2018 Summer Intern Challenge Events

General Rules

- The 2018 Summer Intern Challenge consists of 3 separate events each of which will include multiple rounds.
- Points can be earned in each round, and the winning team will be determined by the overall scores across all events.
- For each event:
  - All teams must load their robot software/data prior to any rounds being run or event details being revealed.
  - No software/data changes are allowed for the duration of the event.
  - A 5-minute transition period will be available between events.
- Remote control of the robots is NOT allowed.
- External inputs and/or configuration are NOT allowed, except as noted.

General Rules (cont.)

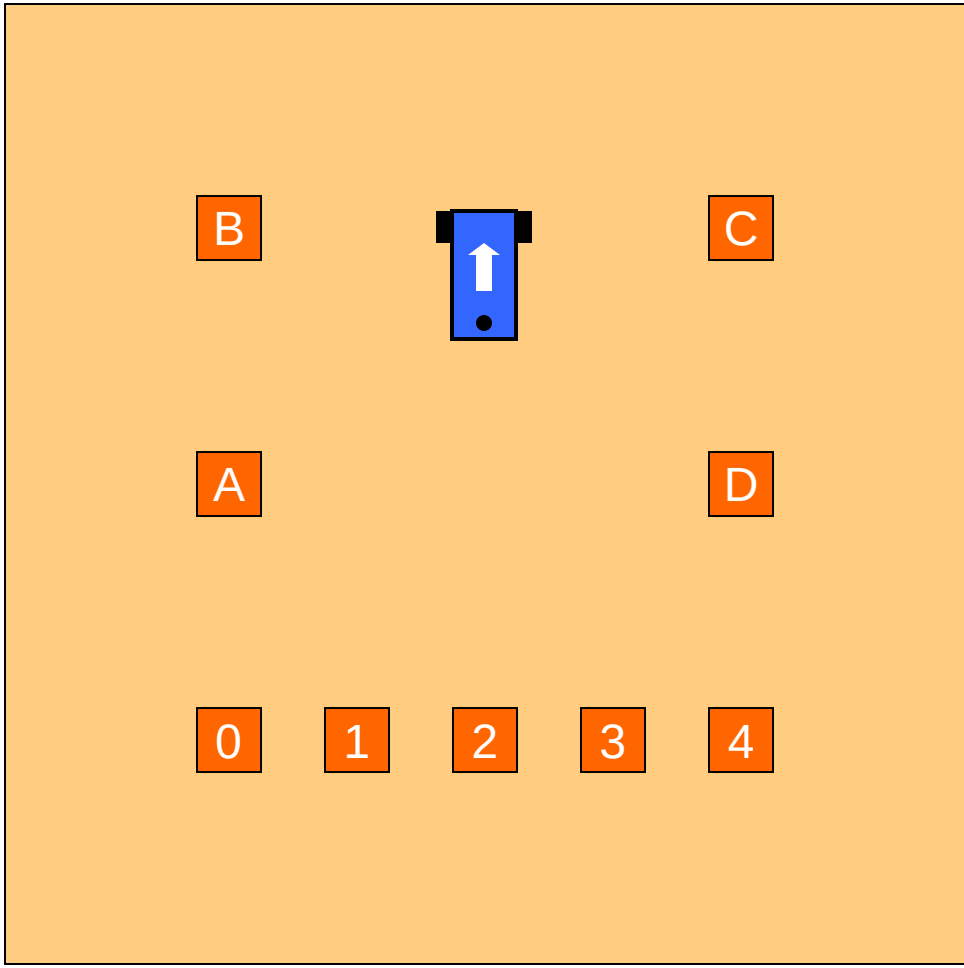
- Unless otherwise specified, a robot's position or "center" is determined by the midpoint of the line segment between the two drive wheels.
- A robot that creeps slightly due solely to non-zeroed servos will still be considered "stopped".
- If the robot moves outside the arena boundary during a heat, it will be stopped.
- If a robot is stopped during a heat (e.g., due to movement outside the arena, time limit exceeded, etc.) it will receive any points already earned in the heat, if applicable.
- The arena, and a 1-foot surrounding perimeter, must remain clear of people / obstacles when robots are active.
  - This is to avoid anomalous readings from the ultrasonic sensors
  - Team members positioning and starting the robot are allowed exceptions

General Rules (cont.)

