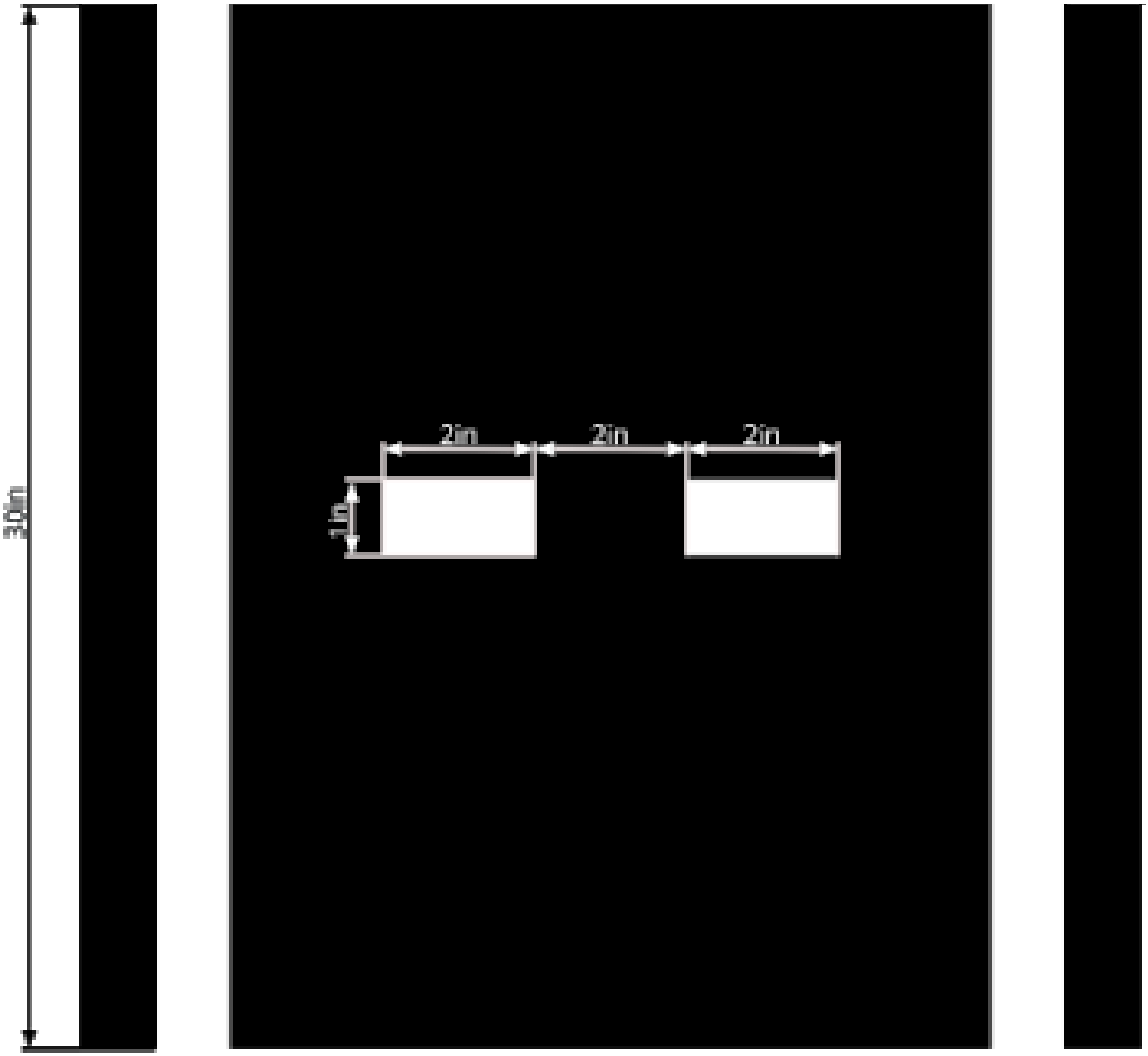
1. All teams compete with the same kit; although, some modifications are allowed.
2. The car kit received by each team after the registration includes:
    1. RC 1/10 Scale Touring Car Chassis.
    2. Brushed Motor.
    3. Electronic Speed Controller for Brushed Motors.
    4. Servo for Steering.
    5. LiPo Battery (2 cells, 4000mAh).
    6. Raspberry Pi 3 B+ Board.
    7. Raspberry Pi Camera Module V2.
3. The following modifications are forbidden and if one of the following parts breaks it should be replaced with an identical one:
    1. Changing the distance between the wheels.
    2. Changing the motor and the gear ratio.
    3. Changing the tires and their contact surface.
    4. Car dimensions should not exceed 12 inch width, 15 inch length, and 12 inch height.
    5. One 2 cell LiPo battery of maximum 4000 mAh should be the only energy source that powers the car and the processor board.
    6. No DC-DC convertors that produce voltages above the battery voltage are allowed.
    7. The car must operate autonomously during the race, no wireless connection is allowed.
    8. The car must use a camera as a primary navigation sensor.
4. Additional sensors such as accelerometer, gyroscope, encoders are allowed.
5. Adjusting the suspension springs and weight balance, removing auxiliary chassis parts, and mounting additional boards is allowed.
6. To see whether your additional modifications are acceptable, email vbalaban@usc.edu before implementing. If your additions are illegal, you will have to remove them before the race.

