Oklahoma Botball Challenge

Botball Challenge is not a direct competition. Teams will be working towards conquering the challenge at hand. These challenges are intended to help teams develop and master various computer science and engineering skills to be better prepared for upcoming Botball Competitions or utilization within the classroom curriculum.

Who can participate: The Botball Challenge is currently restricted to teams that have played Botball in the past.

Needed Supplies:
JBC/Botball kit plus:

- 3 - 2” foam blocks (varying color)
- 11 - 10” long pieces of 1” PVC pipe
- 4 - “T” PVC
- 4 - elbow PVC
- 16 - poms (blue, green, yellow, and red: 4 of each color)

Botball Challenge Rules are subject to change.

Find mat configurations and platform build images at the end of this document. We used a piece of poster board for the platform top. Any solid flat material on hand can be used as the platform top surface.

Botball Challenge 1	U-Turn

Setup: Mat A
Level: Beginner
Skills: Precision Driving, Motor Position Counter

Objective(s):

1. The robot will drive around the green garage and return to the start box.
2. The robot will print to the screen the value of one or both motor position counters: when it starts the first turn, when it starts the straight path back to the start box, and when it stops in the start box.

Constraints:

- The robot must start entirely within the start box of the A mat.
- The robot must start with a light.
- The robot may not drive off the mat.
- Must use 90 degree turns.
- No wheel or caster may touch or cross the green lines.

KISS INSTITUTE FOR PRACTICAL ROBOTICS

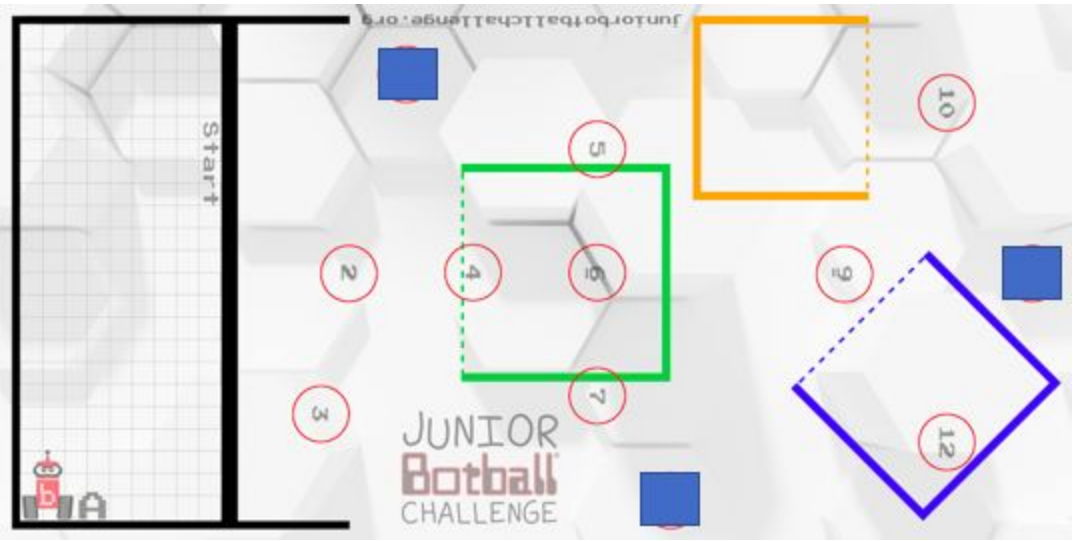
Botball Challenge 2	Tower Building

Setup: Mat A, Place a 2” foam block on circles 1, 8, and 11.
Level: Intermediate
Skills: Precision driving, servos/arms, (rangefinder sensor)

Objective(s):
1. The robot will stack all 3 blocks on top of each other.

Bonus Objective:
The robot will print to the screen the value of the rangefinder sensor before picking up or depositing each block.

