Food Harvesting

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Problem
For the first 60 seconds of operation, the robot must search for "food" which consists of small pieces of colored paper and small RFID cards. The robot must beep and display a message when it detects a piece of "food." Then, in the next 60 seconds, it must find a black square in the center of the field as quickly as possible.

Robot Design
Our robot has the lab's original sweeping sensor design which uses a third motor to slowly sweep the sensor across an area as wide as the robot chassis. The ultrasonic rangefinders are positioned diagonally, 45 degrees from the front of the robot.

Method
Throughout operation, the arm slowly sweeps the area in front of the robot. The current clock time is compared to the start clock time continuously to check the robot's current mode of operation. In the first mode of operation the robot searches for all kinds of food and announces its findings. In the second mode, however, the robot increases its speed and searches only for the black square and stops suddenly when the square is found. Throughout the entire scenario, the robot uses the following procedure for searching.

The robot proceeds forward until either ultrasonic sensor reading is below 24. Then it turns away from the sensed obstacle until the range exceeds 24. The robot's angular momentum keeps it turning slightly after it stops actively turning. It then continues on a forward course. If both sensors register reading below 24 simultaneously it turns in a random direction until they are not both within that

Problems
The speed at which the sensors can detect food is too slow for the robot to cover the entire surface of the field within 60 seconds given the size of the pieces of food. With larger food or more sensitive sensors, this task would be easier to perform within one minute.

Additionally, the rangefinders occasionally fail to sense distance correctly, causing the robot to collide with the exterior wall.

Results
The RFID sensor was not fully plugged in, so it did not read any of the RFID chips. It did detect two of the colored squares. It also found the home in about thirty seconds. Although this duration was significantly longer than expected, it did manage to exhibit its reliable capability of returning to the home. Usually, this process takes about five seconds to complete.