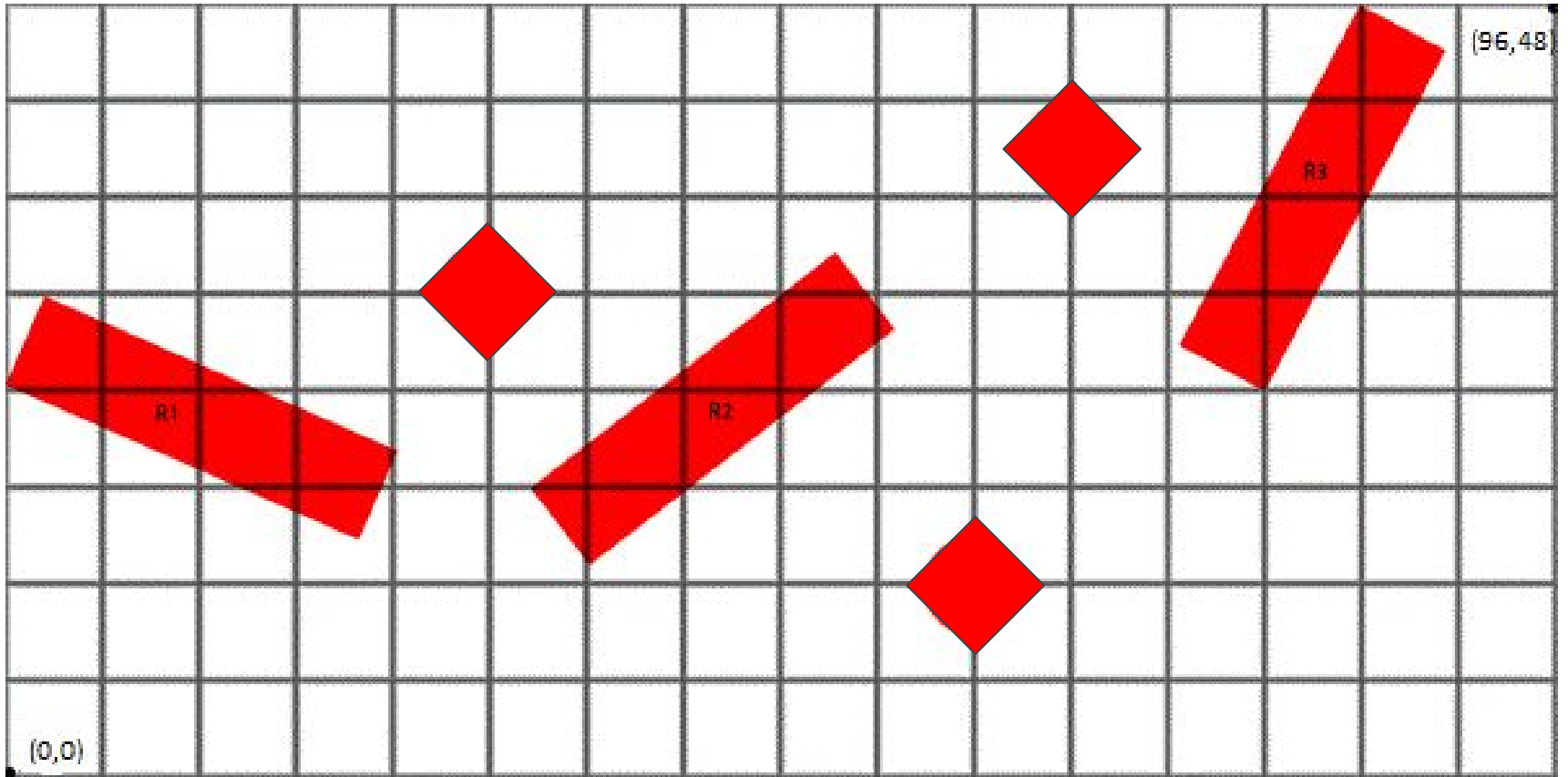
Goal

- Plan a path around a known map, given a start position and an end position, without touching any obstacles in the map