Constraints:
- The robot must start entirely within the start box of the A mat.
- The robot must start with a light.
- The robot may not drive off the mat.
- The blocks must be stacked completely on the mat and such that they are free-standing. The robot may not support the stack at the completion of the challenge.
- The blocks must be stacked in a tower: only one block may touch the ground.



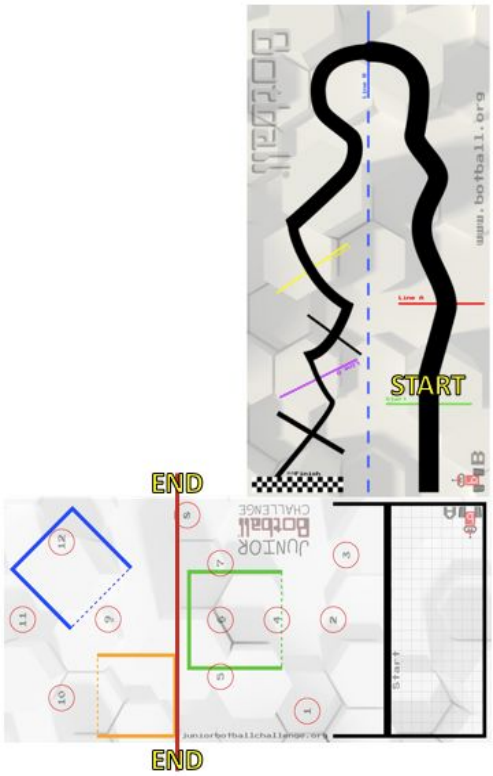
KISS INSTITUTE FOR PRACTICAL ROBOTICS

Botball Challenge 3	Straight and Narrow

Setup: Mats A and B in Configuration 1
Level: Intermediate
Skills: Precision driving, (color sensor, boolean statements)

Objective(s):
1. The robot will drive to and be completely within the start box of mat A, square up on the black line of the start box using sensors of choice, and then drive up Mat A until it crosses line.

Constraints:
- The robot must start behind the green start line of Mat B.
- The robot must start with a light.
- The robot may not drive off the mats.
- The square up may not be hard coded. Must use sensor feedback to square up on the black line. Sensor data in use must be printed to the screen such that method can be verified.
- While driving from the start box to line 21, the robot must maintain a 6 inch path. Note the 6-square “channel” the robot starts in. The wheels may not cross the line that makes up either bound of this channel.



KISS INSTITUTE FOR PRACTICAL ROBOTICS

Botball Challenge 4	Top of the World

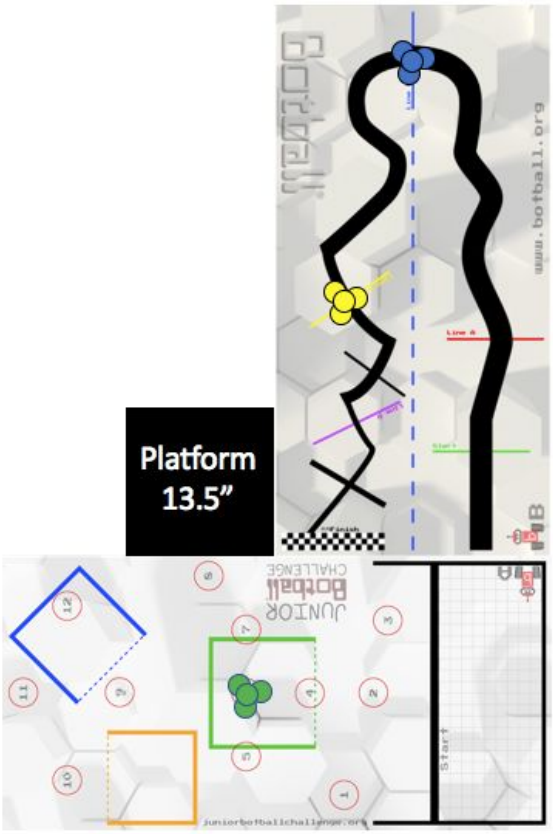
Setup: Mats A and B in Configuration 1. A platform 13.5 inches tall will be made using PVC (see images at end of document) and placed in the corner between mats A and B. The green poms will be placed in a pile on circle 6 of Mat A. The blue poms will be placed in a pile where the blue line B intersects the black line of Mat B. The yellow poms will be placed in a pile where the yellow line C intersects the black line of Mat B.
Level: Intermediate
Skills: Precision driving, effectors