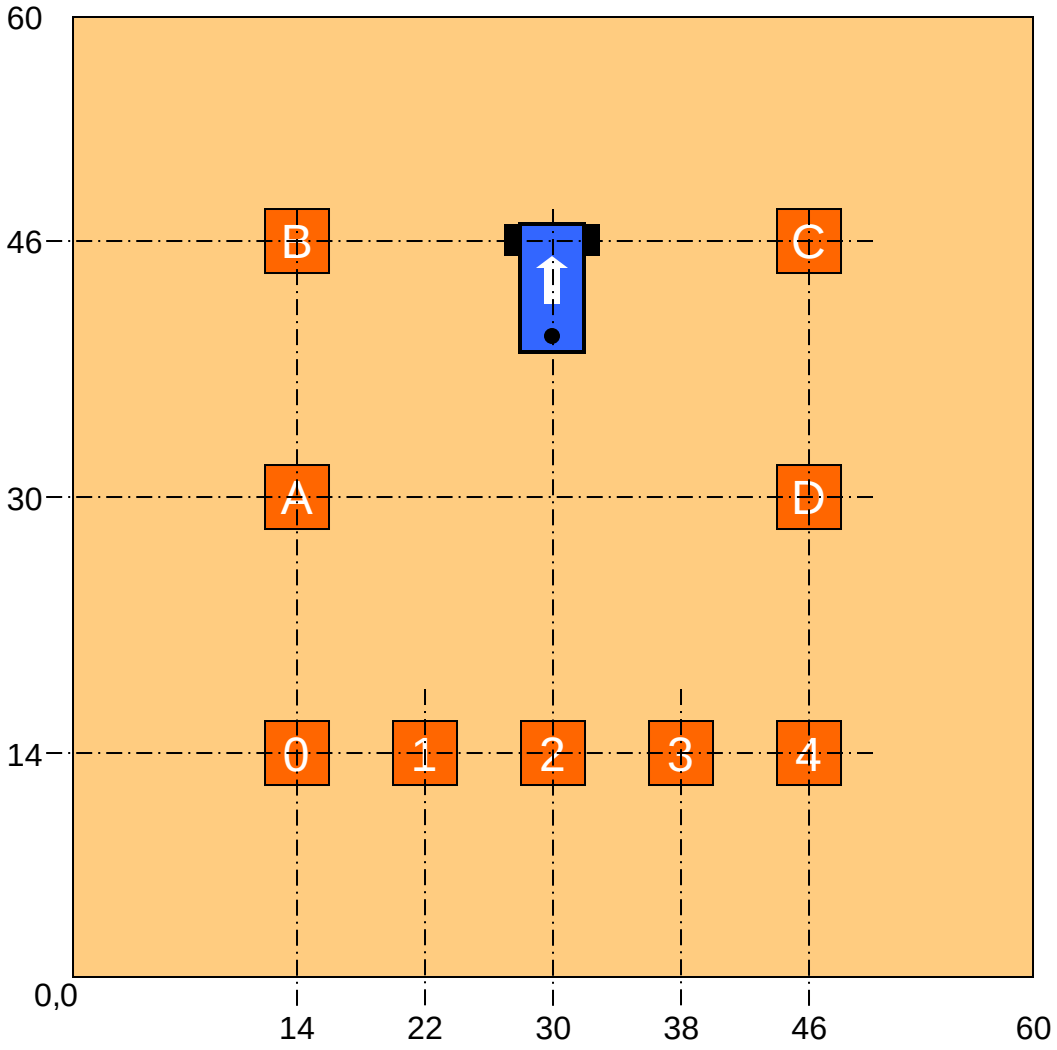
- For the competition, the order of the events may differ from the order in these slides.
- The judges will determine the order in which teams compete for each round in each event.
- If there is a tie after all events, then a tie-breaker round of one of the events will be run.
- Teams are responsible for their robot's integrity
  - Secure electrical connections, calibrate sensors, zero servos, check batteries.
  - A team may request a repair timeout before a heat to address mechanical or electrical issues. Software or data changes are not allowed. The judges will frown upon prolonged or repeated repair requests.
- The decision of the judges is final.

Event: Silly Robot Tricks

- Layout:
  - Arena is a square of side 60” with no walls
  - There are four target locations (A..D)
  - There are five answer squares (0..4)
  - Target locations and answer squares are 4” square
  - Between zero and four targets (unmovable ultrasonic reflectors) will be present
  - All positions and dimensions, including initial robot position and pose angle, are given
- Objective:
  - Count the number of targets present and drive to (and stop on) the answer
- Scoring:
  - Correct answer is required to receive any points
  - Answer faster for more points



