

Canine Companion Challenge



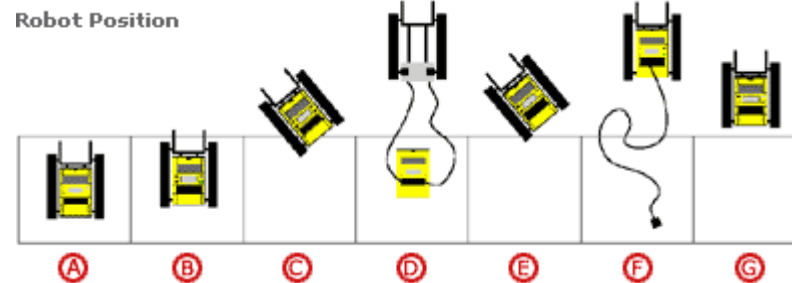
Contest Description

The Canine Companion Challenge contest challenges the exhibitor to design, construct, program and operate a battery powered robot for use in a pet care simulation. The exhibitor will be given tasks to complete to simulate tasks that might be required of a real pet care robot.

Rules

1. Only the exhibitor and a youth “helper” are allowed at the playing field while the Robot is on a task attempt. A “helper” is not required but highly recommended.
2. The exhibitor steps up to the playing field and has at least one minute to perform any needed setup routines. The Judge starts the Match, and the exhibitor performs task attempts for 2-1/2 minutes. More Matches run until every exhibitor has competed once, and this process is known as a Round. There are at least 3 Rounds in the contest. After each Match, exhibitors may go to the pit and fix or adjust the Robot.
3. To avoid erased programs: Downloading is only allowed in the pit area, download settings must be kept on short range or the robot must be directly connected to the programming computer, the process must be shielded from surrounding exhibitors, and the Microcontroller (i.e. NXT, RCX) should be kept OFF when not in use.
4. The Robot is defined as the Microcontroller, NXT or RCX and anything connected to it in any way, including any loose objects being held, manipulated, or moved.
5. The Robot must be programmed using programming software. (i.e. LEGO MINDSTORMS Robotics Invention System, RoboLab, Pbasic, C, etc.)
6. Base is the volume enclosed by the thick black base lines (see the Canine Companion playing field diagram) and inside Border Walls.
7. Before the match, between task attempts, and only while the Robot is completely inside the base area, the exhibitor may package objects, aim the Robot, repair it, load or unload it, add or remove parts, switch programs, and reset mechanisms.

8. All task attempts must start with the Robot completely in Base as shown in the Robot Position diagram in position A, with the Robot turned on but all programs turned off. The Robot must start from within the base lines. This starting technique applies during the whole Match, not just at the beginning.



9. Jigs or other alignment devices may be used to help aim the Robot in starting position and they must stay completely in Base.
10. While on a task attempt, the Robot is to be controlled only by its program, its motors, and its interaction with the field, and not by interaction of any kind with the exhibitor. Remote control of any kind is not allowed, and the signaling of sensors in any way is not allowed.
11. A task attempt is started when the exhibitor starts a program. Delaying or causing the release of stored energy in any form by hand is not allowed. This starting technique applies during the whole Match, not just at the beginning.
12. A task attempt is an effort by the Robot to accomplish one or more of the given tasks. Tasks can be attempted in any order, re-attempted whenever possible, or not attempted at all.
13. The Robot is understood to be on a task attempt starting from the instant a program is initiated. The next time the exhibitor controls or interacts with the Robot in any way (touching/carrying is most common), it is a signal that the Robot is failing or can no longer continue on its own, and the current task attempt is immediately terminated. The exhibitor must then bring the Robot by hand to Starting Position for the next task attempt. Any changes to the playing field after the instant the exhibitor interacts with the Robot are invalid, and are reversed by the referee.
14. Points for moving an object are awarded only if some portion of the object itself is in scoring position as specified in the task, no matter where the Robot is, and no matter whether the object is packaged, palletized, or bound/connected to other objects.