picture from ieeexplore.ieee.org

Map





Demo Procedure

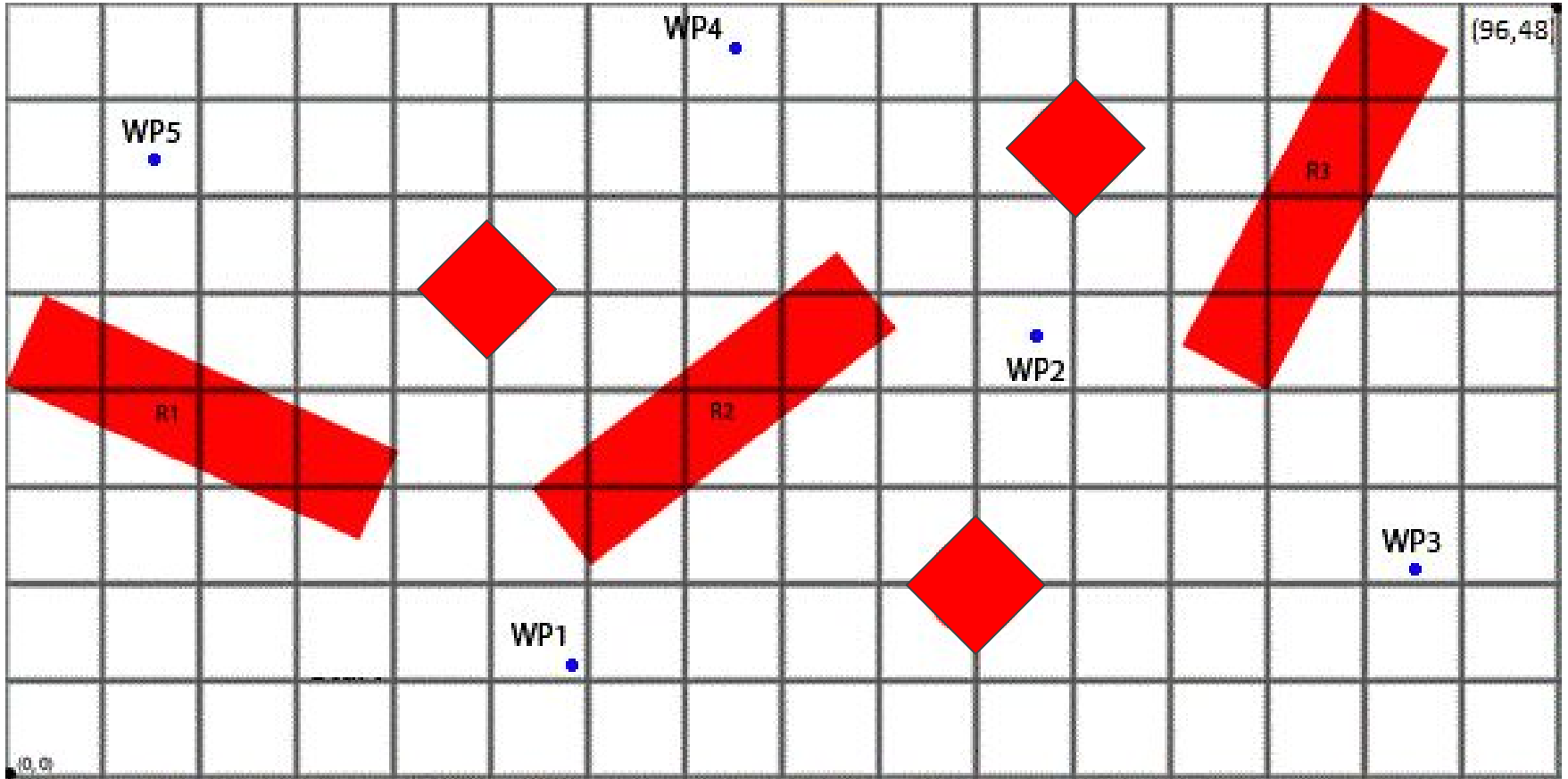
- Get the specified start and end goal position
- Choose a reference point on the robot
- Place the robot at the start position and orientation on the field
- Measure the error when the robot stops or hits an obstacle