Silly Robot Tricks: Arena Layout

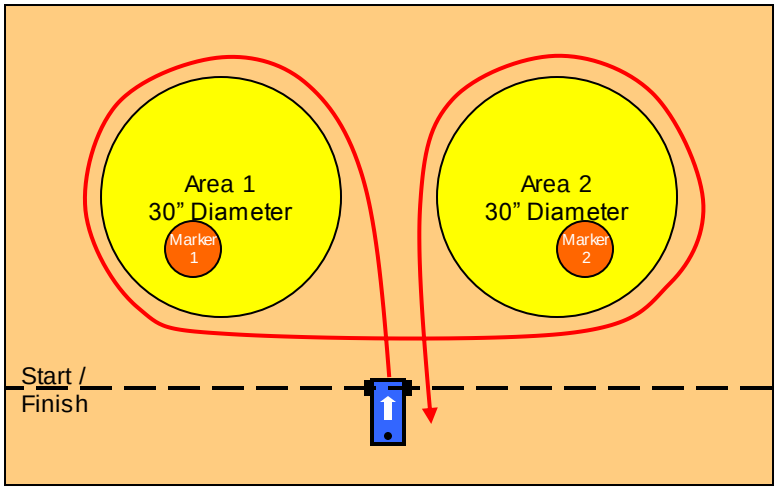


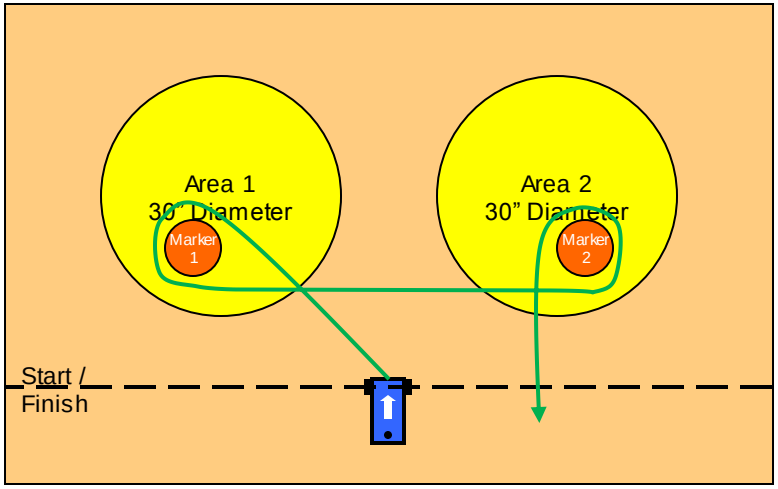
Silly Robot Tricks: Scoring

- 30 points available
  - 10 points per round
  - 3 rounds
  - Each team's score is independent
- Scoring
  - Clock starts when the robot moves
    - Rotating the sensor servo does NOT start the clock
  - Clock stops when the robot stops on an answer square
  - Correct answer in:
    - <= 7 seconds: 10 points
    - 7-12 seconds: 1 point reduction for each second (or fraction thereof) above 7 seconds
    - > 12 seconds: 1 point reduction for each two seconds (or fraction thereof) above 12 seconds
- Competition Notes
  - Each round will feature a different target arrangement
  - Within a round, each team will run with the same target arrangement

