Challenge 2: Ring Around the Can

Setup:

Use Surface-A. Place a 12 oz. empty soda can in circle 6.

Skill:

Learning to turn. The goal is for the robot to drive out and around the can in circle 6 and return to the starting area.

Guidelines:

1. All robot parts must start **BEHIND** the vertical projection of the inside of the start line.
2. Robots may drive off the mat during a run.
3. The entire robot must go around the far side of the can.
4. To achieve completion, the can must not tip over, and some part of it must remain in the circle.

Challenge 4: Serpentine

Setup:

Use Surface-A.

Skill:

Make precision turns <90^{o} and >90^{o}.

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.

Guidelines:

1. All robot parts must start **BEHIND** the vertical projection of the inside of the start line.
2. Robots may drive off the mat during a run.
3. To complete the task, the robot must touch each circle with at least one drive wheel in the correct order through 8.

Challenge 5: Odd Numbers

Setup:

Use Surface-A.

Skill:

Precision robot driving.

Goal:

The goal is for the robot to drive over or touch all the odd-numbered circles without touching or driving over any even circles.

Guidelines:

1. All robot parts must start BEHIND the vertical projection of the inside of the start line.
2. Robots may drive off the mat during a run.
3. To complete the task, the robot must touch or drive over each circle in the correct order: 1, 3, 5, 7, 9, and 11 without touching or driving over any even-numbered circles.

Challenge 7: Load ’Em Up

Setup:

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

Skill:

Precision robot driving, engineering an effector to push cans.

Goal:

The robot will manipulate the can in front of each garage and move it into the garage. Put the can from circle 2 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.

Guidelines:

1. All robot parts must start **BEHIND** the vertical projection of the inside of the start line.
2. Robots may drive off the mat during a run.
3. Robots cannot cross over solid lines of garages.
4. The cans must not tip over, and some part of each can must be on the inside edge of the solid and dotted lines.
5. The robot may be touching cans at the end of the round.

Challenge 10: Chopped

Setup:

Use Surface-A. Place a can on circle 7

Skill:

Learning to use one servo and planning servo placement for a challenge

Goal:

The robot start will drive out, and stop in front of circle 7. Before chopping it must pause for 5 seconds. Next it will chop (move servo to chop down) the can.

Guidelines:

1. All robot parts must start **BEHIND** the vertical projection of the inside of the start line.
2. Robots may drive off the mat during a run.
3. Robot must stop in front of circle 7 and chop the can.

Challenge 14: Dance Party

Setup:

Use Surface-A.

Skill:

Motor and servo control and movement.

Goal:

The robot must “dance” along with the music or rhythm clap.

Guidelines:

1. All parts of the robot must start BEHIND the vertical projection of the inside of the start line.
2. *Robots may drive off the mat during a run.*
3. If the students want music students need to provide their own music clip that plays loud enough for the judges to hear. Music clips can be played from a cell phone or the students can provide live music (singing).
4. 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 counterclockwise turn c. Must move forward d. Must move backward e. Must wave the servo (up and down at least once)

Challenge 9: Cover Your Bases

Setup:

Use Surface-A. Place 7 empty 12 oz. soda cans anywhere on the black starting line.

Skill:

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

Goal:

The robot will manipulate at least 5 upright cans back to the circles 1-7.

Guidelines:

1. All robot parts must start **BEHIND** the vertical projection of the inside of the start line.
2. Robots may drive off the mat during a run.
3. The cans are to be placed by students anywhere on the black line of the starting box.
4. The robot cannot touch a can before starting.
5. The robot's drive wheels must completely leave the starting box (crossing over and no longer touching the black line marking the starting box).
6. The cans must not tip over, and part of each can must touch the circle.
7. Only one can per circle.
8. The robot may be touching a can at the end of the round.