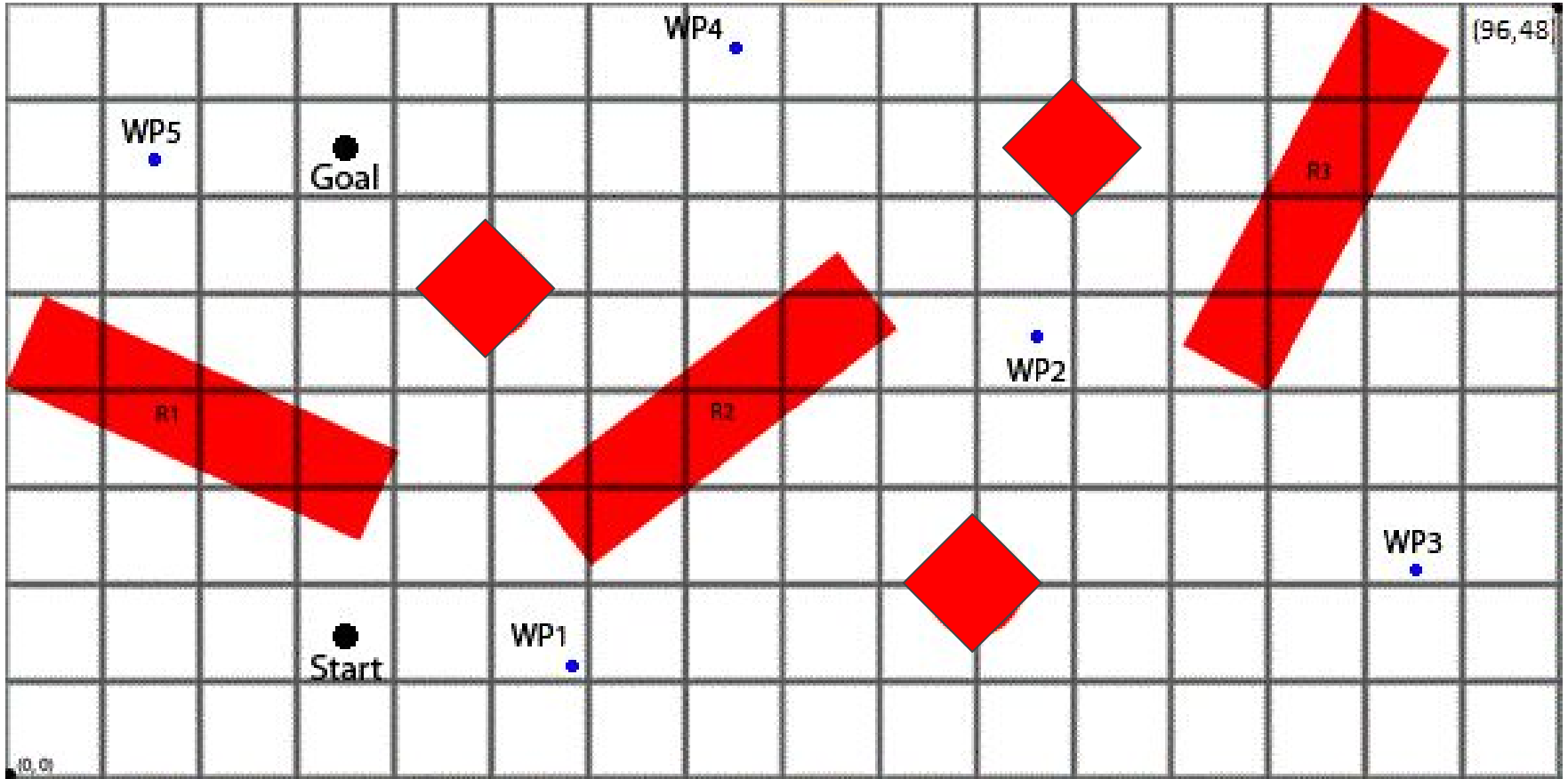
Tips

- Bug 1, Bug 2
- Potential Function (Wavefront)
- Waypoints + Search algorithm
- Start -> Closest waypoint -> Highway! -> Last waypoint -> Goal

