

JBC Challenge 2B *Ring Around the Cans Sr.*

Setup: Use Surface-A. Place a 12oz empty soda can in circles 12, 11, and 10.

Level: Beginner

Skill: Learning to turn.

Goal: The robot will drive out and around the cans in circles 12, 11, 10, and return to the starting area.

Completion: Participants will receive a completion award when the robot drives around the cans and returns behind the starting line.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5-minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual starting line.
2. The entire robot must go around the far side of the can.
3. The cans must not tip over and some part of the can must remain in the circle for the team to achieve completion.

JBC Challenge 3B

Parallel Parking

Setup: Use Surface-A.

Level: Beginner

Skill: Making precision turns and movements.

Goal: The robot will successfully parallel park on the side of at least two of the garages. .

Completion: Participants will receive a completion award when the robot successfully parallels parks on the side of at least two of the garages. **A successful parallel park occurs when the robot moves past the garage (all parts of the robot must go past the end) and then backs into the “space” with less than 2” between the line of the garage (wall) and the entire length of the chassis without touching any part of the solid line of the garage.**

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5-minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8’ enclosure as long as it is behind the actual and virtual starting line.
2. The team **must declare** which garage they intend to parallel park by before starting a run, **only attempting** one color of garage per run.
3. The robot may **not touch** the solid lines marking the 3 sides of the garage the team intends to parallel park by. All lines from undeclared garages will be ignored.
4. **A successful parallel park occurs when the robot moves past the garage (all parts of the robot must go past the end) and then backs into the “space” with less than 2” between the line of the garage (wall) and the entire length of the chassis without touching any part of the solid line of the garage.**

JBC Challenge 5B

Line Dance

Setup: Use Surface-A. No game pieces required.

Level: Beginner

Skill: Motor and servo control and movement.

Goal: The students and the robot will line dance.

Completion: Participants will receive a completion award when the student and the robot “line dances” and completes all of the performance standards listed in the challenge rules below.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5-minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual starting line.
2. The student's verbally call and do the line dance with the robot.
3. The robot must leave the starting box before completing the dance moves and must complete all of the following moves:
 - a. Must complete at least one 360 degree clockwise turn
 - b. Must complete at least one 360 degree counter clockwise turn
 - c. Must move forward multiple times (more than 5)
 - d. Must move backward multiple times (more than 5)
 - e. Must turn to the right multiple times (more than 5)
 - f. Must turn to the left multiple times (more than 5)
 - g. Must wave the servo (up and down at least three times)
 - h. Be creative and have fun.

JBC Challenge 6B

Pick 'Em Up

Setup: Use Surface-A. Place 3 empty 12oz soda cans in circles 2, 9, and 10.

Level: Intermediate

Skill: Precision robot driving, engineering an effector to pick up cans.

Goal: The robot will pick up the can in front of each garage and then place them into the a garage. Pick up the can from circle 2 place it into the green garage, can 9 into the blue garage, and can 10 into the yellow garage. You will attempt all cans in a single run. The cans must be upright (vertical) after placement.

Completion: Participants will receive a completion award when the robot successfully picks up two of the cans and places them into two of the garages in one run.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5-minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual starting line.
2. **The team must declare which garages** they intend to put cans in before starting a run.
3. The cans must not tip over and some part of each can must remain in the inside edge of the solid and dotted lines denoting the garage touching the surface, or that can does not count towards completion.
4. The robot may be touching cans at the end of the round.

JBC Challenge 7

Bulldozer Mania

Setup: Use Surface-A. Place 1 empty 12oz soda can in each numbered circle (12 cans total).

Level: Intermediate

Skill: Precision robot driving, engineering effectors (blades, claws etc.).

Goal: The robot will manipulate **at least five** upright cans behind the starting line in one run.

Completion: Participants will receive a completion award when the robot manipulates **at least three** upright cans behind the starting line in one run.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5-minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual starting line.
2. The robot's drive wheels must completely leave the starting box (crossing over and no longer touching the black line marking the starting box).
3. The cans must not tip over and some part of each can must touch the surface and be behind the start line (actual or virtual within the 8' enclosure), or that can does not count towards completion.
4. The robot may be touching cans at the end of the round.

JBC Challenge 8

Serpentine

Setup: Use Surface-A.

Level: Intermediate

Skill: Make precision turns $<90^\circ$ and $>90^\circ$.