15. If an object being moved is NOT held by or linked to the Robot when a task attempt is terminated, the object stays where it is on the field. If an object IS held by or linked to the Robot when a task attempt is terminated, there are two possibilities: 1) Objects that originated in Base are kept by the exhibitor for another task attempt. 2) Objects that did not originate in Base are taken off the playing field by the referee (and do not score). This rule applies to all objects, including scoring objects, projectiles, props, tools, and agents of any kind.
16. Objects in the way of future task attempts can be removed from the field by the referee upon request unless doing so would have a direct effect on scoring.
17. Refer to the Robot Position diagram. If a task attempt is terminated while all functional parts of the Robot are completely out of Base as shown in positions F and G, the exhibitor must bring the Robot by hand to the Starting Position for the next task attempt. Because of this action, one penalty is assessed, but accomplishments made during the Mission Attempt are retained. Mission Attempts terminated in positions A through E do not result in a penalty, and there is no loss if the Robot happens to be out of Base when the Match ends.
18. At any time during the match, the exhibitor may recover Robot parts that come off as an obvious result of damage or disintegration. The exhibitor may do this by hand or request help from the referee.
19. The exhibitor may not touch task objects outside of Base. If they are activated, damaged, or otherwise disturbed between task attempts or by anything but valid Robot action, the referee restores them as soon as possible. If it is obvious to the referee that task object damage is part of exhibitor strategy, no points are awarded for related tasks, and the object may be removed for the rest of the match.
20. To minimize controversy about what happened during a match, **THE SCORE IS DETERMINED AT THE END OF THE MATCH, BY THE CONDITION OF THE FIELD AT THAT TIME ONLY.** This means that points won't be awarded for accomplishments that the Robot accidentally trashes before the match ends. If the thickness of a line on the field comes into question, and for other situations that are "too close to call" the exhibitor is given the benefit of the doubt. Scores from each Round are independent, and only a exhibitor's best score counts.
21. The "Terms & Rules" are superseded by the "Challenge Tasks" when the two conflict.
22. Decisions of the judges are final and binding.
23. The complete Canine Companion Challenge Task List is on the following page.

Canine Companion Challenge

For the fourth time this week, the housekeeper at the Goodwin estate has quit because their adorable 200-pound St. Bernard has trashed the place... again. Mr. Goodwin is losing hair and sleep over the problem. He can't bear to part with the dog, but he's having more and more trouble finding people who are willing to keep the place clean for any amount of money!

Mrs. Goodwin, however, has heard about your Canine Companion robot through a friend, and wants to know if the robot could perhaps be adapted to serve as a robotic housekeeper for the Goodwin family and their dog. The robot would have to do a few basic chores to be able to keep up with the dog!

The following are the required tasks that the Canine Companion robot must complete. Please keep in mind that the tasks do not necessarily need to be completed in a specific order unless specified in the task description.

Tasks:

Your robot must be able to perform the following tasks on a game board modeled after the Mini mansion:

- Stay in low-power mode until the sound of a barking dog indicates that the robot will be needed.
- Move through the house cleaning up after everything the dog has done this time.
 - The dog has knocked over the trash... so the robot must push all the trash over into the dumpster area.
 - The dog has also tracked mud through the house... the robot must follow the trail as far as it goes, cleaning it up along the way (fortunately, the bottom of the robot automatically cleans any spot the robot passes over).
- After all the mischief, the dog is waiting at the door to be walked... the robot needs to walk it one full lap around the yard.
- The robot must throw the dog's ball for a quick game of fetch.
- The dog also ate all its food... the robot should fill the food bowl with the food that is right next to it.
- After this, the robot must then return to its waiting spot, and wait for the next time it's needed.

Some additional notes and requirements:

- The robot has to be able to do everything to take care of the house and the dog, but not necessarily all in one run, or using only one program. Each task or few tasks can be done with a different program, just so long as everything gets done!