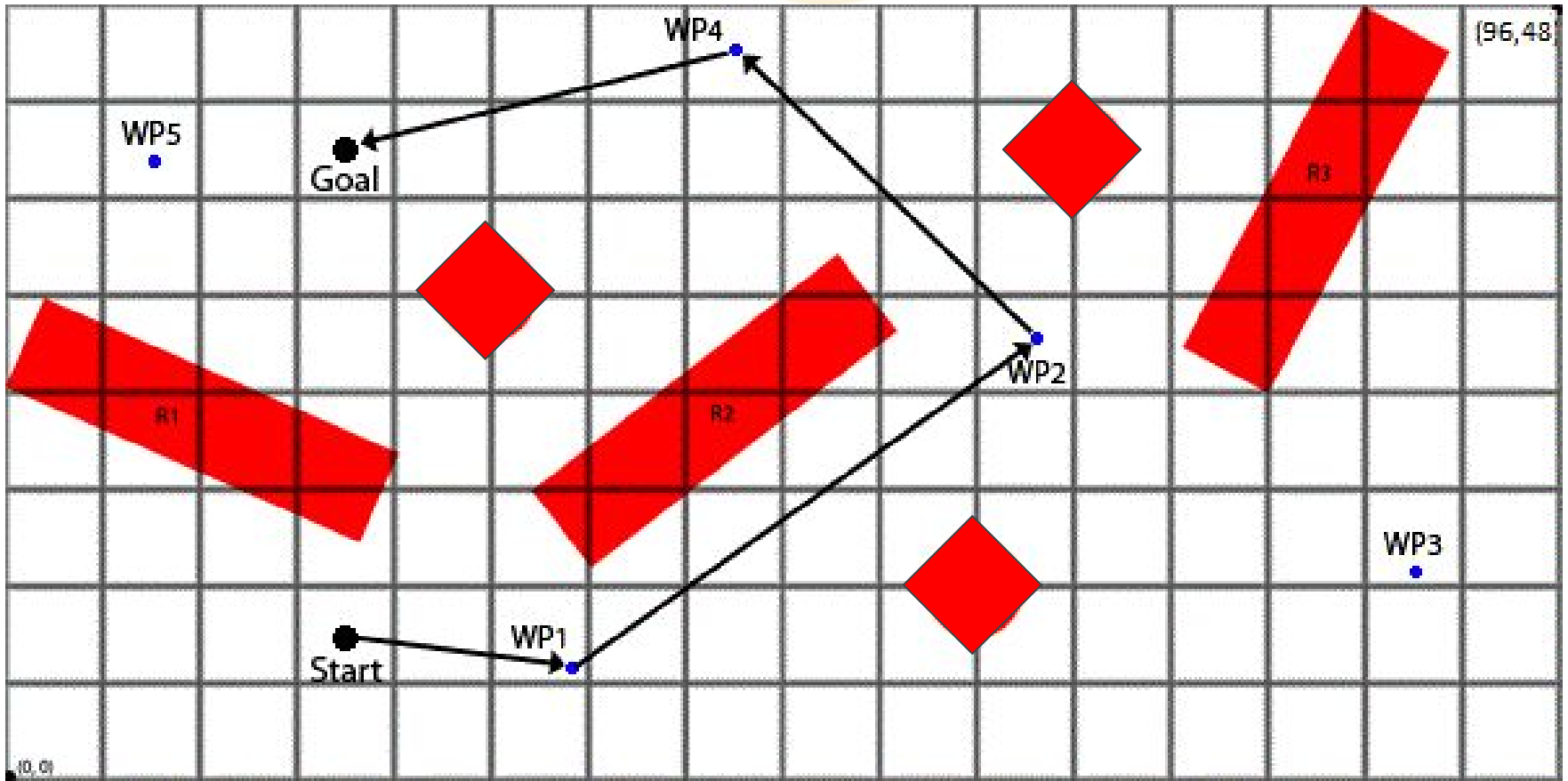
Example Waypoints



Example Path



Example Path



Grading

- Best of three trials

• Distance from goal /inches	$0 < d \leq 1$	$1 < d \leq 3$	$3 < d \leq 6$
• Points	25	15	5
• Time (distance score must not be 0) /seconds	$0 < t \leq 30$	$30 < t \leq 60$	$60 < t \leq 90$
• Points	25	15	5

- Explanation of concepts and algorithms: 25
- A trial ends when the robot stops or hits an obstacle
- Option of easier runs for 10 point penalty



Tips

- Safe vs. fast
- Pre-calculation vs. Real time
- Size and configuration space
- Dead-reckoning error



Other things

- Demos will start at 4pm