



# King of the Hill Challenge

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### **Disclaimer**

It is your responsibility to read and understand this document on a regular basis because we may update it from time to time.

### **King of the Hill Challenge**

The objective of this 1 vs. 1 robot challenge is for your robot to be the first robot to reach and climb the hill at the end of the arena. Before reaching the hill, your robot will navigate through a maze with various obstacles. Since obstacles will change in position and in number, robot design and programs that exhibit general maze-solving abilities are encouraged.



## **Challenge Rules**

1. All robots must be built and programmed to the specifications outlined in our [Lego Competition Rules](#). Unless exceptions are listed in the rules below, any robots not adhering to these specifications will be disqualified for the match and can rejoin once the robot meets the specified requirements.
2. Your competition day rank will be worth 70% of your final score. Teams must complete the [Technical Component](#) (report, presentation, and poster), which is worth 30% of their mark.
3. At the start of the challenge, all teams will gather at the contest area and no further adjustments to the robot will be allowed.
4. Each team will be assigned either the right or the left side of the arena and all robots must start on their respective sides in a designated START area.
5. The front wheels of the robots must start behind the green START line in the designated START area.
6. All robots must have a 3-second delay at the beginning of their programs.
7. For each run, robots will have a time limit of 1 minute to complete the maze and reach the hill. After the start of the run, there must be no human interference.
8. Any type of physical contact by the robot is allowed to claim the hill, except for striking movements, which will result in disqualification.
9. The hill is captured at the end of the run when a robot reaches the top of the bridge.
10. Your robots must be smaller than 8 inches in width and 10 inches in length. It is recommended your ultrasonic/infrared sensor be less than 4.5 inches off from the ground.

## **Judging and Scoring**

1. The maze with all the obstacles will be modified on and during the day of the competition.
2. All teams will gather at the competition area and remain there for the remainder of the round.
3. Judges will time and score each run.
4. Teams will receive the following points for a run:
  - a. First robot to claim the hill will be awarded **4 points**.
  - b. If no robot has claimed the hill within the time limit, the robot closest to the hill will be awarded **2 points**.
  - c. If a robot does not have a 3 second delay, **1 point will be deducted**.
5. The first half of the competition will be a round-robin style tournament. Each match will consist of three runs.
6. The competition will consist of a round-robin style tournament in the morning, followed by elimination playoffs in the afternoon.
7. Decisions of the judges are final.

## King of the Hill Diagram

The dimensions of the entire arena are 4 by 6.5 feet, each of the maze walls is approximately 10 inches long and has a minimum height of 4¾ inches. The bridge has an incline of approximately 20 degrees.

Your robots be smaller than 8 by 10 inches.

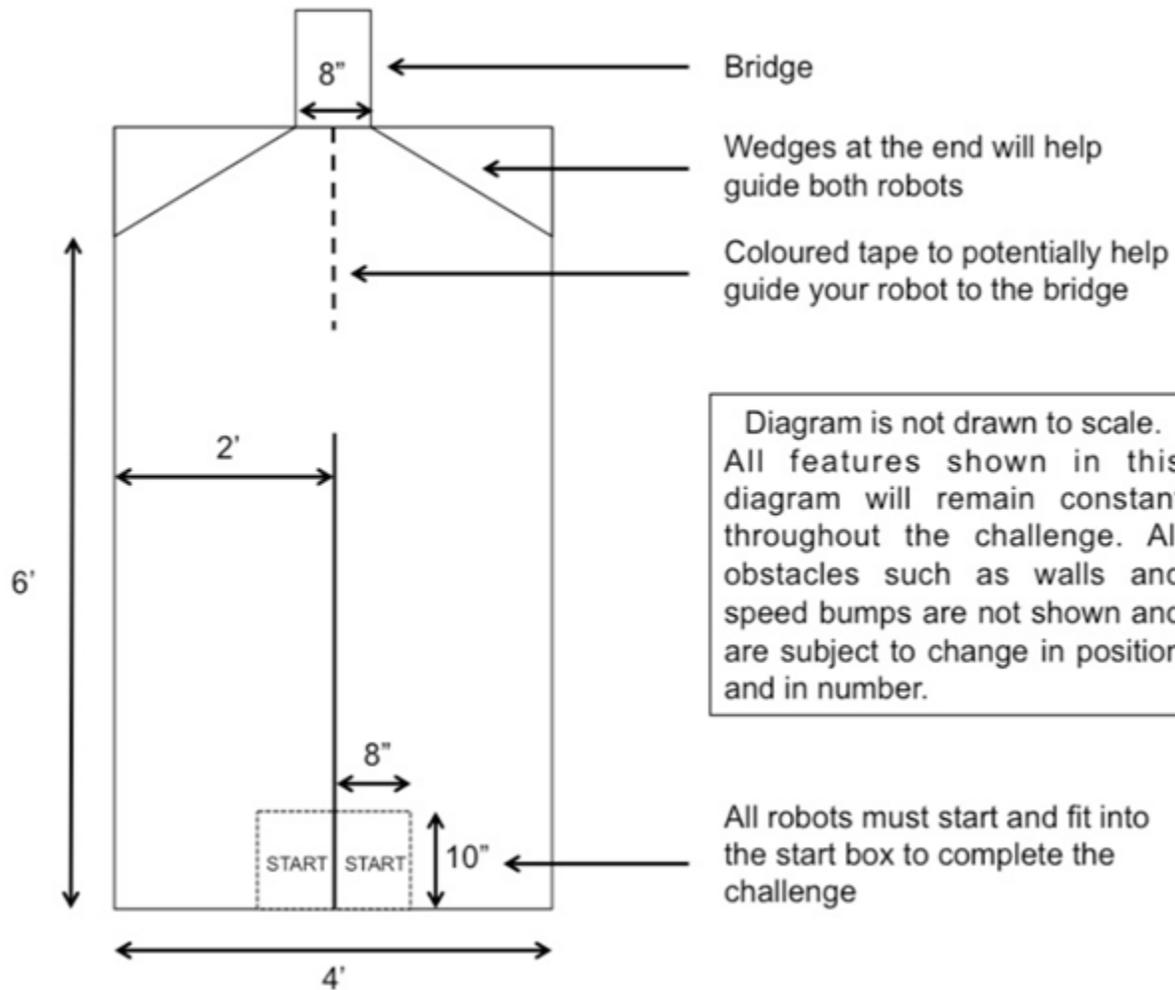


Figure 1: King of the Hill Arena Dimensions.

The coloured tape will be black with a white sheet of paper underneath.

Also, we would like to thank Mr. Alan Stewart for providing materials to make the arena for this challenge.

## Sample Homemade KOTH Arena

Some teams got creative in 2015 in trying to create their own King of the Hill arena and used inexpensive cardboard.



## Suggestions & Hints

1. There are wedges at the end of the arena guiding both robots to the hill. You may want to give special considerations to the design of your front bumper. Some ideas are:
  - a. Shape of the front bumper (i.e. triangular, semicircular)
  - b. "Cage" surrounding the robot
2. Think of ways to try "wall finding". King of the Hill is set up as a maze with obstacles which may be modified during the day of the competition, however the outer walls will always stay constant.
3. Watch YouTube videos on Roombas.
4. Think of how your robot is built. Does it use its mass effectively? Where are all of the sensors placed? Does your program use all of the sensors on it?