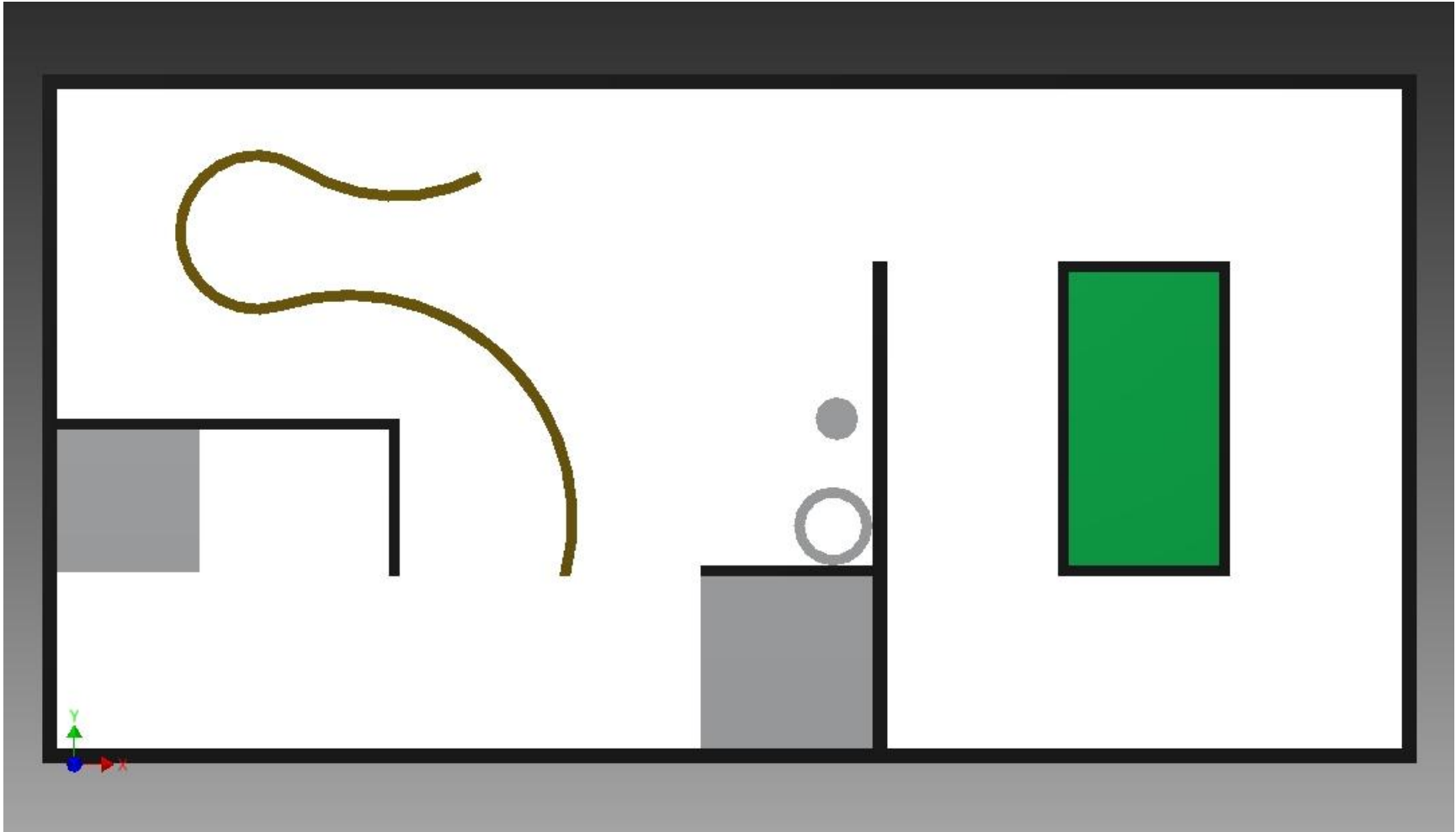
Canine Companion Challenge

Game Board

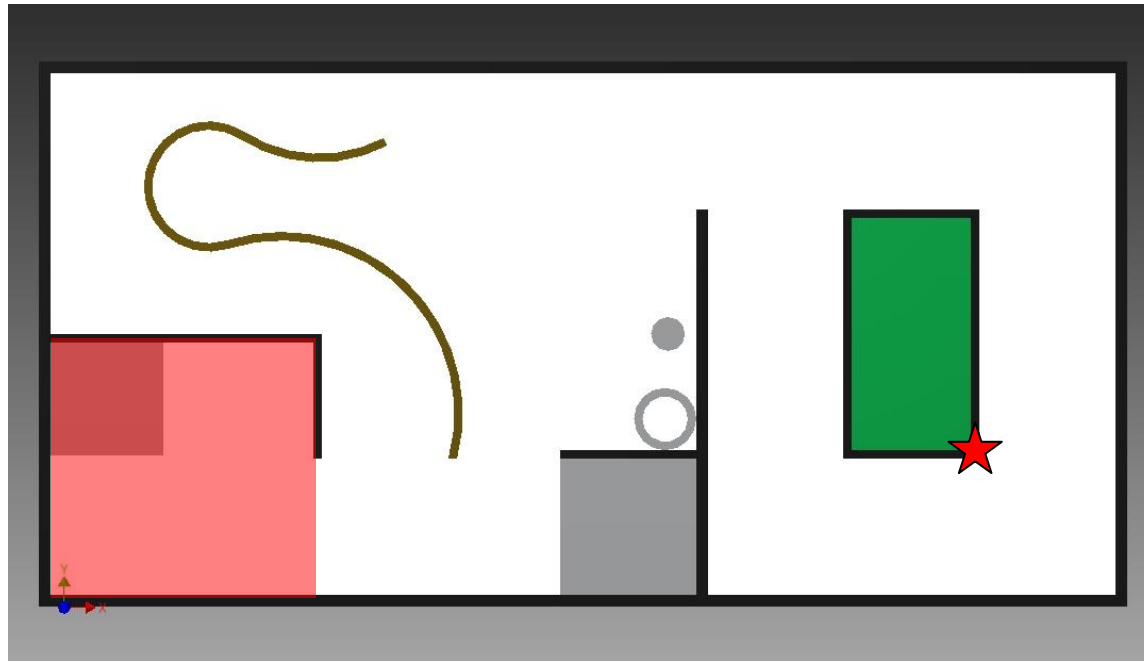
Painted on $\frac{3}{4}$ " Plywood with the playing field is painted flat white with flat black lines




The colors are Color Place Paint from Wal-mart as follows:

Gray - Flat Weathered Tin, Brown - Flat Brownie, Green - Flat Rhubarb Leaf



Canine Companion Challenge



<p>Task 2: Trash Cleanup</p> <ul style="list-style-type: none"> robot must push all the trash into the dumpster area <ul style="list-style-type: none"> 5 points per piece 	<p>The trash will be represented by the following:</p> <ul style="list-style-type: none"> 3- 1/2" Schedule 40 PVC Tees 4- 1/2" Schedule 40 PVC Elbows <p>The "trash" will be placed randomly in the area of the red square shown in the diagram above.</p>	
<p>Task 4: Walk the Dog</p> <ul style="list-style-type: none"> The robot throws/hits the dog's ball. -10 pts. 	<p>The ball will be represented by a ping pong ball placed on top of a 1/2" Schedule 40 PVC Coupler. The Coupler will be placed on the game board at the location of red star in the diagram above. Knocking over the coupler when the ball is "thrown/hit" will result in one penalty.</p>	
<p>Task 5: Feed the Dog</p> <ul style="list-style-type: none"> The robot moves the food onto the food bowl. - 20 pts. 	<p>The dog food will be represented by a single 1 1/4 "Schedule 40 PVC Coupler stood on end.</p>	