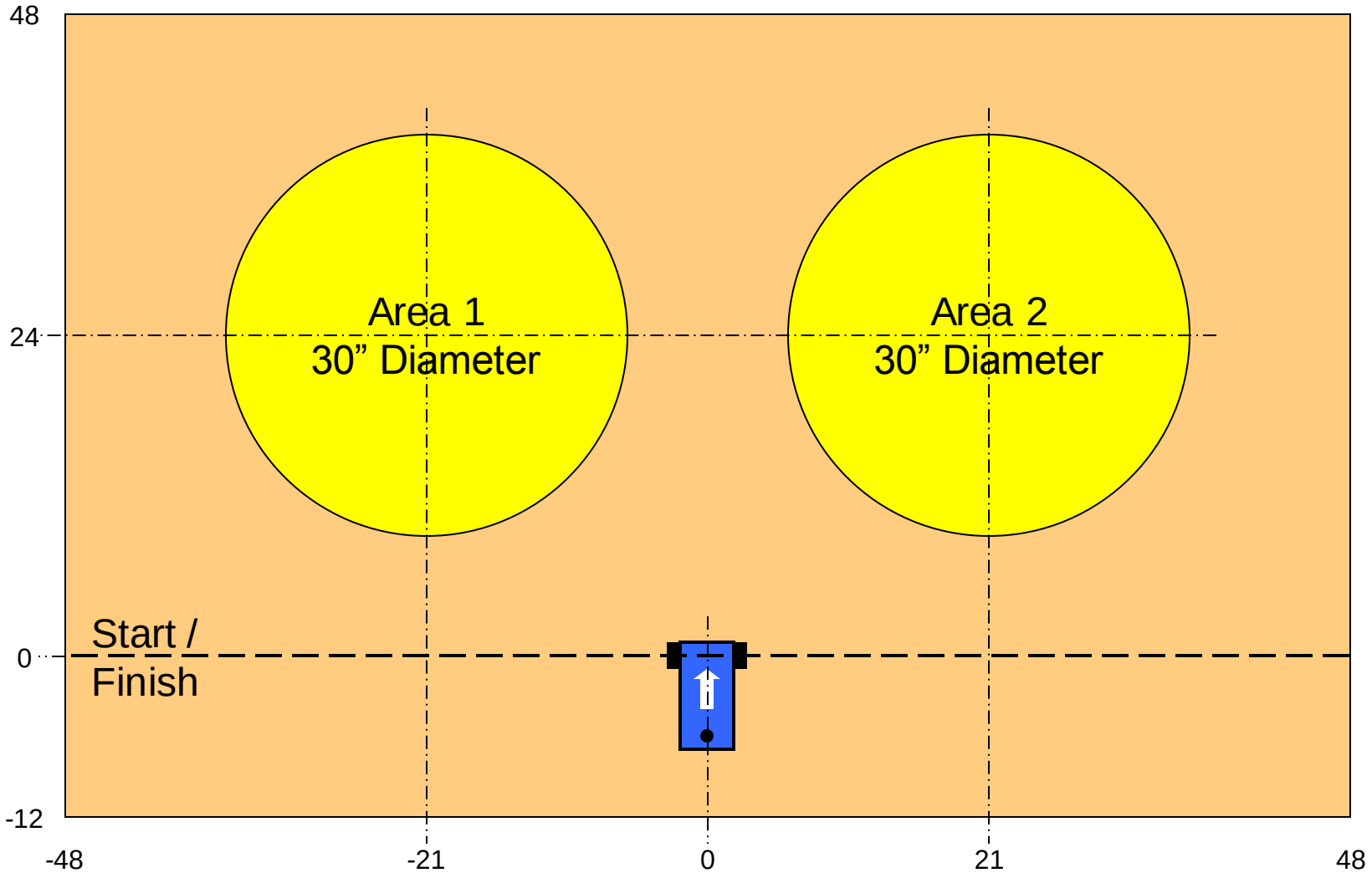
Event: Cloverleaf Race

- Layout:
  - Arena is a 96” x 60” rectangle with no walls
  - There are two marker areas, each of which is a 30” diameter circle.
  - In each marker area, one of the ultrasonic reflector targets will be placed in an undisclosed location.
  - A Start/Finish line, running the length of the rectangle, parallels the long sides.
- Objective:
  - Negotiate in a “cloverleaf” pattern around the two markers and then cross the finish line in the shortest amount of time.
  - Examples:
    - The red path would suffice to complete all course variations, but it is unlikely to be the fastest
    - The green path is roughly the shortest distance for the arrangement of markers shown.
- Scoring:
  - Robots will be ranked in speed order
  - Points awarded based on rank





Cloverleaf Race: Arena Layout



Cloverleaf Race: Details

- The robot may drive anywhere within the arena as it negotiates the course, including crossing the Start/Finish line.
  - Obviously, crossing the line before circling both markers does not count as “completing”
  - Be aware that the Start/Finish line coincides with a seam in the playing surface; driving on this line in a [nearly] parallel direction may cause odometry issues.
- The robot is only required to encircle the markers
  - The marker areas define where the markers may be placed; they are not significant in where the robot is allowed or required to drive
- The robot may circle the markers in either order
  - Meaning it may follow a generally clockwise or a generally counter-clockwise path
- The robot may cross the finish line anywhere along the length of the line.