1. Half an hour before the races start, all cars should be placed on the inspections area.
2. The judges will inspect the cars according to requirements specified in the car kit section.
3. Violation of the requirements would be penalized with extra time or disqualified based on the severity of the violation.
4. Cars would stay in the inspection area until the beginning of the race.
5. No mechanical modifications are allowed after this point without approval from the judges.

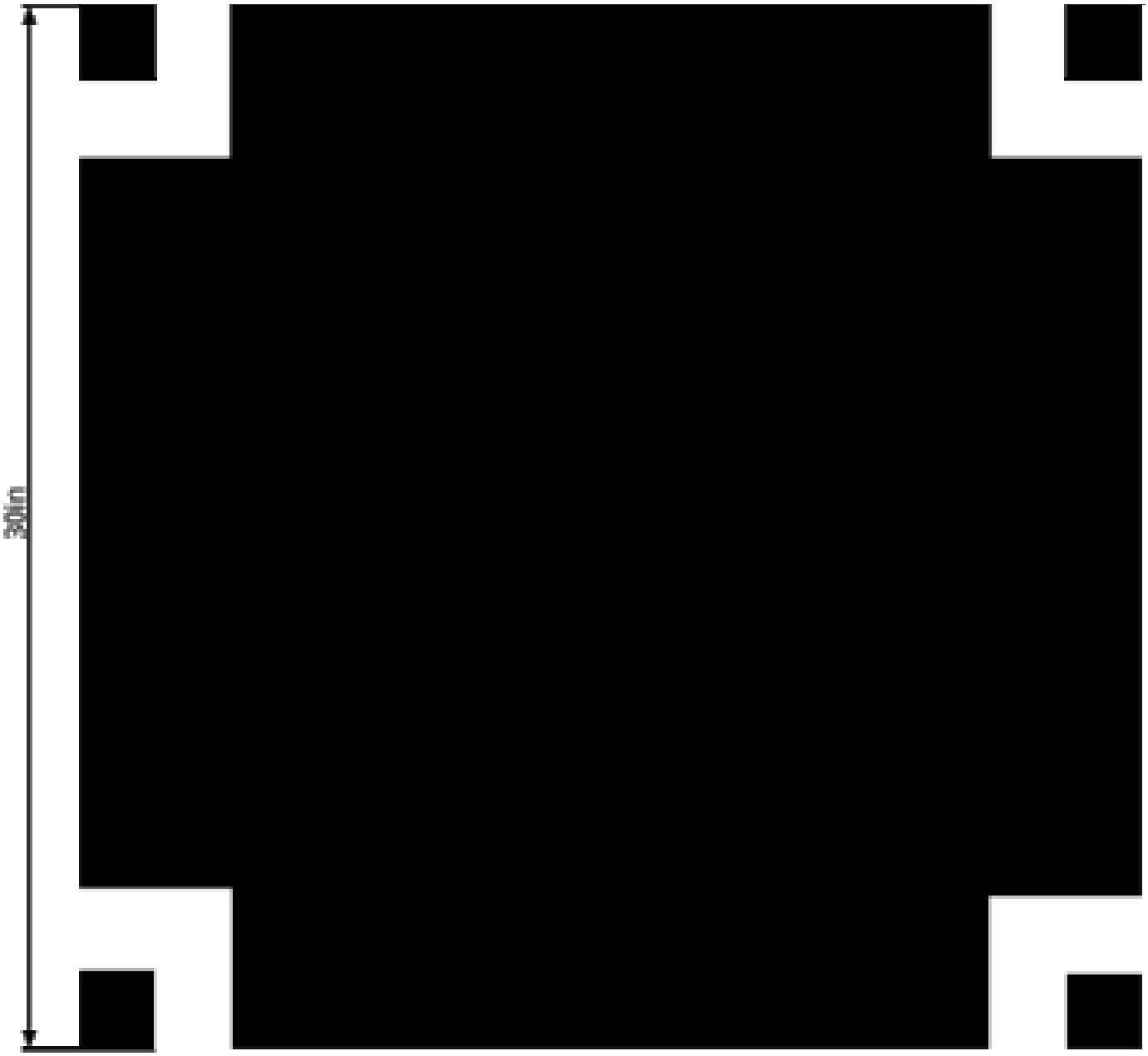
Racing Track:

1. Racing track is black with white lines delimiting the track boundary.
2. The dimensions of a track segment are 30 inch width and 30 inch length.
3. Track segments are of four types as shown below:
    1. Start/Finish Line
    2. Straight Line
    3. Intersection
    4. 90° Turn
4. The white lines delimiting the track are 1 inch wide and spaced 1 inch from the edge of the track segment.
5. The Start/Finish track segment has two white rectangles in the middle of 2 inch width and 1 inch length along which the timing gate is placed.



Start/Finish Track Segment

Straight Line Track Segments are similar but without the two white rectangles in the middle



Intersection Track Segment

90° Turn Track Segment

1. The participation in this race is not mandatory but highly recommended.
2. Completing this race awards the team 1 second deduction from the final race time.
3. The cars drive on a 12 feet long straight portion of the track without having their wheels completely cross the white lines delimiting the track boundary.
4. Teams have 3 attempts to complete the race within 3 hours of the race time period.
5. Teams can attempt completing the race in any order; however, the teams with fewer attempts will have priority.

Progress-Checking Races #2 – Infinity loop:

1. The participation in this race is not mandatory but highly recommended.
2. Completing this race awards the team 1 second deduction from the final race time.
3. The cars must do a full lap on figure 8 shaped track without having their wheels completely cross the white lines delimiting the track boundary.
4. Teams have 3 attempts to complete the race within 3 hours of the race time period.
5. Teams can attempt completing the race in any order; however, the teams with fewer attempts will have priority.

1. All registered teams must compete in the final race.
2. The starting order of the teams is selected randomly.
3. All teams have three attempts to finish the race and record the fastest time.
4. Teams, in order, will finish the first attempt before proceeding with the second and then the third.
5. In between attempts teams are allowed to change the software but not the hardware part of the car.
6. After being called for racing, the team has two minutes to prepare the car and start the race.
7. Only one member of the team is allowed to operate the car during the racing attempt.
8. The car should be placed before the start line no farther than 6 feet.
9. During the race, the car should always be between the two white line delimiting the track.
10. If one of the car wheels during the race completely crosses the white line, the attempt is marked as failed.
11. After finishing one lap if the car stops in less than 10 feet from the finish line an extra second is subtracted from the final time.
12. The team with the fastest time after three attempts wins.

Inspired by: NXP Cup https://community.nxp.com/groups/tfc-emea

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Race On! – Self-Driving Car Competition
Event enable by the Ming Hsieh Institute

Ming Hsieh Institute

Ming Hsieh Department of Electrical Engineering