# Lab 4: Harvesting Contest

Team 2

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## Introduction

The objective of this week's lab was to find food and "harvest" it for sixty seconds and afterwards find its way back home as fast as it can. The foods were made up of RF transponders and colored pieces of paper, which the RFID sensor and color sensor were used to detect. Home was then designated by a different colored piece of paper. Teams were scored on the amount and type of food that was found and the amount of time it took for the robot to make it home.

## Hardware and Software Design

On the hardware side, for this lab we completely redesigned our robot. Instead of having the NXT brick upright on an angle we decided to lay it flat. There are a couple of reasons that we decided to do rebuild it this way. The first was that we wanted it to be easier to attach the different sensors onto our robot. The second reason was due to the field that our robot would be roaming in and what the contest entailed, we wanted our robot to be low to the ground so that it could be easier to harvest the items.

On the software side, we set up different tasks to account for all the sensors, finding home, and harvesting the different types of food. The color sensor read the different colored food items and when it found one, the robot played a tone notifying that a food item was found. The RFID task did the same thing as the color sensor. For the sonar sensor we had it see if the robot was close to a wall and if it was it would turn the robot around so that it could continue to harvest. For the harvesting task, we made the robot alternate left and right after moving forward for a short period of time so that it could cover as much of the arena as possible. The last task that we had was find home. This task was simple due to the fact home was static as well as we knew the location of home. After harvesting for one minute, we had a trigger that would have the robot go straight until it found a wall, then the robot turned the same direction until it found home.

## Problems and Solution

The first problem that was encountered was inaccurate readings from our color sensor. It was unable to distinguish the difference between the home color and the track color. We discovered that it was due to the position and orientation of the color sensor. This problem was resolved by consulting the manufacturer's website and discovering what the appropriate distance and angle were.

The second major problem that occurred was that the robot would detect a false positive reading for isHome() whenever the color sensor would hit the side of the arena. We ended up creating a rail guard so that the color sensor would not run into the side of the arena anymore.

## Unsolved Problems

We had a couple of unsolved problems with this lab. The first was that we could not get an algorithm that consistently performed well during the find home section of the competition. We either found home very quickly or it would miss it and then run a couple of laps around the arena before it found it. We tried tweaking the angle at which it rotated, but did not find much success. One solution that we could have implemented that another team did, was to have the robot arch towards the wall again after it rotated away from the wall. This would ensure that it would not cut the corner where home was located, therefore, allowing it to find it on the first lap.

**Contest Results**

Since we did not pick up many object and took our robot a couple tries to find home, we placed second to last in the competition.

**Conclusion**

In conclusion, our robot did not perform the way we hoped. This was due to the fact that our find home task was not accurate because our robot did not make complete 90 degree turns at each section of the walls. Also, our sound that the robot made was too low so we could not tell if it detected any food or not. Due to these problems we did poorly in the contest.

**Appendix**

Please see the link “Harvest_Lab.nxc” for the code for Lab 4.