Score Sheet - Canine Companion Challenge

EXHIBITOR: _____

4-H CLUB: _____ COUNTY: _____

Tasks	Points Possible	Points Round 1	Points Round 2	Points Round 3
Task 1: Woof-woof <ul style="list-style-type: none"> Stay in low-power mode until the barking dog indicates that the robot will be needed – 15 pts. 	15			
Task 2: Trash Cleanup <ul style="list-style-type: none"> robot must push all the trash into the dumpster area <ul style="list-style-type: none"> 5 points per piece 	35			
Task 3: Mud Trail <ul style="list-style-type: none"> The robot follows the trail as far as it goes. – 30 pts. 	30			
Task 4: Walk the Dog <ul style="list-style-type: none"> The robot walks one full lap around the yard. – 20 pts. The robot throws/hits the dog's ball. -10 pts. 	30			
Task 5: Feed the Dog <ul style="list-style-type: none"> The robot moves the food onto the food bowl. – 20 pts. 	20			
Task 6: Robot in Base <ul style="list-style-type: none"> Robot must then return to its waiting spot, (base) and wait for the next time it's needed. – 15 pts. 	15			
Penalty <ul style="list-style-type: none"> Number of times the robot crossed a thick black line or is handled by a exhibitor member outside base. Knocking over the coupler when hitting the ball. <p>_____ x -2 pts. ea.</p>				
Totals	145			

Highest Total: _____