Objective(s):

1. The robot will place at least 1 pom of each color on top of the table.

Constraints:

- The robot must start entirely within the start box of the A mat.
- The robot must start with a light.
- The robot may not drive off the mats.
- The total height of the robot must be less than 12 inches before the start of the run.



KISS INSTITUTE FOR PRACTICAL ROBOTICS

Botball Challenge 5	Maze Craze

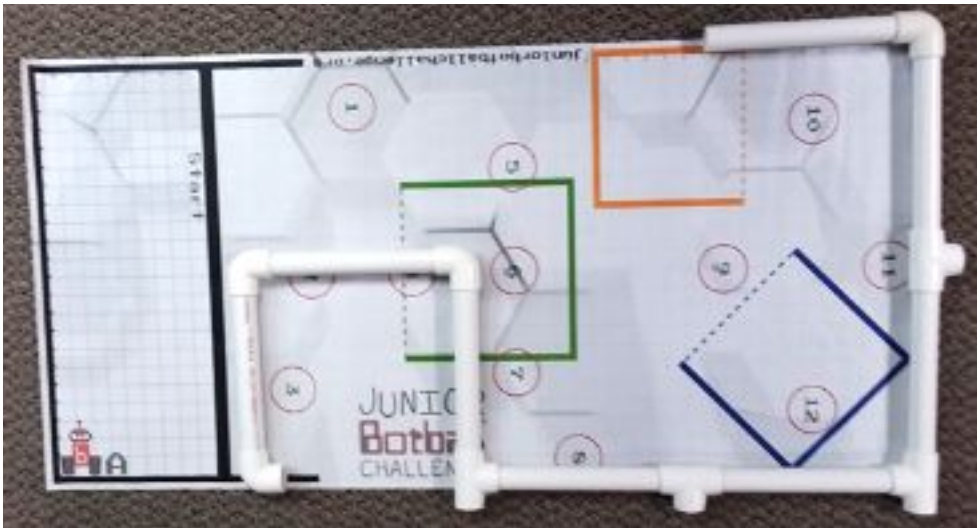
Setup: Mat A, with the PVC maze (see image below)
Level: Intermediate
Skills: Precision driving, sensor use

Objective(s):

1. The robot will navigate the maze and park in the yellow garage.

Constraints:

- The robot must start entirely within the start box of the A mat.
- The robot must start with a light.
- The robot may not drive off the mat.
- Some part of the robot must remain within 3 inches of the PVC at all times, but may not touch the PVC.
- The drive path may not be hard coded. Must use sensor feedback to navigate the path. Sensor data in use must be printed to the screen such that drive method can be verified.



