# **Teacher Notes: Smart Housekeeping Board Challenge**

Introduction to Mobile Robotics > End of Project Activities > Board Challenge

## **Overview:**

This challenge is best accomplished through lots of planning as well as trial and error. It encompasses most of the skills that students have amassed over the course of the Robotics Engineering lessons, but also requires skills that students may have difficulty with, mainly project management and organizational skills. More structure may be needed if students have particular problems working on their own, but the class period can be left fairly unstructured for groups who work well on the challenge at hand.

## **Keeping Track of Student Work:**

Included on the Teacher CD is a printable "Project Journal" page for students to fill out at the end of the class period. You may want to have each student complete one for each day they work with their team on the challenge. These journals provide a good reference for assessment purposes.

### **Rules:**

The rules associated with this challenge are intentionally left very open. It is up to you as the teacher to decide what "counts" and what doesn't when it comes to specifics on the board. For instance, if a group does not sweep *all* of the LEGO pieces into the dumpster, it is for you to decide whether they have fully completed the task or not.

Whatever rules you set should be written down in a centralized list so that all groups can refer back to them. One of the worst things you can do is to unintentionally set different rules for each group, so keeping a centralized list will help organize the rules and avoid this possibility.

## **Success Indicators:**

There is no one "answer" to this challenge. There are many possible ways to complete the necessary tasks. As such, a single "answer key" is both impossible to write as well as useless when evaluating this activity. Instead, look for these success indicators:

- Acceptable completion of at least one of the four tasks. This indicates that students divided the overall problem into smaller parts, and, in the time allotted, were able to find a solution to at least one.
- Made an attempt at all four tasks. This indicates that the group took in the scope of the challenge as a whole, and did not focus solely on the first task until they had it perfect. Note that if you do absolutely require that groups will have made at least an attempt at all four tasks to receive credit for the project, make sure you inform the students of this.
- Successful completion of all four tasks. If a group has had their robot complete all four tasks according to the rules of your classroom, this should be considered extremely successful.
- Division of labor within the team. Using all of a team's resources (including its members) in the best possible way is a very difficult skill for children. Even dividing up the necessary tasks within the team should be seen as a positive indicator in this direction. Make sure that every team member has a job or task.

#### **TEACHER Notes**

 Creative design solutions. Check to see if the students physically augmented their Personal Assistant robot to complete some of the tasks, such as adding an arm to sweep the trash into the dumpster. Not all of the tasks can be accomplished with the Personal Assistant robot unmodified.

## **Helpful Tips:**

- Programs written to complete multiple tasks will be very long, and you may run out of space on the NXT. If this happens, encourage students to divide their programs into smaller programs that attack individual tasks. You can also increase space on the NXT by deleting the "Try Me" programs that are loaded onto the brick with the firmware (see the Deleting Files videos in the NXT Menus section of Basics on the student CD).
- Encourage students to program their robots using the Move block rather than the Motor block. The Move block takes up less space on the NXT and can encompass a behavior that it takes several Motor blocks to create.
- Have students use sequential development techniques when attacking the challenge. Choose one task to start with, and make sure that task is well in hand before attention shifts to the next task. If students have divided the labor to tackle individual tasks, make sure one task is the group's priority to complete before competition day.
- Testing is key. Even the most well-thought out program will not behave exactly as planned the first time you put the robot down on the board. Have students test their robots and test them often. Also, encourage students to test their programs in small pieces. Rather then putting the robot down and running a program to do all of the tasks, have them test to see if the robot can get from place A to B first, and then from B to C, etc.
- Make sure every student in a group has a task. Students that are idle can disrupt their own team as well as others in the classroom.
- The Light Sensor cannot sense the red tape. With the floodlight on, the Light Sensor reads the light reflected from red tape the same as it reads a white board. This way, the red tape is a visual border to the "house" on the board, but students will not be able to have robots "track" it like any other color line. If you wish your students to be able to sense the line, substitute a different color tape in place of the red tape.
- Check on student progress often. Ask each group what it is they are trying to accomplish at least once per class period while they are working on the challenge. You can use this as an opportunity to guide them away from strategies that you feel may not work, or lead them towards ideas that may help them. Involvement is up to you, but make sure to take an active role in this challenge, especially with younger students, to keep everyone focused and on task.
- Similar to other board-type competitions, you may want to assign a point value to each task or sub-task, and require a minimum amount of points to receive credit for the challenge. This will allow students to prioritize which tasks to tackle first and which to leave for later, based on their strategy for accumulating points. This also is an easy way to give "partial credit" for tasks not fully completed. For example, you could assign 50 points if you walk the dog all the way around the yard, but 15 if you get the dog all the way outside of the house. And 3 points per piece of trash that makes it all the way into the dumpster, with another 10 points if they get all 8 pieces in.