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SoutheastCon 2009 Hardware Rules

The Recycling Robot

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I. Introduction

Athletic stadiums and college campuses are plagued by the issue of trash after tailgating parties. This is both unsightly and time consuming to clean up, and represents a potentially significant source of untapped recyclable materials. By developing an autonomous robot that can locate, sort, and separately store the different containers, the manpower needed for cleaning can be reduced. After most tailgating events, there is often an assortment of glass, plastic, and aluminum beverage containers, all of which can be easily recycled.

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II. Objective

Robots must locate, obtain, sort, and store used Coke products.

All sorting and storage is to be done on the robot. Points are awarded for the collected objects at the end of the round. Some points will be awarded for unsorted items; however, more points will be awarded for correctly sorted items. The winners will be judged on points with run time being the tiebreaker.

III. Playing Field

1. The playing field shall consist of a (10x10) square green Astroturf base with an “invisible dog fence” perimeter that acts as the boundary. The dog fence kit will be provided upon registration.
2. A 1-foot grid of small spray-painted dots will indicate potential locations for Coke products. The integrity or visibility of the dots will not be guaranteed for use other than container placement.
3. There will be a hard boundary at the extremity of the course to prevent interaction with other robots on adjacent fields. The height and exact location of the boundary will not be specified and is not intended as a navigational aid.
4. The objects in play consist of standard Coca-Cola products: 12

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ounce aluminum cans, 0.5 liter plastic bottles with the tops still on (yes, this violates recycling standards), and glass 11.5 ounce Coke bottles. None will contain liquid, but they may feature minor deformations due to previous usage.

5. The containers may be placed horizontally in any orientation on the playing field.

IV. Robot

1. The robot must have a single button labeled “START”.
2. The robot must be able to fit in a 12x12x18 inch box at the start of each match.
3. There is no weight or material restriction. But the robot must be powered by non-dangerous means (no combustible liquids or gasses). Gas canisters with a maximum working pressure of 100 psi will be allowed. We kindly request that all canisters are easily inspected and that the participants will allow extra inspection for safety. This may include external checks or other acts of verification. It is advisable to keep any high-pressure system in an enclosed compartment.
4. Any robot deemed dangerous by competition officials will be subject to disqualification. This includes any robots using admissible levels of compressed air implemented in a dangerous way.
5. One(1) to three(3) storage containers may be placed on the robot. Each container must be removable and replaceable. Each container must consist of a separate plastic trash bag.
6. Prior to the beginning of each round, each container must be

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labeled as to which object type will be stored inside. The team will gain the extra points for correctly sorted objects only if they are in the corresponding container.

7. The bags may not drag on the playing surface
8. See section “Scoring” for additional information on scoring and point distribution

V. Rules of Play

1. On cue from an official, a team member must press a start button. The robot must operate autonomously thereafter with no interaction from people or electronic sources.
2. A team may not take any action that purposely interferes with the course of play or causes damage to the playing field or competing robot. The penalty for destructive interference is disqualification for that match.
3. A robot may start in any orientation at the discretion of the team provided that some part of the robot is within six inches of the “dog fence” on the interior side. The team is responsible for placement, and may not step onto the field.
4. The robot must traverse the play field and gather cans and bottles. Points will be awarded for everything picked up with additional points for correct sorting. This is detailed under the Scoring section.
5. The playing time will be 5 minutes.
6. The robot is not required to return to any specific zone by the end of the time period.

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7. At the end of the time period the robot may stop autonomously or a team member may stop the robot. However, regardless of when the robot is actually deactivated, no additional points may be accumulated. Any objects obtained after the time limit will not be scored.
8. In addition to the time constraint, a team member may call time at any point. This will be recorded as the runtime for that round.
9. The robot does not have to return to its original size at the end of the round (but must do so before the next round).
10. Some damage to the aluminum and plastic containers is permitted. Damage of the glass bottles, however, is not allowed for safety reasons.

VI. Competition Format

1. Qualified teams will be divided evenly into two groups and will alternate competing in heats.
2. There will be two heats per group (robots will run at least twice).
3. The container placement will not vary for all rounds of a heat.
4. The robots in the group currently competing will be maintained in a staging area and unavailable to the teams for modification until after the heat.
5. Robots in the group not currently competing will have full access to their robots.
6. Further details concerning the format will be released at a later date.

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VII. Scoring

1. Each can or plastic bottle correctly sorted is worth 15 points.
2. Each glass bottle correctly sorted is worth 30 points.
3. Each object incorrectly sorted is worth 5 points.
4. Points will be calculated after the end of the round by the judges by assessing the number of sorted and unsorted objects.
5. A team is welcome to observe the point calculation and propose an objection, but only before the score is officially recorded. It is the team's responsibility to be present at the calculation (which will directly follow the round and will be done off to the side) and the team may not request a delay in the calculation.

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