KISS INSTITUTE FOR PRACTICAL ROBOTICS

Botball Challenge 6	Break Away

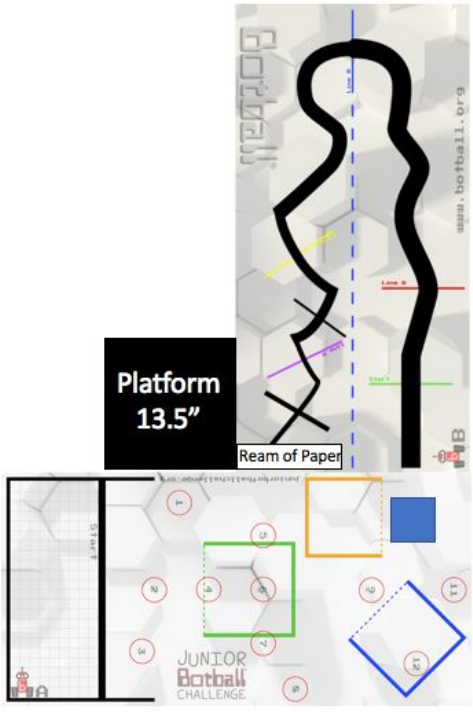
Setup: Mats A and B in Configuration 2. A platform 13.5 inches tall will be made using PVC (see images at end of document) and placed in the corner between Mats A and B. A foam block will be placed on circle 10. A ream of paper will be placed on the finish line of Mat B.
Level: Intermediate
Skills: Precision driving, digital and analog sensor, line-following

Objective(s):

1. The robot will locate the block and pick it up
2. Then navigate to the start of the black line on mat B
3. Follow the line to the ream of paper
4. Once at the ream of paper, stop and place the block on top of the platform

Constraints:

- The robot must start entirely within the start box of the A mat.
- The robot must start with a light.
- The robot may not drive off the mats.
- The robot must follow the black line from start to finish before placing the block on the table.
- The robot must touch the ream of paper before placing the block on the table, but may not knock it over.
- The total height of the robot must be less than 12 inches before the start of the run.



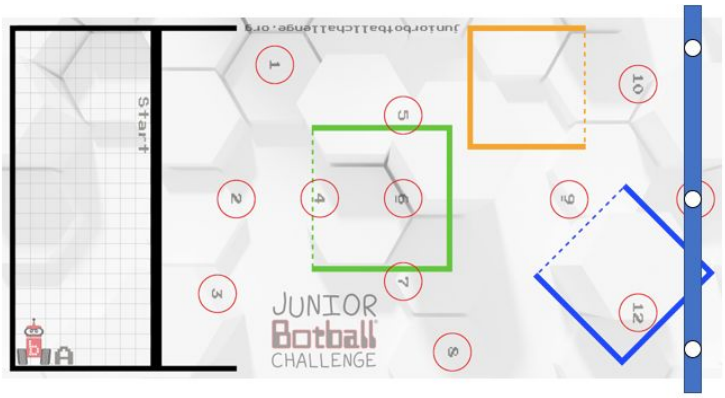
KISS INSTITUTE FOR PRACTICAL ROBOTICS

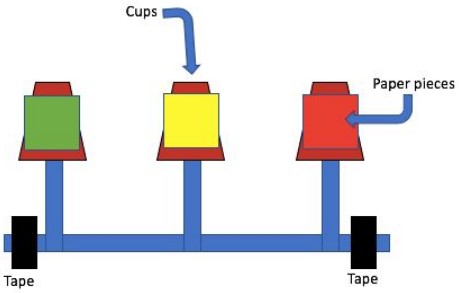
Botball Challenge 7	Search and Rescue

Setup: Mat A with PVC pipes set with three pipes sticking up (base taped to the mat) along the top edge of Mat A (edge opposite the start box). On each peg, place a cup each with a different colored piece of paper taped around it (see image). One of these colors must be red (think Botguy red). Additional support for the PVC may be constructed (see build in challenge description video).
Level: Intermediate
Skills: Effectors, camera/color recognition

Objective(s):
1. The robot will identify the cup marked with red, retrieve it, and return to the start box of mat A.

Constraints:
- The robot must start entirely within the start box of the A mat.
- The robot must start with a light.
- The robot may not drive off the mats.
- The total height of the robot must be less than 12 inches before the start of the run.
- The cup and robot must end the run both completely behind the start line.