Cloverleaf Race: Scoring

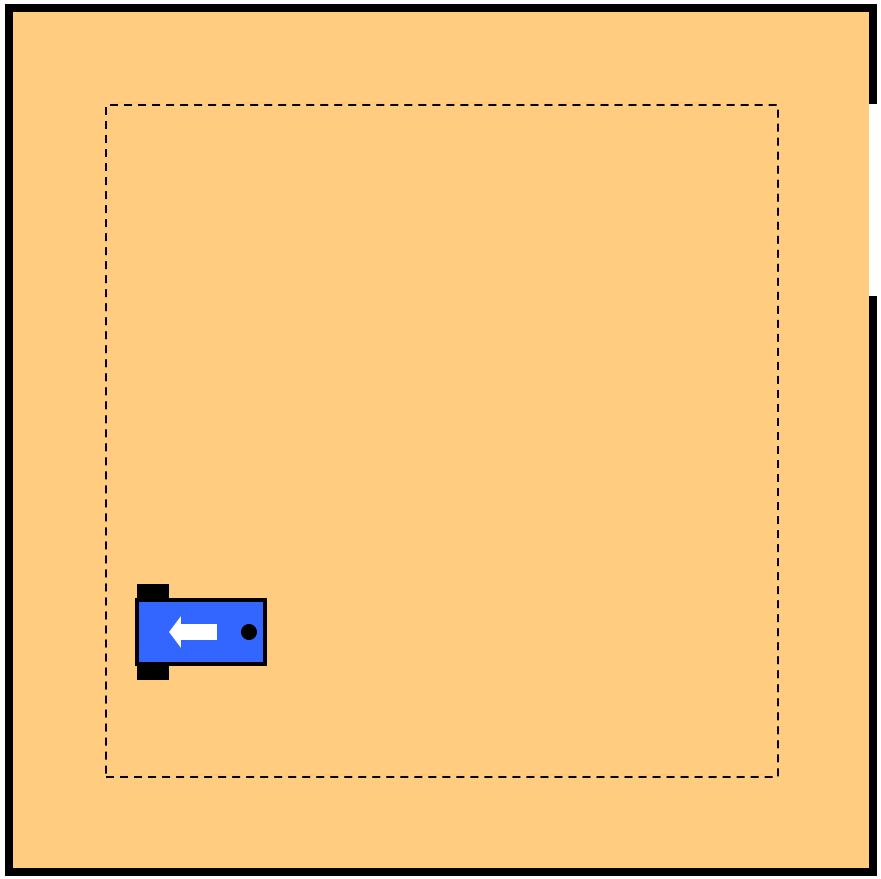
- 40 points (plus 5 bonus points) available
  - 20 points per round
  - 2 rounds
- Scoring
  - Clock starts when the robot moves
    - Rotating the sensor servo does NOT start the clock
    - Optional “Green Flag” race start (see next slide)
  - Clock stops when the robot crosses the finish line
  - Teams will be rank-ordered by time for each round
    - Fastest team gets 20 points
    - Next fastest gets 15, then 10, and 5.
    - Failure to complete within the time limit results in zero points
  - 5 bonus points (total for event) for using “Green Flag” start
- Competition Notes
  - Each round will use a different target arrangement
  - Within a round, each team will run with the same arrangement
  - Time limit: 90 seconds

Cloverleaf Race: Optional "Green Flag" Start

- Bonus points will be awarded for using this alternate starting method:
  - The robot must initially remain stationary in its starting position
    - Rotating the sensor servo is allowed
    - Team will indicate when they are ready for the starting countdown
  - The race official will start the heat with a "3-2-1-go" countdown
  - The robot is triggered to start by a team member "waving the green flag" (waving/moving their hand) in front of the robot.
    - Silly green glove must be worn on hand (Nah, just kidding ☺)
  - Clock begins on "Go"
- The method must be used for both rounds to receive the bonus points
  - The bonus points are for the event, not per round

Event: Breakout

- Layout:
  - Arena is a walled square of undisclosed size, with side length between 48” and 84”
  - One wall has a 12” gap
  - The robot starts in the arena at an undisclosed position and pose angle
    - Pose angle will be parallel/perpendicular to sides
    - No part of the robot will be within 6” of any side
- Objective:
  - Leave the arena by driving through the gap
- Scoring:
  - Robots will be ranked in speed order per round
  - Points awarded based on rank
  - Successful exit required to earn any points
- Configuration Inputs:
  - For this event only, teams will be allowed to provide 2 bits of input data to their software
  - The arena layout and robot initial pose angle and position for a round will be revealed, at which time the teams may configure their input
  - Separate inputs will be allowed for each round
  - Input shall be constant logic levels on digital input pins 2 & 3



Breakout: Scoring

- 40 points available
  - 20 points per round
  - 2 rounds
- Scoring
  - Clock starts when the robot moves
    - Rotating the sensor servo does NOT start the clock
  - Clock stops when the robot passes through the plane of the wall
  - Teams will be rank-ordered by time for each round
    - Fastest team gets 20 points
    - Next fastest gets 15, then 10, and 5.
    - Failure to exit results in zero points
- Competition Notes
  - Each round will use a different starting position and gap position
  - Within a round, each team will run with the same starting arrangement
  - Time Limit: 90 seconds