Goal: The robot will drive on the surface touching each of the numbered red circles with at least one of the robot's wheels in sequential order (1, 2, 3, etc.) through 8.

Completion: Participants will receive a completion award when the robot drives through (touches with at least one drive wheel) circles 1-8 in the correct order in one run.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5-minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual starting line.
2. The robot must touch each circle with at least one drive wheel in the correct order through 8 for completion.

JBC Challenge 10

Solo Joust

Setup: Use Surface-B. Place one empty 12oz soda can on the black line between the text “Line B” and the B in “Botball”.

Level: Intermediate

Skill: Driving the robot in a straight line, and manipulating a can.

Goal: The robot will drive without touching Line B (blue line) with either wheel and knock over a can on the other side of the blue line.

Completion: Participants will receive a completion award when the robot knocks over the can without the drive wheels crossing the blue dotted line.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5-minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start with the wheels on the green line side of the blue dotted line (Line B) and be completely behind the vertical projection of the inside of the green “Start” line and the blue dotted line. The arm may not project over the solid line until after the entire robot has crossed the start line.
2. The robot must drive to the end of the mat (indicated as past the black line) and tip over the can without any drive wheels touching Line B (blue line).

JBC Challenge 11

Be Happy

Setup: Use a 2' x 4' sheet of butcher paper. Attach a marker to the robot.

Level: Intermediate

Skill: Driving and operating a servo.

Goal: The robot will drive on the butcher paper while manipulating the marker to draw a smiley face ☺

Completion: Participants will receive a completion award when the robot successfully makes three marks on the paper that can be construed as a smiley face.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5-minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must make at least 3 separate marks that could be construed as a smiley face – two eyes and a mouth.

JBC Challenge 17B

Lost and Found

Setup: Use Surface-B.

Level: Intermediate

Skill: Using a reflectance sensor, ET or lever sensor, and servos

Goal: Find the can: The robot will follow the black line; grab the can on black and yellow line intersection.

Completion: Participants will receive a completion award when the robot follows the black line with a sensor, stops and grabs the can located on the intersection of the black and yellow line. The robot must hold the can above the mat, (not touching) and stopped.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5-minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line.
2. The robot must be following the line. Dead reckoning will not be allowed and will result in a disqualification. If the judge believes dead reckoning is occurring, he will immediately check the code running on the robot.
3. Participants will receive a completion award when the robot follows the black line with a sensor, stops and grabs the can located on the intersection of the black and yellow line. The robot must hold the can above the mat, (not touching) and stopped.

JBC Challenge 19

Mountain Rescue

Setup: Use Surface-A. Place a full ream (500 sheets) of standard 8.5" x 11" copy paper inside the blue garage so that it is touching the solid side and back lines of the garage and extends over the dashed line. Place 3 empty 12oz soda cans on top of the ream of paper.

Level: Advanced

Skill: Precision robot driving, engineering effectors utilizing two servos.

Goal: The robot will get the cans off of the platform and bring them to the starting box.

Completion: Participants will receive a completion award when they have rescued at least one can and brought it back to the starting box.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5-minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual starting line.
2. The 3 empty cans will be placed by the students onto the top of the ream of paper prior to the start of their run.
3. Cans are considered to be on the top of the platform if the cans are upright, touch the top surface of the platform, and do not touch the surface of the mat, tape, or floor.
4. Cans are rescued and count as placed in the starting box when they touch the surface of the starting box and are upright.
5. Once a can is rescued, students can remove the can, set it aside and reset their robot in the starting box to go after additional cans.

JBC Challenge 20B

Bump Bump

Setup: Use Surface-A. Place a ream of paper on the long side of the green garage, and another along the end of the Starting Box, (see picture below).

Level: Advanced

Skill: decision-making. Module 8, lesson 8.3

Goal: Robot will drive forward until the touch sensor is pressed on the front of the robot, pauses and then back up until the touch sensor on the rear of the robot is pressed, then pause and drive forward to circle 2.

Completion: Participants will receive a completion award when the robot leaves the starting box, and touches the ream of paper using a touch sensor, pauses, and backs up and touches the other ream of paper, pauses, and drive forward to circle 2. Volunteers must be able to see the stops.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. All other General Rules apply.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual starting line.
2. The robot's drive wheels must completely leave the starting box (crossing over and no longer touching the black line marking the starting box).
3. The robot must use two touch sensors that are visible to the judge.