KISS INSTITUTE FOR PRACTICAL ROBOTICS

Botball Challenge 8	Pathfinder

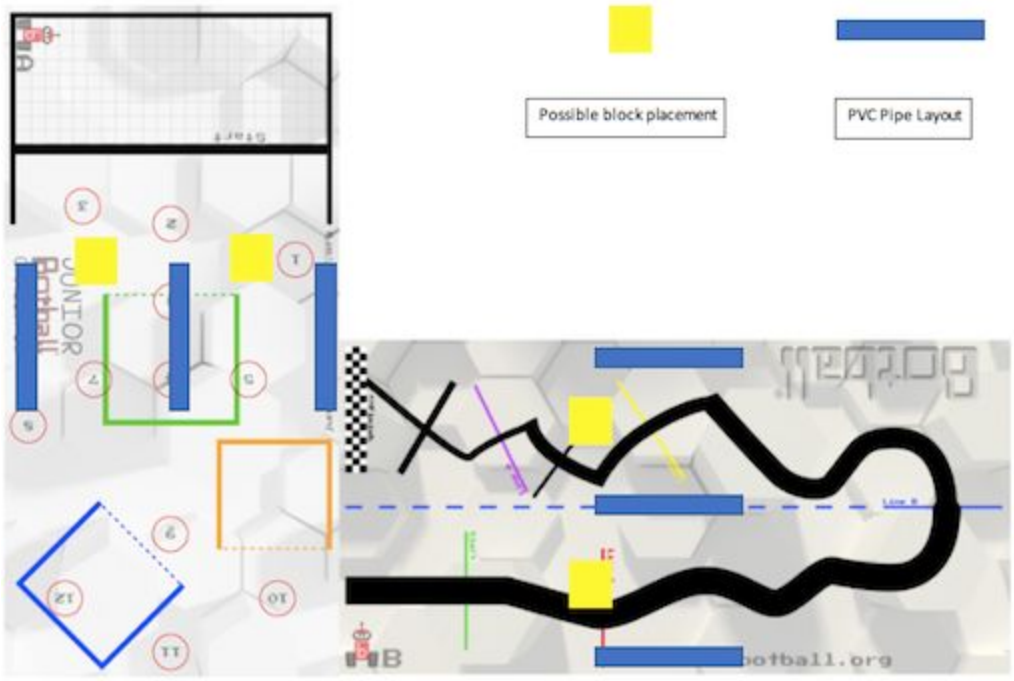
Setup: Mats A and B in Configuration 1. With PVC pipe lined up in two zones as shown in picture. Pipe on Mat A is lined up from grid line 9 going away from the start box. Pipe on Mat B lines up with red Line A going away from the start and finish lines.
Level: Intermediate
Skills: Precision driving, Et sensor

Objective(s):

1. The robot will detect which path is open on each mat.

Constraints:

- The robot must start entirely within the start box of the A mat.
- The robot must start with a light.
- The robot may not drive off the mats.
- The foam blocks will be placed randomly in one of the yellow placement spots for each PVC zone.



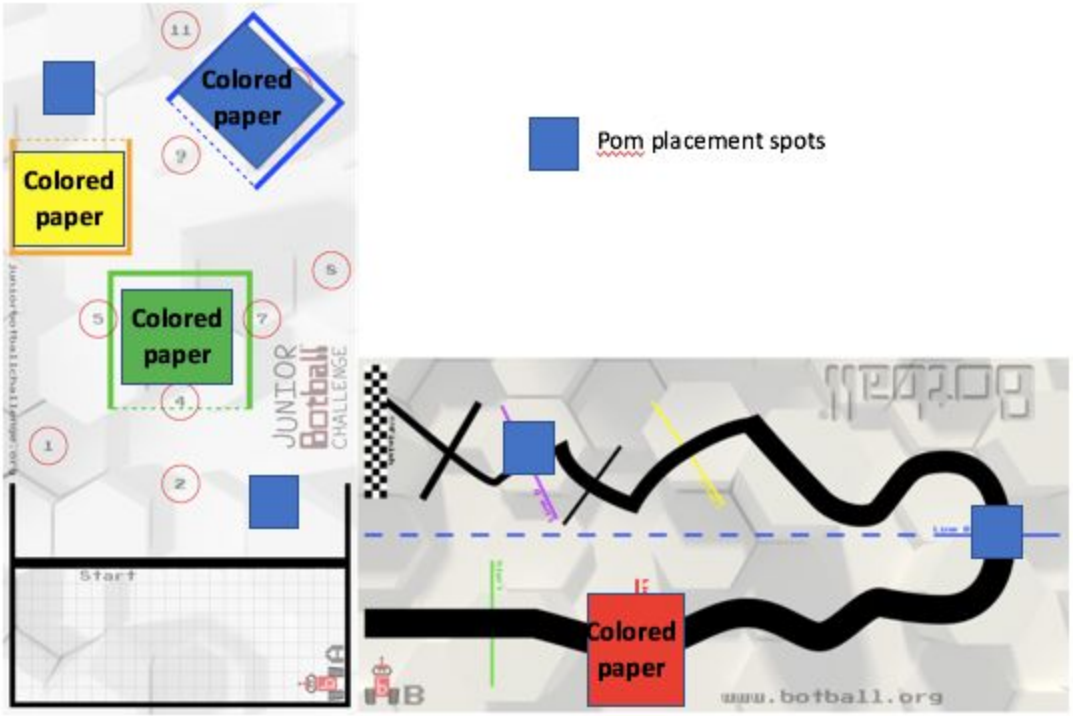
KISS INSTITUTE FOR PRACTICAL ROBOTICS

Botball Challenge 9	Matchmaker

Setup: Mats A and B in Configuration 1. Papers will be placed on the matching colored garages on Mat A, and Mat B at the black and red intersection. One pom (of random color, one of each color pom) on circle 3, and 10, and one pom on Mat B where it intersects the blue and one where it intersects the purple line.
Level: Intermediate
Skills: Using the camera to distinguish between colors

Objective(s):
1. The robot will locate each of the colored poms and place them on the matching paper.
2. The robot will use the camera to detect the poms.

Constraints:
- The robot must start entirely within the start box of the A mat.
- The robot must start with a light.
- The robot may not drive off the mats.
- Must use camera feedback to sort the poms. Camera data in use must be printed to the screen such that drive method can be verified.



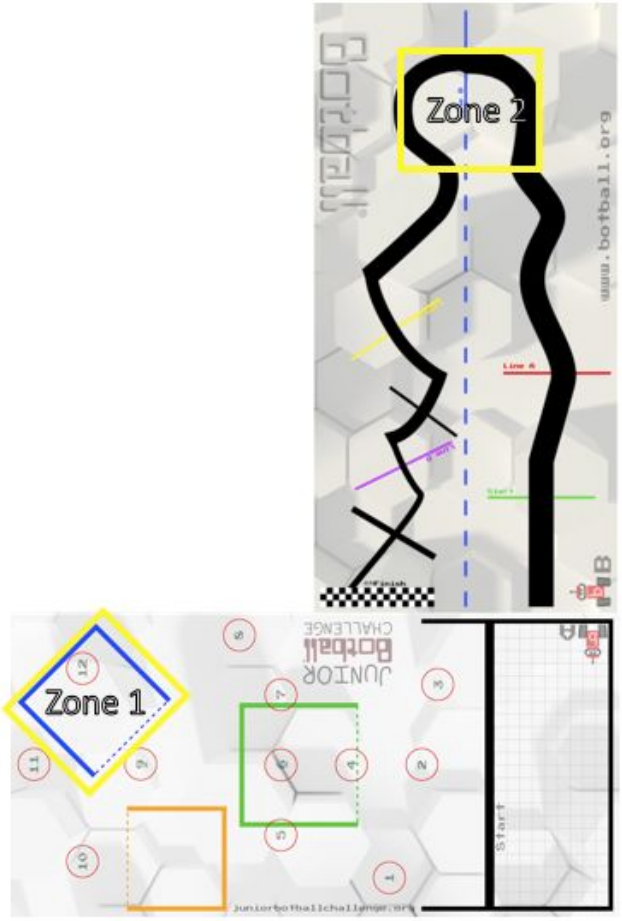
KISS INSTITUTE FOR PRACTICAL ROBOTICS

Botball Challenge 10	Now You See Me

Setup: Configuration 1, 4-7 (total number of) red or green poms placed on the mats in two different zones. Zone 1 will be in the blue garage and Zone 2 will be in the bubble made by the Mat B black line.
Level: Intermediate
Skills: Camera or ET sensor

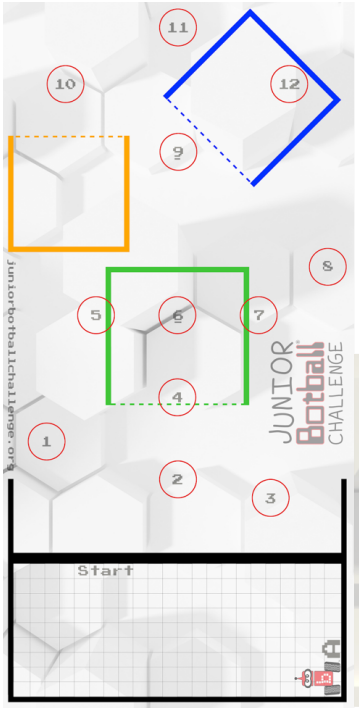
Objective(s):
1. The robot will locate the poms in each Zone and print a statement declaring how many of each color of pom are located at each Zone.

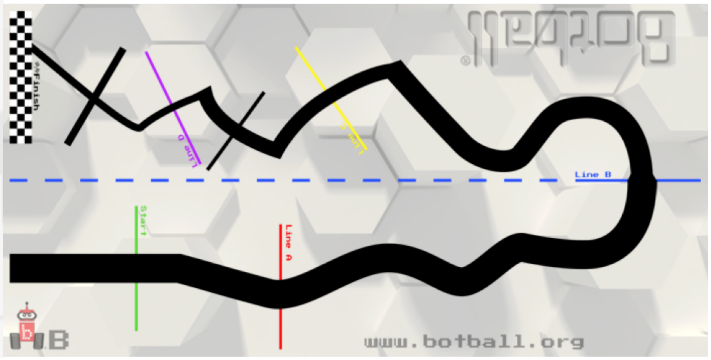
Constraints:
- The robot must start entirely within the start box of the A mat.
- The robot must start with a light.
- The robot may not drive off the mats.



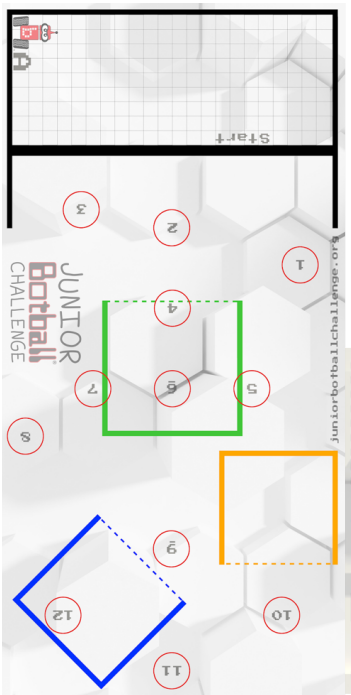
KISS INSTITUTE FOR PRACTICAL ROBOTICS

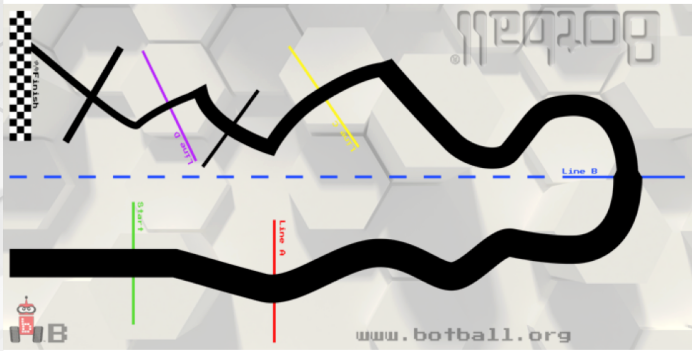
Configuration 1





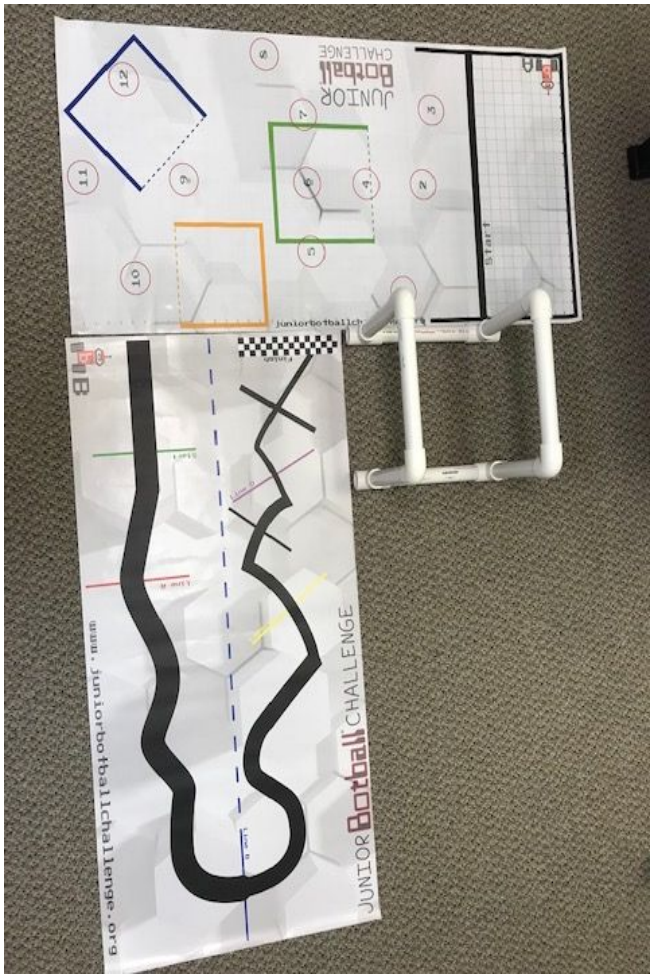
Configuration 2

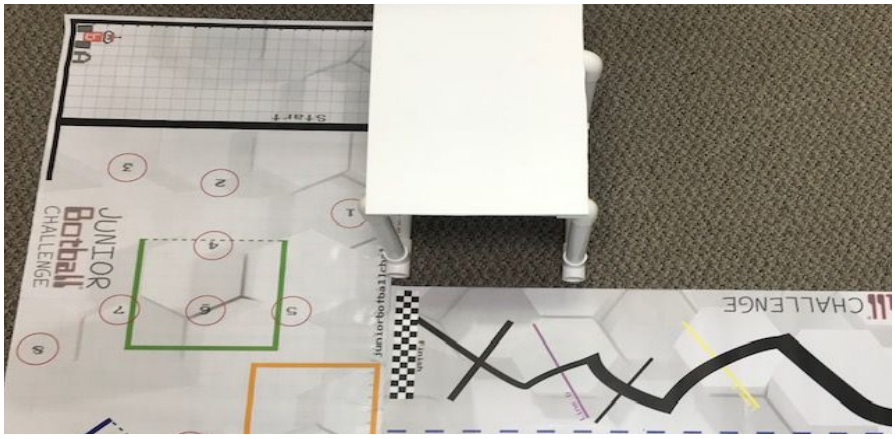




KISS INSTITUTE FOR PRACTICAL ROBOTICS

Platform without the top





Platform with the top

KISS INSTITUTE FOR PRACTICAL ROBOTICS